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Editorial: Digitalization in providing products and services for sustainability

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Editorial on the Research Topic
Digitalization in providing products and services for sustainability

Product service systems (PSSs) contribute to keeping societies up and running in good and bad times, such as the COVID-19 outbreak. PSS research on how to make business models more sustainable and organizations more resilient has advanced substantially; see recent review articles (Zhou and Song, 2021; Brissaud et al., 2022). Consumers and organizations are searching for solutions to enhance sustainability awareness and practice. Current business models and PSSs of most companies have not been designed with sustainability as a top priority in mind. Digitalization may provide new pathways to promote more sustainable products and services, and PSSs. This Research Topic aims to provide some insights into creating and implementing sustainability-oriented PSSs.

This special issue has four articles. The first one is "Development of Online Needs-Based Workshop Support System in a Pandemic", by Murata et al., which concerns how to achieve sustainable consumption and production patterns considering value—a key concept in PSSs. The authors discuss the living-sphere approach that aims to design products for a target living sphere by determining the sufficiency of fundamental human needs among local residents. The Max-Neef framework was applied to develop an online needs-based workshop support system that builds upon digital collaboration tools. The system was tested in Japan, and it was working as designed. The results showed the online sessions functioned as a replacement for in-person sessions during the recent pandemic.

The second article "Sustainable in Action: From Intention to Environmentally Friendly Practices in Makerspaces Based on the Theory of Reasoned Action", by Klemichen et al. explains how makerspaces can promote social-ecological changes in society. The physical and social spaces of a makerspace are where participants can ideate and innovate. The newly created knowledge is spread outside the makerspace. Makerspaces have the potential to create and spread sustainability knowledge and awareness using physical and digital tools. Makers are aware of sustainable development, however, makerspaces are characterized by high consumption of resources. It is important to consider the consumption of resources in the early design phase by considering environmental aspects as early as possible. The authors discuss the ecoMaker project that combined engineering processes and sustainability knowledge in the maker scene. The framework was co-developed with makers and applied in makerspaces for products and services according to the open-source approach.

The third article in this Research Topic is "A computational approach to evaluating curricular alignment to the united nations sustainable development goals" by Lemarchand et al. a. The article discusses how the SDGs are embedded in university curriculums. This article presents a natural language processing-based technique that was used to analyze university curriculums according to their SDG links. The technique develops a sustainability lexicon of root keywords and applies Term Frequency–Inverse Document Frequency methods to sustainability documents. The approach described in the article offers a basis for evaluating the embeddedness of sustainability in university curriculums.

The fourth article, "An evaluation of a computational technique for measuring the embeddedness of sustainability in the curriculum aligned to AASHE-STARS and the United Nations Sustainable Development Goals" by Lemarchand et al. b argues that universities increasingly need to assess their curriculums' alignment to the SDGs. This article presents a study where the technique described in the 3rd article of this Research Topic was applied to analyze 5,773 modules in a university's curriculum portfolio according to sustainability themes. With the strategic objective of systematically assessing the sustainability content of taught curricula, it is critical to evaluate the precision and accuracy of the computed results in order to attribute text to the appropriate SDGs and level of sustainability embeddedness. This article evaluates the precision and accuracy of the technique by comparing the results against a manual expert interpretation of a sample of modules.

The articles of this special issue introduce advances toward sustainable PSSs via digitalization, namely the development of university curriculums for sustainability, virtual collaboration, and increasing sustainability awareness among innovators and product developers. Digitalization is ubiquitous in our lives as providers of products and services as well as consumers thereof. When we analyze the whole spectrum of PSSs from both angles, we can quickly realize that there is so much research to be performed on our way toward more sustainable PSSs.

Author contributions

All authors co-wrote this editorial together. All authors contributed to the article and approved the submitted version.

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Conflict of interest

Publisher's note

References

Brissaud, D., Sakao, T., Riel, A., and Erkoyuncu, J. A. (2022). Designing value-driven solutions: the evolution of industrial product-service systems. *CIRP Ann. Manufact. Technol.* 71, 553–575. doi: 10.1016/j.cirp.2022.05.006

Zhou, C., and Song, W. (2021). Digitalization as a way forward: a bibliometric analysis of 20 years of servitization research. *J. Clean. Product.* 300, 126943. doi: 10.1016/j.jclepro.2021.126943