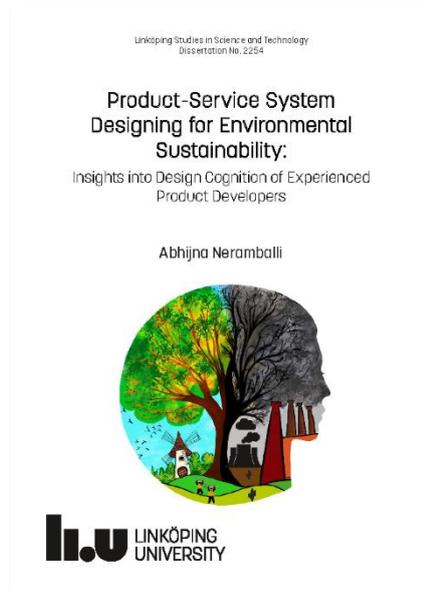




MISTRA
Resource-Efficient and
Effective Solutions

New dissertation helps companies design for environmental sustainability

Abhijna Neramballi (2022) Product-Service System Designing for Environmental Sustainability: Insights into Design Cognition of Experienced Product Developers, PhD dissertation. Linköping, Linköping University Electronic Press.



In a recently published dissertation from Linköping University, Abhijna Neramballi from Mistra REES shows how companies in the manufacturing industry can transition from traditional product designing to designing product-service system (PSSs) and become circular and resource-efficient. Abhijna has studied the cognition of experienced product developers conceptually designing PSSs for resource efficiency and tried to understand how it is different from traditional product designing.

In a PSS, both products and services are designed and integrated with a systems perspective to offer functional performance, as opposed to conventional manufacturers, who design, develop, and ultimately sell a product. PSSs offer more business opportunities for the manufacturers, who can sell a service or functionality but keep ownership of the product. The idea is that the provider will maintain the product components for a longer time than a customer would normally do, thereby extending the lifetime of the product or component and reducing environmental impacts.

Several companies and more than 68 experienced product developers have been involved during Abhijna's five years of research. The research, based on laboratory sessions, reveals that the designing of PSSs for environmental sustainability is different compared to typical product designing on a cognitive level, and, therefore, designers need dedicated design support for the former. Three design support tools were developed based on the improved understanding of the cognitive characteristics of PSS designing, aiming at supporting companies in their design process.

"We also found that one of the tools, the procedural guidance, was guiding designers' thinking while designing, as it supported them to apply a wider life cycle perspective and the ability to design product-service system more effectively".

The second tool, called lifecycle function deployment (LFD), translates environmental requirements into requirements for the design and supports effective and efficient decision-making. The third is a knowledge base that helps designers to determine which product and service elements can be integrated based on best practices. Both tools have been shown to help designers reduce environmental impact, which is a goal of Abhijna's research – to help companies design circular and resource-efficient solutions and contribute in the transition to a resource-efficient and climate-smart society.