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The digitainability of the European agri-food system: New challenges and opportunities for business decision-making across system-, chain and network-, and firm-levels

EDITORIAL

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IFAMA is actively working to coordinate opportunities for collaboration with its regional chapters, recognize and support their work, and offer all IFAMA members opportunities to benefit from these activities. At the same time, IFAMA intends to profile its journal - the IFAMR, and its annual World Congress with broad participation of fellow European researchers. To pursue these objectives, IFAMA and IFAMA Europe boards have decided to publish an annual “IFAMA Europe Special Issue” of IFAMR focusing on hotly discussed topics of European agri-food systems. Thematic Guest Editors will edit the Special Issue.

Two major trends affect simultaneously agriculture and agrifood businesses: sustainability transition and digital transformation (Chkarat *et al.*, 2023; Lichtenthaler, 2021). This topic, sometimes coined as digitainability (Gupta *et al.*, 2020; Pellegrini *et al.*, 2023) concentrates one of the most powerful phenomena affecting the future of agribusiness and food industries, in Europe and all over the world. These two trends of sustainability and digitalization have their own logic, based upon internal and external forces, such as societal demands, disruptive strategies of newcomers and startups, innovative strategies of conventional companies, policy-driven decisions, globalization of the supply chains as well as the rise of short agrifood distribution channels. How these two powerful and long-lasting trends combine, and with which rationale? What are the specificities of Europe on this issue? What are, what will be, the consequences of digital sustainability for business models of agribusiness, food industries and agriculture? What are the strategies of in-house companies? Of external companies, more especially in the development of digital services and global digital

platforms? Business decision-making around those questions is complex and involves system level, chain & network level, and firm level thinking.

This IFAMA Europe Special Issue of IFAMR has welcomed contributions centered on one country, inter-European comparisons, and comparisons between European and non-European situations. It has also welcomed research that focuses on Europe testimonies from managers, original case studies, and inter sectors comparisons. The contributions are also focused on original theories and methodologies dealing with this topic of digital sustainability.

The themes and topics of this Special Issue can be organized around three subjects.

(1) System-level thinking: Multi-stakeholder perspectives on the role of systemic digital innovations in the digitainability of the European agri-food system: (a) Socio-technical innovation bundling for digital sustainability in the European agri-food system. (b) Diffusion of systemic digitainable innovations to the mainstream in the European agri-food system. (c) Globalization vs territorialization in the process of agri-food system digitainability

(2) Chain and network-level thinking: Digitainable innovation – organization – fit in agri-food supply/value chain networks. (a) Innovative organizational structures to facilitate collaboration with competitors for transparency in digitainable agri-food supply/value chain networks. (b) Relational multiplexity in digitainable agri-food supply chain network management. (c) Best practices in agri-food supply chain network governance on the digital road towards due diligence?

(3) Firm-level thinking: Agri-food entrepreneurship and digital business models for sustainability in innovation ecosystems. (a) Certification schemes digitainability processes. (b) EU policy (including Green Deal, CAP reform and CSDDD) as driver and/or barrier businesses for companies' sustainability? (c) Scaling up the agri-food digital digitainable transformation of agri-food businesses via business model innovation.

Laura Eline Slot, Mechthild Donner and Fatima El Hadad-Gauthier show in their article “*How can digitalisation contribute to sustainability of business models in agri-food value chains? – a systematic literature review*” that the expectations of digital technologies in sustainable agricultural development are considerable. However, applying these technologies in agri-food value chains can have downsides, which are still barely studied. The main objectives of this systematic literature review are to discover the state of the art of the research in the use of digital technologies in business models contributing to sustainability in the agri-food sector, and to make recommendations for future research and management practice. In order to bring concepts together and develop a theoretical framework and advance knowledge, performing a literature review is conducive. Here, the commonly-used PRISMA-method was used to develop a systematic literature review. From this review, an overview of business model innovations, and drivers, benefits and drawbacks of digitalisation in agri-food value chains were distinguished. Key themes found in the literature were the effects of COVID-19 on digitalisation and business resilience, the economic sustainability of business models, and the importance of communication technologies in agri-food value chains. This article recommends for future research and management practice to use a framework that looks through a value co-creation and open innovation perspective to the individual business model level and the interaction between (sustainable) business models in local and global food systems.

In their article “*The Transformative Team-Up of Emergent Strategies and Dynamic Capabilities – Guiding Agrifood Organizations Through Change*” Katharina K. Mybes and Jon H. Hanf propose a new view of the theoretical frameworks of Teece’s dynamic capabilities and Mintzberg’s emergent strategy. Merging both of these concepts into one framework provides insight into their reciprocal relationship.

Situations are highlighted in which these two concepts can support an organization and aid during periods of internal and external change and disruption, currently presenting to the agricultural sector by demanding advances in digitalization and sustainability, termed digitainability. This article is relevant to management scholars and management practitioners alike. Providing an extension of the theoretical frameworks, the article presents organizational and individual factors aiding both concepts, and areas of further investigation to fully understand the mechanics behind emergent strategies and dynamic capabilities. With the understanding of impactful factors, organizational leaders will learn how they can support their organization for such times, as well as fostering innovation to sustain a competitive advantage within the agrifood market environment.

Constantine Ilioupoulos, Irini Theodorakopoulou, Thomas Giotis and Gianluca Brunori focus their article “*The perception of costs and benefits of farm digitalization in Europe*” on how farm digitalization is transforming agriculture by enhancing productivity, sustainability, and efficiency through advanced technologies like sensors, AI, and data platforms. However, its adoption generates both opportunities and challenges, shaped by stakeholders’ diverse perceptions of costs and benefits. This article explores these dynamics using insights from 18 living labs across Europe, where farmers, policymakers, and technology providers co-developed digital solutions. Findings reveal digitalization’s potential to optimize decision-making, promote sustainability, and foster innovative business models while also highlighting significant financial, social, and operational barriers. Economic concerns – such as high initial costs, unequal access, and fears of technological obsolescence – emerged as critical adoption barriers, particularly for small farms. Non-economic challenges include steep learning curves, trust deficits, and the risk of alienating farmers from hands-on practices. The study underscores the need for inclusive policies, targeted financial support, infrastructure development, and farmer-centered training programs to address these challenges. By fostering trust, collaboration, and equitable access, stakeholders can ensure that farm digitalization benefits all, aligning with European sustainability goals. This article offers actionable insights for policymakers, agribusiness leaders, and researchers seeking to navigate the complexities of digital transformation in agriculture.

The article “*Identification of financing and sponsorship models for a legume-specific market information dashboard through LLM-supported analyses of qualitative expert interviews*” by Dennis Köpp, Tanja Schäfer, Hendrik Bertram, Petra Zerhuse-Blecher, Mehmet Gültas and Marcus Mergenthaler, provides an in-depth analysis of niche markets such as the European legume market, where transparency is crucial to promote competitive conditions and enable informed decisions. The LeguDash dashboard aims to increase the transparency of the legume market through a publicly accessible and interactive information platform thereby facilitating legume cultivation and increasing sustainability in cropping systems. Guideline-based qualitative interviews with selected experts were conducted to discuss financing and sponsorship models. The interviews were subjected to qualitative content analysis, both manually and using a Large Language Model (LLM)-based methodology. ChatGPT were used for the LLM-supported analysis. As a result of the interviews, various financing and sponsorship models were proposed, including public funding, subscription-based paid content with a paywall and a model where companies provide data in exchange for free access. Flexible, customizable solutions that can be integrated into existing systems are required. Methodologically, the LLM-supported content analysis of the qualitative data material provided valuable - partly inconsistent and partly corrective - insights. These insights can be used to fine-tune manual analysis characterized by specialist context knowledge beyond the immediate interview content. LLM-enriched manual analysis can potentially enable a deeper and more contextually appropriate analysis of the qualitative data. Therefore, LLM-assisted analyses of qualitative interviews seem promising to complement manual qualitative research for agribusinesses.

Maryna Kovalova, Vladislav Valentinov and Taras Gagalyuk examine in their article “*Societal value creation through digital technologies: Insights from stakeholder collaborations of Ukrainian*

agroholdings” the rapid adoption of digital technologies by Ukrainian agroholdings, highlighting the transformative potential of agrifood digitainability, where digital innovation and sustainability intersect within agricultural practices through diverse stakeholder collaborations. We introduce a conceptual framework that categorizes firm-stakeholder interactions across two dimensions – primary versus secondary stakeholders and value creation versus legitimacy – capturing the complexity of these engagements. This framework redefines the concept of societal value creation, particularly emphasizing stakeholders traditionally classified as “secondary” within stakeholder theory. Their empirical analysis reveals that collaborations with both primary and secondary stakeholders generate significant social and environmental benefits, repositioning secondary stakeholders as active contributors to firm value creation. They argue that by treating secondary stakeholders as co-creators of societal value, agrifood firms can harness digital technologies to achieve both competitive advantage and enhanced legitimacy within their stakeholder environment.

Monika Ivaylova Varbanova, Marcia Dutra de Barcellos, Milena Kirova, Hans De Steur and Xavier Gellynck, in their article “*Sustainably Implementing Agriculture 4.0 in SME Manufacturing Companies in Eastern Europe: A Case Study from Bulgaria*”, show that the European Union’s new paradigm of “growing sustainably” underscores the urgent need to complete its digital and green transformation. This study investigates how the integration of digital transformation and sustainability—termed “digitainability”—can be effectively implemented in small and medium-sized enterprises (SMEs) within Eastern Europe. By exploring multi-stakeholder perspectives, their research identifies the systemic digital innovations that can enhance the implementation of Agriculture 4.0. The article is structured into three stages: Stage 1 conducts a thorough literature review to identify successful factors and barriers related to the digital transition of SMEs in Europe; Stage 2 proposes a conceptual framework that evaluates the synergistic potential of these factors and outlines a step-by-step business model tailored for agri-food SMEs; and Stage 3 validates this model through a case study based on qualitative assessments from semi-structured interviews with company owners and managers. Findings reveal that while innovative agri-food companies in Eastern Europe are increasingly adopting smart technologies to mitigate climate change impacts, there remains a significant gap in their understanding of Industry 4.0 concepts. This research contributes to the discourse on digitainability by offering practical insights for SMEs aiming to leverage digital tools for sustainable growth in an evolving market landscape.

In their article “*Digitalisation and Sustainability in the Armenian Wine Sector: Challenges and Opportunities*”, Jochen Heussner and Jon Hanf show that Armenia’s wine sector, steeped in a 6000-year-old vinicultural heritage, is undergoing a profound shift as it contends with modern-day pressures of sustainability and digitalization. This article examines the sector through the lens of “digitainability,” exploring how emerging technologies from IoT sensors to Artificial Intelligence to blockchain-based traceability can address systemic issues, including fragmented supply chains, financial constraints, and inconsistent quality standards. Findings reveal significant disparities in digital literacy and resource availability between large and small producers. While larger wineries exhibit higher adoption rates of digital tools, smaller producers face considerable financial and infrastructural barriers. The study also highlights opportunities for wineries to leverage digital solutions for enhanced resource efficiency, market differentiation, and sustainable growth. However, challenges remain, including limited policy support, inadequate technical knowledge, and concerns over the return on investment in digital infrastructure. This research contributes to both academic and practical discussions. From a theoretical perspective, it enriches the understanding of digital transformation in transitioning economies, drawing on concepts from the Resource-Based View and Dynamic Capabilities frameworks. For industry practitioners and policymakers, it provides actionable recommendations such as investing in digital literacy programs, fostering collaborative knowledge-sharing platforms, and integrating digital solutions with global sustainability initiatives like the European Green Deal. By illustrating how Armenian wineries navigate the intersection of

tradition, economic transition, and technological innovation, the article shed light on broader lessons in the global agri-food domain.

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