

Introducing Strategic Decision Support Systems for Sustainable Product-Service Development across Value Chains

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Abstract

There is growing consensus among the world's scientific community that society is currently on a course that is unsustainable. This is partly due to product-related impacts like climate change through high use of fossil-based energy, human health problems due to toxic materials, or unfair labor practices. The sustainability of products could be improved on at least two levels: by designing out unsustainable aspects of products or by changing the way that products interact with society. One urgent problem we see is that companies do not have a systematic approach for incorporating sustainability criteria into their decision support systems (DSS).

Given this, what would a strategic decision support system (SDSS) look like that more systematically incorporates (1) a focus on sustainability, (2) a broader approach to meeting needs by product-service systems, and (3) interfaces that are targeted toward specific groups of decision makers i.e. product developers or business unit managers? Furthermore, how could such an SDSS be implemented not only at an individual company, but also for a value chain?

This article intends to give preliminary answers to these questions that will then be further investigated in a coming research project.

To incorporate sustainability, we anticipate the SDSS being structured by a framework for strategic sustainable development that provides a principle-based definition of sustainability and a systematic method to identify problems and solutions by backcasting from that definition. Further, the SDSS will likely provide opportunities to consider trade-offs in shifting from product-only focus to a focus on product-service systems. Additionally, the SDSS interfaces are expected to be flexible in design and implementation so that they can be incorporated into business and product developers' existing decision-making processes. They will likely be formed around an optional built-in product development process and include

interfaces toward increasingly specific in-depth tools within areas like life cycle modeling, technical simulation and investment calculus.

We expect implementation to start with an overview study of existing tools and methods for sustainability integration and onsite case studies with product developers and business-related decision-makers in companies. The case studies will include identifying the gap between the company's current DSS and an envisioned SDSS and then identify ways to close that gap. From these specific experiences we will draw generic guidelines for how other companies could implement a SDSS. We expect that broader implementation of the SDSS throughout value chains would be facilitated by including a mechanism for knowledge management that allows for both proprietary knowledge to remain confidential while sharing relevant knowledge and experiences that allow for optimization at a value chain scale.