

Editorial

Product-Service Systems: reviewing achievements and refining the research agenda

Abstract

This special issue on *Product-Service Systems: reviewing achievements and refining the research agenda* shows the progress that has been made in the PSS field in the last decade, including various national and international research projects and companies' initiatives, important achievements and gaps at theoretical and practical levels. Most of the papers can be of interest to practitioners, company managers and consultants, since they present methods and tools for helping companies to shift towards PSS in environmentally sound ways and to evaluate the outcomes of the shift. In addition, this issue can be of interest to the research community since it evaluates the progress in the PSS field and outlines a future research agenda.

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1. Introduction

One of the important issues in modern world is concern for the state of the environment and anxiety about the long-term sustainability of the society at large. Technological improvements seem to be able to contribute to potential improvement of the situation to some extent, but the final outcome of the efforts very much depends upon such soft issues as consumer behaviour, servicing products and economies, as well as on established and emerging institutions. A concept of Product-Service Systems suggests the need to link hard and soft issues such as technology and sociology, products and services, and to view existing environmental problems from a systemic perspective. In order to find holistic solutions to these problems, the concept of Product-Service Systems (PSS) calls for the development of multidisciplinary approaches that require inputs from a broad range of disciplines, such as economics, management, environmental studies, sociology, psychology, product design and engineering.

This special issue on *Product-Service Systems: reviewing achievements and refining the research agenda* provides an overview of the development in the PSS field, highlights important achievements, identifies gaps, and outlines a future research agenda. This issue is composed of 10 papers that

present results of finalised research in the PSS field, which are of particular importance for practitioners, company managers and researchers.

The topics of the papers in this special issue address the interest and the need to help companies to shift towards more service-oriented solutions in environmentally sound ways. The majority of the papers present methods, methodologies and tools for companies to design scenarios of new business models or parts of them, such as additional services, or to evaluate the outcomes of the shift towards PSS. The papers also reflect an important trend of expanding the scope of PSS and similar research from focusing on manufacturing companies towards studying service companies, the main business model of which is to develop and deliver services.

Most of the papers were presented in draft form during one of the conferences organized within the framework of the EU-funded Thematic Network Sustainable Product Development Network (SusProNet) that existed between 2002 and 2004. In addition to a PSS state of the art book [1], this special issue is one of the scientific results of the Network.

As an overview of the contents of this special issue, please note that the 10 papers are divided into six categories. The first category focuses on factors that affect transfer and application of PSS and is represented by one paper (Cook, M.B. et al.).

The second category presents methodologies for designing product-service systems in companies and includes three papers, one each by (Maxwell, D. et al.), (Aurich, J.C. et al.), and (Morelli, N.). The third category contains a paper that develops a material for communication about product-service systems (Krucken, L. and A. Meroni), while the fourth category presents a scenario-based case study of a product-service system for baby prams (Mont, O. et al.). The fifth category is devoted to developing methodologies for evaluating three PSS cases and includes the three papers that discuss a leasing system for electronic and electric equipment (Tasaki, T. et al.), services provided to households (Halme, M. et al.), and Local Exchange Trading Systems (Briceno, T. and S. Stagl). The sixth category contains the paper by A. Tukker, and U. Tischner, which summarises the results achieved in the PSS field in the last decade and discusses future directions for research and practical applications.

The more detailed introduction of the contents of the individual articles is presented in the following sections.

The paper by M. Cook, T. Bhamra and M. Lemon addresses an important issue that although the ideas of selling function instead of product and diversifying products with services has been developed and employed by a number of companies, the PSS concept, with the environmental rationale, have been largely conceptualised in academia. In order to address the gap of transferring environmentally adopted PSS to business reality, certain support for businesses is needed. The paper contributes to closing this gap by providing a rationale for the transfer of the PSS concept from academia to industry in the United Kingdom. The authors report the findings of research conducted as part of the SOLiD project. It combines the theoretical approach with case study research and develops a framework that should help companies to shift towards product-service systems.

The paper by D. Maxwell, W. Sheate and R. van der Vorst draws on experiences from the project, which developed a pragmatic approach for supporting Sustainable Product and/or Service Development in industry. The approach incorporates life cycle thinking, ecodesign and strategies for improving social performance. Implementation of the SPSD approach was tested in industry and conclusions were made based upon the effectiveness of the suggested strategies. In addition, the paper identifies key success factors that relate to functional and systems issues.

The following paper by J.C. Aurich, C. Fuchs and C. Wagenknecht develops a process for the systematic design of technical services for supporting products. The authors combine the product engineering with service engineering and conclude that for integrated PSS engineering, intuitive approaches for the design of technical services must be replaced by systematic design processes, which for acceptance reasons within the enterprise, must be comparable with already well established product design processes. In addition, the authors argue that the allocation of specific service design tasks to the regional and local service providers in the extended value creation network must be systematically supported in order to flexibly meet changing customer requirements. The paper tests

the developed process in a case study of a company that produces heavy road construction machines.

The contribution from N. Morelli proposes methods for mapping the actors that are or should be involved in developing and delivering PSS, methods to define the requirements and structure of a PSS and methods to represent and blueprint a PSS. The proposed methods were tested in design exercises developed within cooperative research projects and in academic curricula. The proposed tools pay special attention to the existence and the level of development of infrastructures in specific locations for which PSS are designed. The author identifies tools that exist in other than design disciplines, which may help to incorporate cultural and social norms into product-service design. He also argues for combinations of the existing tools with such approaches as scenarios and use cases.

The paper by L. Krucken and A. Meroni proposes an approach to developing a communication tool that aims to stimulate the building of stakeholder networks and delivering product-service systems. They report on the outcomes of the EU project HiCS that investigated how shared visions between networks of partners can be created and used in product-service systems. The paper discusses different levels of interaction required in such a project, including communication material that helps participants to find potential partners and communication material to present the developed solution to users. The approach developed in the HiCS project is demonstrated by the communication material designed for a specific food solution called Punto X Solution.

The subsequent paper by O. Mont, C. Dalhammar and N. Jacobsson develops a scenario for developing a product-service system for baby prams, which is composed of reconditioning and leasing. The viability of the developed scenario is tested in a financial analysis, which indicates that the leasing and reconditioning system delivers higher revenue per pram produced than traditional sales. The paper demonstrates that in order for the system to work efficiently and be economically attractive several product design changes need to be made. The service design part must include identification of the most appropriate factors for the product reconditioning actor in the supply chain: the retailer. Further the paper discusses potential solutions for the identified bottlenecks of this product-service system and the potential environmental benefits.

The next paper is the first among the three papers of this issue which develops methods and tools for evaluating environmental, economic and social characteristics of product-services. The paper by T. Tasaki, S. Hashimoto, and Y. Moriguchi develops a method for evaluating a leasing system for electronic and electric equipment. In particular, the paper reports on the study that devised a quantitative method of evaluating the level of material use in lease/reuse systems of electrical and electronic equipment, and evaluated the effectiveness of these PSSs in waste prevention. The developed method has been used for evaluating three hypothetical EEE lease/reuse systems and the current EEE system in Japan. The results show that take back system following the leasing system uses more material than the conventional

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