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Designing Algorithms for Circular Business: Are We On The Right Track?

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Algorithms in combination with Artificial Intelligence (AI), Internet-of-Things (IoT), and Token and Blockchain infrastructure will have the potential to develop the next generation circular business models (Van Heck, 2021). These models can provide the basic needs for all people (food, work, housing, health, water) within the means of the living planet (pollution, biodiversity loss, carbon loading), see Raworth, 2017. In our research at Erasmus University, we developed and tested several algorithms in field experiments together with entrepreneurial partners. Examples include algorithms for an electric carsharing company to combine grid balance with customer mobility (Kahlen et al., 2018), for a supermarket chain to balance time slots to customers with operational sustainability (Agatz et al., 2021), and for flower auctioneers to balance revenue with distribution efficiency (Lu et al., 2019). This TREO talk will discuss five IS research challenges to carve out the right track that is needed to develop algorithms for circular business: (1) Nowadays most algorithms are stand-alone. Next-generation algorithms will need to collaborate with each other to support the reuse and recycling of material flows in complex circular business ecosystems. (2) Most algorithms are profit driven. Circular business models focus on people, planet, and prosperity and algorithms need to be designed with these new objective functions. (3) Research on algorithm accountability and responsible usage AI is progressing, but more research is needed on the operationalization of explainable AI and the accountability towards humans needs and the living planet. (4) AI and Algorithms, and IT in general, do have a terrible footprint, see Hao (2019). Next generation algorithms will need to be designed with a net zero carbon footprint. (5) Algorithms are mostly designed from a human-centric AI perspective. In circular business hybrid forms of human-machine interaction and collaboration will be needed, see Fügener et al. (2021).

References
Agatz, N., Fan, Y., Stam, D. (2021). The Impact of Green Labels on Time Slot Choice and Operational Sustainability. *Production and Operations Management*, 30(7), 2285-2303.
Fügener, A., Grahl, J., Gupta, A., Ketter, W. (2021). Will Humans-in-the-Loop Become Borgs? Merits and Pitfalls of Working with AI. *MIS Quarterly*, 45(3), 1527-1556.
Hao. K. (2019). Training a Single AI Model Can Emit as Much Carbon as Five Cars in Their Lifetimes. *MIT Technology Review*, 6 June 2019.
Kahlen, M., Ketter, W., van Dalen, J. (2018). Electric Vehicle Virtual Power Plant Dilemma: Grid Balancing versus Customer Mobility. *Production and Operations Management*, *27*(11), 2054-2070.
Lu Y., Gupta, A., Ketter, W., van Heck, E. (2019). Dynamic Decision Making in Sequential Business-to-Business Auctions: A Structural Econometric Approach. *Management Science* 65(8), 3853-3876.
Raworth, K. (2017). *Doughnut Economics*, Random House, London, United Kingdom.
Van Heck, E. (2021). *Technology Meets Flowers: Unlocking the Circular and Digital Economy*, Springer Nature, Cham, Switzerland.

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