Digital Innovation for a Sustainable Economy

Timo Phillip Böttcher
Technical University of Munich
Timo.Boettcher@tum.de

Andreas Hein
Technical University of Munich
Andreas.Hein@tum.de

Maximilian Schreieck
University of Innsbruck
Maximilian.Schreieck@uibk.ac.at

Helmut Krcmar
Technical University of Munich
Helmut.Krcmar@tum.de

1. Introduction

Sustainability has emerged as one of society's most urgent challenges, requiring transformational changes to business practices that have contributed to climate change, biodiversity loss, and social inequality (United Nations, 2015). Companies across sectors are responding through strategic initiatives to develop more ecologically and socially responsible business models (Böttcher, Empelmann, et al., 2023; Böttcher, Petry, et al., 2023; Schreieck et al., 2017). Digital technologies like artificial intelligence, blockchain, the Internet of Things, and big data analytics enable innovations to drive sustainability across organizational functions and value chains (Block et al., 2022; Khan et al., 2023; Kotlarsky et al., 2023; Paiola et al., 2021; Schoormann et al., 2023; Schreieck et al., 2017).

The "triple-bottom-line" defines sustainability as economic, ecological, and social sustainability (Elkington, 1998). However, digital innovation and transformation research focuses heavily on the economic sustainability of organizations while putting ecological and social perspectives on the sidelines (Vial, 2019). On the contrary, information systems research on ecologic sustainability, known as Green IS, has primarily focused on specific optimizations of emissions reduction using digital technology (Zeiss et al., 2021), while it has rarely addressed social sustainability explicitly. Similarly, companies have been slow to adopt environmentally and socially sustainable practices, often resorting to superficial efforts such as greenwashing and carbon offsetting instead of integrating all three elements of sustainability into their core business logic (Day et al., 2023; Delmas & Burbano, 2011). The discourse on balancing economic, social, and environmental objectives is nascent, with many companies still in the early stages of implementing and scaling digital sustainability initiatives (Böttcher, Empelmann, et al., 2023; George et al., 2020; Schoormann et al., 2023).

To support the digital transformation for sustainability, we need theories, conceptual frameworks, and empirical insights from cutting-edge research on digital innovation for a sustainable economy (Böttcher, Empelmann, et al., 2023; Foss & Saebi, 2017; Gregori & Holzmann, 2020; Kotlarsky et al., 2023; Leidner et al., 2022; Melville, 2010). Therefore, this minitrack aims to advance scholarly conversations on how digital innovation can support the transition toward a sustainable economy. Specifically, we called for submissions that discuss how digital technologies can be leveraged to increase efficiency, transparency, and connectivity for reducing resource use, carbon emissions, and waste. This scope includes designing sustainable business models, engaging customers and stakeholders, and measuring impact.

2. The 2024 minitrack

This minitrack facilitates cross-sectoral knowledge sharing on digital sustainability trends, best practices, lessons learned, and future outlooks. The two papers in this year's minitrack session explore how digital technologies like artificial intelligence, blockchain, and analytics can be leveraged to promote sustainability and circular economy goals. A key theme connects the two contributions—the importance of considering the entire lifecycle of digital systems to ensure they are designed and implemented in an ecologically responsible manner. Both papers take a solutions-focused approach, providing insights and guidelines that businesses and researchers can apply when developing sustainable digital innovations.

The first paper, "Meta-requirements for the Design of a Blockchain-enabled Multi-sided Platform for Sustainability and Circular Economy," by Buyssens and

URI: https://hdl.handle.net/10125/106901
978-0-9981331-7-1
(CC BY-NC-ND 4.0)

Viaene (2024) conducts a systematic literature review to identify requirements for designing a blockchain-enabled multi-sided platform that integrates circular economy principles. It derives six meta-requirements related to traceability, smart contracts, incentives, transparency, collaboration, and efficiency. The requirements emphasize the need for blockchain platforms to enhance trust, accountability, and environmental performance across transactions. The work contributes by bridging blockchain and sustainability research, offering considerations for building systems that minimize ecological footprints.

The second paper "Towards Sustainability of AI: A Systematic Review of Existing Life Cycle Assessment Approaches and Key Environmental Impact Parameters of Artificial Intelligence" by Dokic et al. (2024) reviews approaches for conducting lifecycle assessments of AI systems to understand their sustainability implications. It finds that the energy and emissions from hardware like data centers are critical impact factors along the AI lifecycle. The paper calls for more holistic lifecycle assessment methods tailored to AI, considering both direct operational impacts and emissions from manufacturing the required infrastructure. It underscores the urgency of standardized sustainability measurement frameworks as AI proliferates globally.

Overall, the two papers demonstrate digital innovation has potential for sustainability but must be guided by scientific insights on lifecycle impacts. They provide complementary recommendations—one targeted at blockchain system design and the other focused on AI impact measurement. Together, the works advance understanding of how to build ecologically and socially responsible information systems.

3. References

Block, C., Rennings, M., & Bröring, S. (2022). Selecting technologies to engage in sustainability transitions—A multi-stakeholder perspective [Article; Early Access]. *Business Strategy and the Environment*, 27.

Böttcher, T. P., Empelmann, S., Weking, J., Hein, A., & Krcmar, H. (2023). Digital Sustainable Business Models: Using Digital Technology to Integrate Sustainability into the Core of Business Models. *Information Systems Journal*(Early Access).

Böttcher, T. P., Petry, J., Weking, J., & Hein, A. (2023). Balancing on the Triple-Bottom-Line: Tensions in the Success Factors of Digital Business Models for Sustainability. 56. Hawaii International Conference on System Sciences, Maui, HI, USA.

Buyssens, H., & Viaene, S. (2024). Meta-requirements for the Design of a Blockchain-enabled Multi-sided Platform for Sustainability and Circular Economy. 57th Hawaii International Conference on System Sciences (HICSS), Honolulu, HI, USA.

Day, T., Mooldijk, S., Smit, S., Posada, E., Hans, F., Fearnehough, H., Kachi, A., Warnecke, C., Kuramochi, T., & Höhne, N. (2023). *Corporate climate responsibility monitor 2023*. https://newclimate.org/sites/default/files/2023-04/NewClimate_CorporateClimateResponsibilityMonitor2023_Feb23.pdf

Delmas, M. A., & Burbano, V. C. (2011). The Drivers of Greenwashing [Article]. *California Management Review*, *54*(1), 64-+.

Dokic, D., Groen in't Woud, F., & Maass, W. (2024). Towards Sustainability of AI: A Systematic Review of Existing Life Cycle Assessment Approaches and Key Environmental Impact Parameters of Artificial Intelligence. 57th Hawaii International Conference on Service Sciences (HICSS), Honolulu, HI, USA.

Elkington, J. (1998). Partnerships from cannibals with forks: The triple bottom line of 21st-century business. *Environmental Quality Management*, *8*(1), 37–51.

Foss, N. J., & Saebi, T. (2017). Fifteen Years of Research on Business Model Innovation. *Journal of Management*, *43*(1), 200-227.

George, G., Merrill, R. K., & Schillebeeckx, S. J. D. (2020). Digital Sustainability and Entrepreneurship: How Digital Innovations Are Helping Tackle Climate Change and Sustainable Development. *Entrepreneurship Theory and Practice*, *45*(5), 999-1027.

Gregori, P., & Holzmann, P. (2020). Digital sustainable entrepreneurship: A business model perspective on embedding digital technologies for social and environmental value creation. *Journal of Cleaner Production*, *272*, Article 122817.

Khan, I. S., Ahmad, M. O., & Majava, J. (2023). Industry 4.0 innovations and their implications: An evaluation from sustainable development perspective [Article]. *Journal of Cleaner Production*, *405*, 14, Article 137006.

Kotlarsky, J., Oshri, I., & Sekulic, N. (2023). Digital Sustainability in Information Systems Research: Conceptual Foundations and Future Directions. *Journal of the Association for Information Systems*, *24*(4), 936-952.

Leidner, D. E., Sutanto, J., & Goutas, L. (2022). Multifarious Roles and Conflicts on an Interorganizational Green IS [Article]. *MIS Quarterly*, *46*(1), 591-608.

Melville, N. P. (2010). Information Systems Innovation for Environmental Sustainability [Article]. *MIS Quarterly*, *34*(1), 1-21.

Paiola, M., Schiavone, F., Grandinetti, R., & Chen, J. (2021). Digital servitization and sustainability through networking: Some evidences from IoT-based business models. *Journal of Business Research*, *132*, 507-516.

Schoormann, T., Strobel, G., Möller, F., Petrik, D., & Zschech, P. (2023). Artificial Intelligence for Sustainability—A Systematic Review of Information Systems Literature. *Communications of the Association for Information Systems*, *52*(1), 199 – 237.

Schreieck, M., Wiesche, M., & Krcmar, H. (2017). Governing nonprofit platform ecosystems – an information platform for refugees. *Information Technology for Development*, *23*(3), 618-643.

United Nations. (2015). *Transforming our world: the 2030 agenda for sustainable development*. https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *Journal of Strategic Information Systems*, *28*(2), 118-144.

Zeiss, R., Ixmeier, A., Recker, J., & Kranz, J. (2021). Mobilising information systems scholarship for a circular economy: Review, synthesis, and directions for future research. *Information Systems Journal*, *31*(1), 148-183.