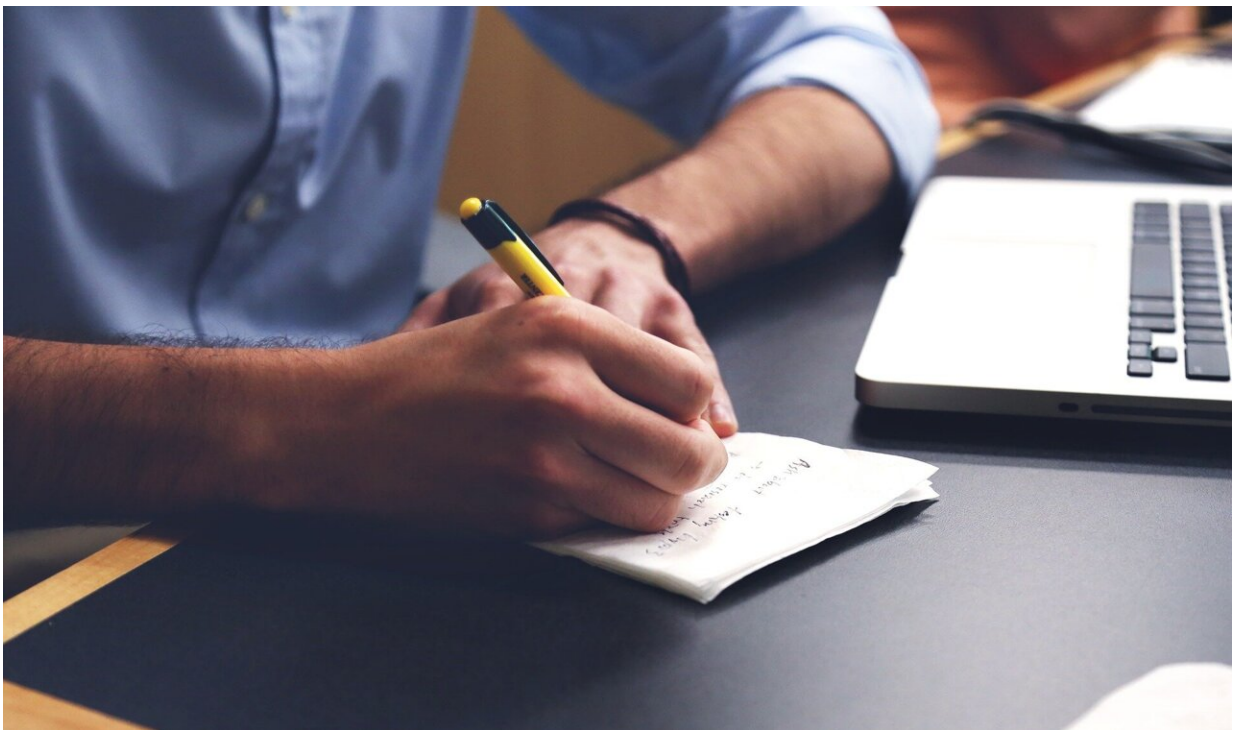# Companies can improve the sustainability of their products in the earliest product-design stages

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Credit: Pixabay/CC0 Public Domain

An interdisciplinary team of researchers from Lithuanian and Italian universities propose a tool that allows companies to assess the circularity of their future products. The self-assessment tool emphasizes the co-creation of circular design in the early (creative) stages of product

development, encouraging entrepreneurs and designers to think more systematically and collaborate better by integrating related stakeholders into the product development process. The study is published in the *Journal of Industrial Ecology*.

"The majority of existing practical tools (systems of indicators) are aimed at measuring the environmental impact of products already in the market. Many companies are aware of sustainability and circularity, but they need skills and tools, which can help develop sustainable new products," says Lina Dagilienė, professor at Kaunas University of Technology (KTU) School of Economics and Business.

A circular product design framework (CD-Framework) and a self-assessment tool (CD-Tool), co-created with researchers from KTU, Politecnico di Milano and business companies, are aimed at product developers, designers, and entrepreneurs. The CD-Framework consists of 10 categories; the additional questions focus on certain products' specific aspects and add interactivity.

Circular solutions: Win-win for businesses and society

"The systemic thinking based structured information was one of the advantages identified by the companies who participated in our research. Our tools helped them understand how they could practically include circularity in their products. For example, by changing the packaging and production materials or including additional services in a circular business model," says Prof. Dagilienė.

According to the researchers, product or service design can become a catalyst of circular transition. Dagilienė says that the focus on product design reflects an eco-friendly mindset which aims to prevent damage,

rather than to manage the consequences of irresponsible behavior.

"The growing amount of waste, pollution, noise, and diminishing biodiversity is the price that society pays for the environmentally harmful production. Our circular design tools emphasize the importance of planetary boundaries and promote the systemic attitude towards new product development among current and future entrepreneurs," says Prof. Dagilienė, Principal Researcher at the Digitalization research group at the KTU School of Economics and Business.

In contrast to the linear mindset, the [circular economy](#) (CE) can be linked with the idea of Spaceship Earth, where humans must find their place within a cyclical ecological system. The CE emphasizes a win-win between the environment and business activity. According to Dagilienė, such a mindset can be beneficial to businesses as it allows them to create a unique value proposition for their customers.

"Moreover, in the context of stricter environmental policies and ever-present greenwashing, implementation of real circular innovations in the processes and products becomes increasingly important. For that, companies need knowledge and skills," says the KTU researcher.

Bridges the gap between research and practice

The [study](#), which resulted in the circular design framework and tool included practitioners from business in the process. The researchers were observing the companies applying the tool and registered the challenges they faced. According to Dagilienė, it is important to design a [user-friendly](#), uncomplicated instrument without compromising its content.

"The research-practice gap can be described through forest and tree metaphor. While a practitioner cares about a specific tree and its

qualities, a researcher will always be interested in the whole forest, its growth tendencies and other characteristics. Similarly, when developing new products, business practitioners require fast, specific solutions for their products, whereas researchers are developing systems, which focus on general tendencies, instead of individual needs of one company," explains Dagilienė.

The study by researchers of KTU School of Economics and Business bridges the gap between research and business. The circular design pre-accelerator took four months—during this time, eight workshops were organized, led by experts from different fields of sustainable new product development.

In total, the pre-accelerator received 62 applications to become participants or experts; 48 novel concepts underwent rigorous evaluation and 16 proposals for further engagement were selected. Finally, 10 circular or sustainable ideas completed the pre-accelerator program.

"The majority of the participants were small companies, as they have less human and financial resources, and similar activities allow them to renew their knowledge and share their practices with the representatives from other branches of industry," says Dagilienė.

During the action research of pre-accelerator, the scientists were collecting data (expert diaries, focus groups, interviews) from the participants. According to Dagilienė, networking, sharing knowledge, expanding outlook were the main benefits of the activity as reported by the practitioners.

Users' acceptance of circular products is related to storytelling

"The majority of the tested ideas represented techno cycle of product development—handbags, saunas, campervans, educational toys, candles, cardboard furniture. However, we also had the ideas about database of sustainable suppliers in film production, and products made from buckwheat hulls," says Dagilienė.

She emphasizes that the development of a circular product benefits from design-thinking approach, which involves the final user in the product design process. This helps to create products, which are attractive to the final user, and understand what the customers value in these products.

"For example, we observed that users' acceptance of circular products (especially repaired, recycled ones) is closely linked to visual representation and storytelling," says Dagilienė.

Usually, circular or sustainable products are more expensive (or they are not circular). That is why it is important to understand the needs of the consumer from the very first stages of product development.

"The business needs to know for what their customer is ready to pay more. However, it is also essential to ensure that circular economy solutions would not create social injustice, which would happen if they were affordable only to those with higher income," emphasizes Prof. Dagilienė.

To avoid this, an extensive analysis of the customers' needs and expectations must be undertaken, together with experimenting with products and business models.

The self-assessment tool for circular product design (CD-Tool) co-created by interdisciplinary team of scientists from KTU and Politecnico di Milano in collaboration with businesses is available on circuloop.lt website.

More information: Lina Dagilienė et al, Developing a circular design framework: Co-creation and validation of a circular product and service design tool, *Journal of Industrial Ecology* (2024). DOI: 10.1111/jiec.13494

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