FEELING READY? THE INTERPLAY BETWEEN DIGITAL READINESS AND SUSTAINABLE GROWTH IN THE EUROPEAN FOOD INDUSTRY.

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Abstract

In the face of the challenging demography, nutrition, and climate change crises, the world needs to achieve tangible steps toward a sustainable food system while at the same time increasing its production to meet the growing demand (Hassoun, Aït-Kaddour, et al., 2022). In this context, the agriculture and food (Agri&Food) firms must produce without interruption, healthy, safe, tasty, affordable, and sustainable food (Van Mil et al., 2014). Currently, the food system is too consuming, too polluting and too wasteful in terms of natural resources (Hassoun, Prieto, et al., 2022). If no change is made, the food system will not be able to provide safe, healthy, nutritious products to the increasing population within planetary boundaries (Marvin et al., 2022). Thus, a shift towards food system sustainability is essential and innovative solutions are urgently needed (Hassoun, Prieto, et al., 2022). It is important to note that, the production of food relies on the access to resources (i.e., land, energy, fresh water, or soil nutrients). Current degradation and use of these resources surmount their regeneration rate (Bindraban et al., 2012; Molden et al., 2007). In addition, the production of food causes emissions that deteriorate the planet environmental layers (Rockström et al., 2009). To reduce the production impact while ensuring the needs of current and future generations, the United Nations defined, in 2015, Sustainable Development Goals (SDGs). SDGs are highly entangled with the food system and call for a change of both its model of governance and structure (Hassoun, Prieto, et al., 2022). A systemic approach is essential to hit the transition and achieve the SDGs. In Europe SDGs have been translated through the EU Green Deal (European Commission, 2023). EU Green deal intend to transform the EU into a cutting-edge community, resource-efficient and economically competitive; ensuring to reach zero net emissions of greenhouse gases by 2050. Scholars have demonstrated that digitalisation represents great potential to succeed in this transition; thus recommending to combine the EU Green Deal with the Digital strategy vision (Marvin et al., 2022). Indeed, digitalisation, alluded to as the use of computer technologies and ICT, is providing innovative opportunities to sort out current challenges and opening up new avenues of growth (Hassoun, Prieto, et al., 2022; Nasution et al., 2018; Soomro et al., 2020). Expectations regarding the possibilities offered by digitalisation to achieve SDGs are rather high (Beier et al., 2021). To leverage at best the benefits offered by digitalisation, firms need to ensure and measure their digital readiness (Soomro et al., 2020). In this context, the concept of digital readiness interlinked with sustainable growth is attracting increasing interest but remains understudied (Denicolai et al., 2021; Trischler & Li-Ying, 2022). In particular, we lack a clear overview of the

link between digital readiness mechanisms and its impacts on sustainable growth options. In other words, scholars have not addressed how digital readiness favours or inhibits future real growth options particularly in the context of sustainable growth (Denicolai et al., 2021).

Over the past years, many scholars have investigated the importance of sustainability and sustainable development and how to achieve SDGs (Beier et al., 2021; Johnson & Schaltegger, 2016). The concept of sustainability refers to the ability to support current development without compromising future needs (Zaccai, 2012). For one stream of research, sustainability is the process of achieving sustainable development (Sartori & Silva, 2014), and for another, sustainable development is the journey to fulfil sustainability (Lozano, 2008). Both are based on the ''three pillars approach'' which refer to the need to balance economic, environmental and social objectives (Zaccai, 2012). From the business perspective, it refers to the firms' strategies and activities implemented to achieve the three integrated goals (Yusoff et al., 2018). Sustainable growth is a derived concept, referring to the application of the three pillars to achieve long-term perspective of growth (Doane & MacGillivray, 2001). Digitalisation, can support in this direction and help firms enlarge their business in a sustainable way (Szabó et al., 2023). For example, scholars have demonstrated that implementing and using tools such as cloud computing, Internet of Things (IoT), or wireless sensor networks, can improve the management of a supply chain. Findings, even reveal a reduction in costs and an improvement in service ensuring sustainable growth (Kittichotsatsawat et al., 2021). In a nutshell, digitalisation is transforming the entire industry structure, the nature of competition, and stakeholders' limits, exposing them to new opportunities (Ciasullo et al., 2022; A. Ferreira et al., 2022; Hervé et al., 2020; Soomro et al., 2020). Digitalisation is the result of three interlinked components of digital technologies: 1) digital artefacts (a digital component such as a digital content which is part of an offer and brings value to the user), 2) digital infrastructures (a set of digital tools that offer computing capabilities), and 3) digital platforms (a set of shared services) (J. J. M. Ferreira et al., 2023). To leverage the three components of digital technologies, firms need to ensure and measure their digital readiness (Soomro et al., 2020). Digital readiness is defined as the ability of a firm to embrace and use digital technologies (Denicolai et al., 2021), thus embracing digitalisation. Previous studies, highlight the need to align digital readiness goals with the business strategy. Firms are struggling to reach their objectives due to their lack of digital readiness (Machado et al., 2020). To measure firms' digital readiness, and as a result the gaps that need to be filled, multiple scales have been developed (Soomro et al., 2020). However, we lack an overview of how the readiness results impact sustainable development options (Denicolai et al., 2021). Knowing that, it is of concern to better understand the impacts of digital

readiness on possible sustainable growth directions (Denicolai et al., 2021). Reviewing the existing literature, conceptualising the field and identifying future research directions will be a first step in that direction (Tranfield et al., 2003; S. S. Xiao et al., 2020). Essentially, to advance knowledge, scholars must access a holistic view of what is already known and thus build their research on prior existing work. Among the different methods for reviewing the literature, the integrative one allows to screen, critique, and synthetise an exhaustive part of the literature to develop new perspectives. This method combines both the strengths of narrative review (discovery process) with the power of systematic approaches to minimise bias and improve transparency (Fan et al., 2022). Therefore, we define a clear methodology regarding our search criteria (cf. Table 1) and our selection criteria. By doing so we aim to outline 1) where we select our literature (SCOPUS and Web Of Sciences to ensure the best coverage), 2) when we conduct our research (up until September 2023), 3) how we find the articles (selection of keyword to capture conceptual boundaries connected with Boolean operators), 4) what data-set we will select, and 5) why we will include or exclude some articles (Callahan, 2010)

Table 1: Combination of keywords use to select the articles

String 1		String 2		String 3
"digital readiness*" OR "digital maturity" OR "digitalization*" OR "digital" OR "digitalisation*" OR "digital transformation" OR "information and communication technolog*" OR "industry 4.0"	**AND**	"sustainable growth*" OR "sustainable business model*" OR "sustainable business*" OR "sustainabilit*"	**AND**	"food industr*" OR "food sector*" OR "food compan*"

While scholars have focused on the role of digitalisation on sustainable transition and growth, little attention has been paid on digital readiness in this context. This study will be a first attempt to present a holistic framework from a food system perspective of the topic and identify future research directions. To the best of our knowledge, this research is one of the first to connect the two streams of research (digital readiness and sustainable growth) in terms of

sustainable growth effects. We are still at an early stage of our research but our first findings seem to confirm the importance for firms in the food industry to evaluated their digital readiness to achieve their sustainable growth objectives. In addition, our study should leads us to several recommendations for future research directions.

We believe that results shall benefits scholars, managers and policy makers. From a scholarly perspective, we will provide a better understanding of the relevant concepts to investigate the link between digital readiness and sustainable growth, thus allowing to achieve sustainable objectives. From a managerial perspective the paper will provide insights to face the food system challenges. From a European policy perspective, these insights will help in modernizing the policies and answering the EC European Green Deal communication leveraging the Digital Strategy vision.

Keywords: Digital readiness; Sustainability; Growth options; Food industry

REFERENCES

Beier, G., Niehoff, S., & Hoffmann, M. (2021). Industry 4.0 : A step towards achieving the SDGs? A critical literature review. *Discover Sustainability*, *2*(1), 22. https://doi.org/10.1007/s43621-021-00030-1

Bindraban, P. S., Van Der Velde, M., Ye, L., Van Den Berg, M., Materechera, S., Kiba, D. I., Tamene, L., Ragnarsdóttir, K. V., Jongschaap, R., Hoogmoed, M., Hoogmoed, W., Van Beek, C., & Van Lynden, G. (2012). Assessing the impact of soil degradation on food production. *Current Opinion in Environmental Sustainability*, *4*(5), 478-488. https://doi.org/10.1016/j.cosust.2012.09.015

Callahan, J. L. (2010). Constructing a Manuscript : Distinguishing Integrative Literature Reviews and Conceptual and Theory Articles. *Human Resource Development Review*, *9*(3), 300-304. https://doi.org/10.1177/1534484310371492

Ciasullo, M. V., Montera, R., Mercuri, F., & Mugova, S. (2022). When Digitalization Meets Omnichannel in International Markets : A Case Study from the Agri-Food Industry. *Administrative Sciences*, *12*(2), 68. https://doi.org/10.3390/admsci12020068

Denicolai, S., Zucchella, A., & Magnani, G. (2021). Internationalization, digitalization, and sustainability : Are SMEs ready? A survey on synergies and substituting effects among growth paths. *Technological Forecasting and Social Change*, *166*, 120650. https://doi.org/10.1016/j.techfore.2021.120650

Doane, D., & MacGillivray, A. (2001). *Economic Sustainability The business of staying in business*.

European Commission. (2023). *A European Green Deal Striving to be the first climate-neutral continent*. Commission Europa. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

Fan, D., Breslin, D., Callahan, J. L., & Iszatt-White, M. (2022). Advancing literature review methodology through rigour, generativity, scope and transparency. *International Journal of Management Reviews*, *24*(2), 171-180. https://doi.org/10.1111/ijmr.12291

Ferreira, A., Franco, M., & Haase, H. (2022). Strategic alliances and development of intellectual capital : A study of technology-based SMEs. In *INTERNATIONAL JOURNAL OF ORGANIZATIONAL ANALYSIS* (Vol. 30, Numéro 6, p. 1644-1671). EMERALD GROUP PUBLISHING LTD. https://doi.org/10.1108/IJOA-10-2020-2440

Ferreira, J. J. M., Fernandes, C. I., & Mota Veiga, P. (2023). The role of entrepreneurial ecosystems in the SME internationalization. *Journal of Business Research*, *157*, 113603. https://doi.org/10.1016/j.jbusres.2022.113603

Hassoun, A., Aït-Kaddour, A., Abu-Mahfouz, A. M., Rathod, N. B., Bader, F., Barba, F. J., Biancolillo, A., Cropotova, J., Galanakis, C. M., Jambrak, A. R., Lorenzo, J. M., Måge, I., Ozogul, F., & Regenstein, J. (2022). The fourth industrial revolution in the food industry—Part I : Industry 4.0 technologies. *Critical Reviews in Food Science and Nutrition*, 1-17. https://doi.org/10.1080/10408398.2022.2034735

Hassoun, A., Prieto, M. A., Carpena, M., Bouzembrak, Y., Marvin, H. J. P., Pallarés, N., Barba, F. J., Punia Bangar, S., Chaudhary, V., Ibrahim, S., & Bono, G. (2022). Exploring the role of green and Industry 4.0 technologies in achieving sustainable development goals in food sectors. *Food Research International*, *162*, 112068. https://doi.org/10.1016/j.foodres.2022.112068

Hervé, A., Schmitt, C., & Baldegger, R. (2020). Internationalization and Digitalization : Applying digital technologies to the internationalization process of small and medium-sized enterprises. *Technology Innovation Management Review*, *10*(7), 28-40. https://doi.org/10.22215/timreview/1373

Johnson, M. P., & Schaltegger, S. (2016). Two Decades of Sustainability Management Tools for SMEs : How Far Have We Come? In *JOURNAL OF SMALL BUSINESS MANAGEMENT* (Vol. 54, Numéro 2, p. 481-505). TAYLOR & FRANCIS INC. https://doi.org/10.1111/jsbm.12154

Kittichotsatsawat, Y., Jangkrajarng, V., & Tippayawong, K. Y. (2021). Enhancing Coffee Supply Chain towards Sustainable Growth with Big Data and Modern Agricultural Technologies. *Sustainability*, *13*(8), 4593. https://doi.org/10.3390/su13084593

Lozano, R. (2008). Envisioning sustainability three-dimensionally. *Journal of Cleaner Production*.

Machado, C. G., Almström, P., Öberg, A. E., Kurdve, M., & Almashalah, S. Y. (2020). Maturity Framework Enabling Organizational Digital Readiness. In K. Säfsten & F. Elgh (Éds.), *Advances in Transdisciplinary Engineering*. IOS Press. https://doi.org/10.3233/ATDE200204

Marvin, H. J. P., Bouzembrak, Y., Van Der Fels-Klerx, H. J., Kempenaar, C., Veerkamp, R., Chauhan, A., Stroosnijder, S., Top, J., Simsek-Senel, G., Vrolijk, H., Knibbe, W. J., Zhang, L., Boom, R., & Tekinerdogan, B. (2022). Digitalisation and Artificial Intelligence for sustainable food systems. *Trends in Food Science & Technology*, *120*, 344-348. https://doi.org/10.1016/j.tifs.2022.01.020

Molden, D., International Water Management Institute, & Comprehensive Assessment of Water Management in Agriculture (Program) (Éds.). (2007). *Water for food, water for life : A comprehensive assessment of water management in agriculture*. Earthscan.

Nasution, R. A., Rusnandi, L. S. L., Qodariah, E., Arnita, D., & Windasari, N. A. (2018). The Evaluation of Digital Readiness Concept : Existing Models and Future Directions. *The Asian*

Journal of Technology Management (AJTM), *11*(2), 94-117. https://doi.org/10.12695/ajtm.2018.11.2.3

Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S. I., Lambin, E., Lenton, T. M., Scheffer, M., Folke, C., Schellnhuber, H. J., Nykvist, B., De Wit, C. A., Hughes, T., Van Der Leeuw, S., Rodhe, H., Sörlin, S., Snyder, P. K., Costanza, R., Svedin, U., … Foley, J. (2009). Planetary Boundaries : Exploring the Safe Operating Space for Humanity. *Ecology and Society*, *14*(2), art32. https://doi.org/10.5751/ES-03180-140232

Sartori, S., & Silva, F. L. D. (2014). *Sustainability and sustainable development : A taxonomy in the field of literature*. *1*.

Soomro, M. A., Hizam-Hanafiah, M., & Abdullah, N. L. (2020). *Digital readiness models : A systematic literature review*. *9*(4), 3596-3605.

Szabó, R. Z., Szedmák, B., Tajti, A., & Bera, P. (2023). Environmental Sustainability, Digitalisation, and the Entrepreneurial Perception of Distances as Drivers of SMEs' Internationalisation. *Sustainability*, *15*(3), 2487. https://doi.org/10.3390/su15032487

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. *British Journal of Management*, *14*(3), 207-222. https://doi.org/10.1111/1467-8551.00375

Trischler, M. F. G., & Li-Ying, J. (2022). Exploring the relationship between multi-dimensional digital readiness and digital transformation outcomes. *International Journal of Innovation Management*, *26*(03), 2240014. https://doi.org/10.1142/S136391962240014X

Van Mil, H. G. J., Foegeding, E. A., Windhab, E. J., Perrot, N., & Van Der Linden, E. (2014). A complex system approach to address world challenges in food and agriculture. *Trends in Food Science & Technology*, *40*(1), 20-32. https://doi.org/10.1016/j.tifs.2014.07.005

Xiao, S. S., Lew, Y. K., & Park, B. I. (2020). International Network Searching, Learning, and Explorative Capability : Small and Medium-sized Enterprises from China. In *MANAGEMENT INTERNATIONAL REVIEW* (Vol. 60, Numéros 4, SI, p. 597-621). SPRINGER HEIDELBERG. https://doi.org/10.1007/s11575-020-00426-7

Xiao, Y., & Watson, M. (2019). Guidance on Conducting a Systematic Literature Review. *Journal of Planning Education and Research*, *39*(1), Article 1. https://doi.org/10.1177/0739456X17723971

Yusoff, T., Wahab, S. A., Latiff, A. S. A., Osman, S. I. W., Zawawi, N. F. M., & Fazal, S. A. (2018). Sustainable Growth in SMEs : A Review from the Malaysian Perspective. *Journal of Management and Sustainability*, *8*(3), 43. https://doi.org/10.5539/jms.v8n3p43

Zaccai, E. (2012). Over two decades in pursuit of sustainable development Influence, transformations, limits. *Environmental Development*.