Routledge
Taylor & Francis Group

The Design Journal
An International Journal for All Aspects of Design

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rfdj20

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To cite this article: Janne Pekkala, Sanna Peltonen & Miia Lammi (2019) Service orientation–based tool for assessing and improving service design and development practices in manufacturing industry, The Design Journal, 22:sup1, 2089-2103, DOI: 10.1080/14606925.2019.1594932

To link to this article: https://doi.org/10.1080/14606925.2019.1594932

EAD 2019

Running with Scissors, 13th International Conference of the EAD, University of Dundee, 10-12 April 2019

Service orientation–based tool for assessing and improving service design and development practices in manufacturing industry

Janne Pekkala[a*], Sanna Peltonen[b], Miia Lammi[c]

[a]Design Centre Muova Vaasa, University of Applied Sciences, Finland
*Corresponding author e-mail: janne.pekkala@muova.fi

Abstract: Industrial manufacturing companies are increasingly shifting their focus from products to services, challenging their development functions at the operational and strategic levels. When strengthening a company's service orientation, attention must be paid to service experience and value co-creation, which create momentum for service design. However, the research has thus far been silent on concrete guidelines for how to proceed with servitisation. In this article, we propose a service orientation–based tool to facilitate service development and design in industrial manufacturing companies. The tool combines previous research on NSD and service design with empirical investigations and the authors' experience. The tool provides a framework for assessing and improving the organisation and implementation of service design and development in industrial manufacturing companies.

Keywords: Service design, NSD, industrial services, maturity model

1. Introduction

The current research indicates that services are playing an increasingly significant role in industrial manufacturing companies (Kindström & Kowalkowski, 2009; Ostrom et al., 2010). Companies are developing services in order to differentiate themselves from their competitors (Kowalkowski, Witell, & Gustafsson, 2013), to create revenue and to increase customer satisfaction (Gebauer & Fleisch, 2007).

Although infusing a service perspective into manufacturing companies is acknowledged as important (Costa, Patricio, Morelli, & Magee, 2018), companies have remained technology-, product- and engineering-oriented (Kindström & Kowalkowski, 2009). The transformation from product manufacturer into service provider is widely acknowledged as challenging (Costa et al., 2018; Kindström & Kowalkowski, 2014; Oliva & Kallenberg, 2003; Ostrom, Parasuraman, Bowen, Patrício, & Voss, 2015), slow (Fundin, Witell, & Gebauer, 2012), and stepwise (Gebauer, 2007).

Kowalkowski et al. (2013) defined service infusion as the extent to which a firm focuses on service as its core offering and the extent to which customers regard the organisation as a service provider. According to Fundin et al. (2012), service transition covers the role of services in the total offering and the organisational transformation while moving from one position to another. Martin and Horne (1992) identified four positions in the product–service continuum: the company offering may include only products, products with services, services with products, or services alone.

Bowen et al. (1989) suggested a model for identifying the level of service orientation in manufacturing companies. At the first level, services are seen as augmenting the product and are used primarily for differentiation. At the second level, services are seen as forming part of product strategy. Services can add value to the offering and help sustain a competitive advantage, but their role vis-à-vis the product is supportive. At the third level, the focus is on the integration of service-oriented goals at the strategic level. Finally, at the fourth level, the company has adopted the necessary service organisation arrangements.

Facilitating servitisation and service infusion are important research areas at present (Ostrom et al., 2015). However, Martinez et al. (2010) noted that the current management literature is silent about the models of servitisation as a change process, lacks 'how-to' descriptions, and does not address the challenges faced by organisations when entering into the service business. Companies seem to lack route maps to guide them during their transitions (Fundin et al., 2012), while the current NSD literature provides only limited support for managers striving to develop service offerings (Biemans, Griffin, & Moenaert, 2016).

One notable exception is a study by Jin et al. (2014), who developed a maturity model for assessing and guiding organisational capabilities in NSD. Their NSD maturity model is a literature-based categorisation of success factors in service development that are organised into four key process areas and into more fine-grained maturity dimensions. Key process areas cover strategic planning capability of NSD, process formalisation, knowledge management and customer involvement. Capabilities are mostly defined as process management guidelines and do not include the capabilities related to actual design work.

The value of services is always co-created, experiential, individual and contextual (Costa et al., 2018). This presents a challenge for manufacturing companies, which may face problems in the development of services based on customer-service experience (Miettinen, 2017). The increasing attention being paid to service experience and value co-creation has created favourable conditions for service design to enter into the discussion. Service design focuses on the experiential dimension of value, understanding contextual experiences and utilising human-centred design methods (Wetter-Edman et al., 2014). Service design is regarded as an approach that is positioned 'at the intersection of service strategy, service innovation, and service implementation' (Ostrom et al., 2010) aiming 'to envision and materialize new human-centered service value propositions' (Costa et al., 2018).

At the operational level, service design is about collecting user insights and producing new service concepts, as well as facilitating the development process between stakeholders (Miettinen, 2017). Service designers tend to understand service from the perspective of the end user and customer, generate and propose new service concepts, and represent the relational and temporal nature of service in visual form (Kimbell, 2009, 2011).

Yu and Sangioirgi (2014) examined how service design research contributes to NSD studies. Service design studies have focused mainly on the design phase of the process, have emphasised service

interactions as an object of design, and have paid significant attention to methods, tools and modes of engagement. However, there is a lack of practical tools for managers in manufacturing companies to support the strategic aims of NSD through service design. In real-life settings, service design and development must be integrated into a collection of effective practices and principles for servitisation.

This paper describes a service orientation–based tool for assessing and improving service design and development capabilities in industrial manufacturing companies. The SODD tool integrates the capabilities of service design into traditional managerial service development maturity models. The tool builds upon the literature in service design, NSD and customer involvement, focusing especially on maturity models (Jin et al., 2014; Rapaccini, Saccani, Pezzotta, Burger, & Ganz, 2013). The tool was developed in an iterative manner with 31 Finnish industrial SMEs and was informed by the experience of the authors on multiple industrial service design projects.

This paper answers the recent call for cross-fertilising service innovation and service design research (Antons & Breidbach, 2018) and bridging service design and other organisational areas (Ostrom et al., 2015). The SODD tool proposed in this paper not only offers a framework for analysing and describing how companies currently organise and manage their service development but also provides a concrete roadmap for companies in service transition.

2. Development of the SODD tool

The general aim when designing maturity-based models is to produce useful and usable tools according to their domain of application and purpose (Fraser, Moultrie, & Gregory, 2002; Pöppelbuß & Röglinger, 2011). In order to ensure the usefulness of the SODD tool, qualitative empirical research was carried out in an iterative manner with Finnish manufacturing SMEs.

The preliminary content for the SODD tool was built upon the model suggested by Jin et al. (2014). Based on the authors' experience on service design projects in manufacturing companies, the model was reinforced with a service design approach. Therefore, the literature on service design was included in the development of dimensions.

The tool is aimed at covering critical capabilities in managing and implementing service development and design. These capabilities were hypothesised to a number of logically progressive levels reflecting required changes in service orientation. The higher levels of service orientation build on the required principles and practices at the lower levels. The tool is aimed at assessing the present state of companies' service development and design practices.

The tool was applied in 31 Finnish industrial SMEs between September and November 2017. Company executives were asked to reflect aloud as they considered and selected the levels of capabilities that best described their organisations. The data include audio recordings and notes from the sessions. Based on the feedback, the phrasing of capabilities and levels was refined in order to secure understandability. In addition, the tool was expanded to cover not only assessments of the status quo but also the setting of appropriate goals for improving service development and design practices.

Most importantly, testing of the tool revealed the lack of knowledge and experience in relation to service design. In order to make the meaning and role of service design easier to understand, it was explicated as a collection of concrete actions that respond to a series of explicit needs in service development.

The application of the refined tool was studied in depth in a single manufacturing company in September 2018 (hereafter referred to as Case Company). Case Company is a Finnish business-to-business manufacturer with approximately 80 employees in 2017. It offers machinery, software and services to the product manufacturing industry worldwide. Case Company was one of the 31 interviewed companies. The managing director and development manager (responsible for production and R&D) were asked to test the refined tool by reflecting aloud while using the tool. The session lasted for three hours, and the research data include audio recordings and notes from the session.

Based on Case Company's experiences, the tool was refined to its current form. The next chapter presents the service orientation levels modified for the context of manufacturing companies. Thereafter, the service design and development capabilities are described and connected to appropriate service orientation levels.

3. Levels of service orientation

Fundin et al. (2012) claimed that manufacturing companies progress slowly in organisational transformation on the goods-to-services continuum. In particular, SMEs are hindered by their lack of critical resources in service business, for instance, staff, competencies, facilities and finances (Kowalkowski et al., 2013). This agrees with the findings from our interviews with 31 Finnish SME companies. The interview data indicate that these manufacturing companies are still heavily product-oriented. On the other hand, almost all of the companies in our data set exhibit a high degree of interest in and motivation toward services. Many companies acknowledged having gaps in their knowledge regarding how to proceed in effecting the service transition. This highlights the need for a stepwise roadmap for servitisation.

Many of the interviewed companies have already declared financial objectives in relation to their service business. However, all companies lacked the practices and processes required for service development. The companies were developing services mainly on an 'ad hoc' basis at customers' request. Service development proceeded without its own budget, indicating that it was not yet seen as its own business function. None of the interviewed companies had used service design. Moreover, the concept of service design was unknown.

Based on these findings, the service orientation levels were modified to fit the actual company context. In the SODD tool, we have divided the service orientation continuum into four levels (Figure 1) indicating the role of services in the company, and how this role reflects service development and design.

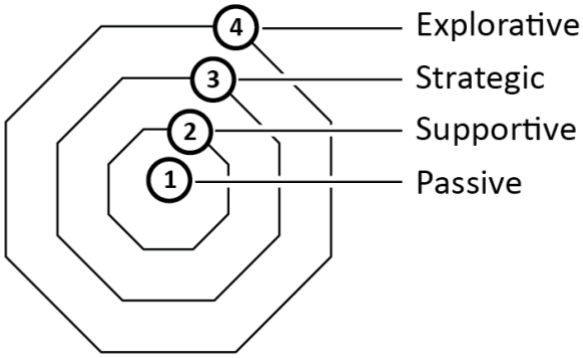

Figure 1. Four levels of service orientation

Due to the current state of manufacturing companies, the first stage in the continuum is termed 'Passive'. At this stage, the company is focused on its products, while services are not regarded as important to the business. Companies can provide some services, for instance, spare parts, yet they do not pay attention to service development. Services may be developed on an ad hoc basis if requested by customers.

At the 'Supportive' level, products are supplemented with services. The company acknowledges the value of services in supporting its products and product sales. Most development resources are allocated to product development, in addition to which there is interest in developing services. The majority of the interviewed companies positioned themselves at this level.

Services are a significant part of the business at the 'Strategic' level. Companies at this level see that services have strategic value for the business. Services and products are seen as having equal standing, and service development is continuous. Many of the interviewed companies may have the attainment of this level as a short-term goal. At this level, service development has reached board meeting agendas, and companies have formulated ambitious growth objectives for their service businesses.

At the 'Explorative' level, services are a key driver of innovation and renewal. The company has adopted a service-oriented mindset. None of the interviewed companies positioned themselves at this level. This indicates that the transition from product-oriented company into service-driven business is a lengthy one which requires the alignment of structures, systems and cultures (Kohtamäki & Helo, 2015). The next section describes service design and development capabilities and links them to the four levels of service orientation described above.

4. Service design and development capabilities

Service development and design capabilities were hypothesised to attain progressive levels reflecting changes in service orientation. These levels are cumulative and described as prerequisite practices and principles. They are constructed on the basis of specific dimensions. The capability dimensions are illustrated in Figure 2. The prerequisites of each capability (with the exception of the Passive service orientation, which does not include aspirations for the enhancement of service development) are described next.

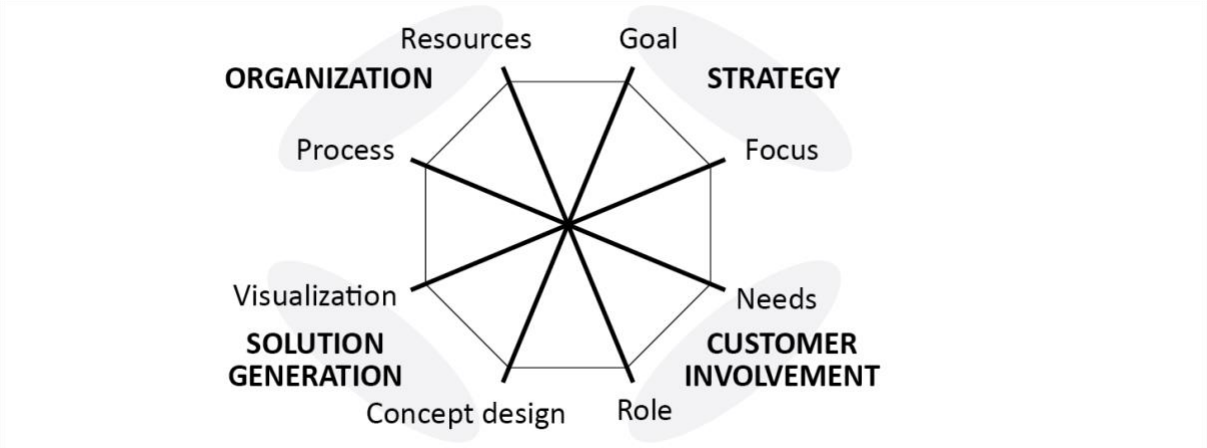

Figure 2. Service development and design capabilities in the SODD tool

4.1 Organisation

Organisation refers to the capabilities required to establish a successful service development process, making appropriate use of methods, resources and assigned responsibilities. In the SODD tool, organisation comprises two capabilities: process and human resources.

A formalised service development **process** can provide a framework for service development, speed up the development process and lead to better development performance (Edvardsson, Meiren, Schäfer, & Witell, 2013). However, the development of services requires flexible, iterative processes with a high degree of customer involvement (Kindström & Kowalkowski, 2014). Services are also developed in an ad hoc manner at the local level as a result of interactions between customers and individual professionals (Jaakkola & Hallin, 2018).

Management must achieve a balance between a structured process and explorative encouragement (Kindström & Kowalkowski, 2009). Recognition of the differences between service and product development leads to the development of distinct service development processes (Kindström & Kowalkowski, 2009, 2014; Kowalkowski & Ulaga, 2017). The prerequisites for executing successful service development processes at each service orientation level are described next.

- At the *Supportive* level, an existing product development process model is adapted to also manage service development projects. However, the adapted process must emphasise challenges in the sales phase, because the sales force is often unaccustomed to selling services.
- At the *Strategic* level, the company identifies the unique characteristics of service development and adopts models that emphasise a high degree of customer involvement. There are established practices for gaining organisational support and resources for designing new services.
- At the *Explorative* level, a development model supports flexibility and iteration and may be tailored to the specific needs of the company. At this stage, product and service development work in close collaboration, and a company has established processes to manage the development of a service portfolio.

Human resource capability relates to the question of what kinds of skills, roles and other human resources are needed in service development. The development and innovation of industrial services requires the involvement of front-line employees (Gebauer, Krempl, Fleisch, & Friedli, 2008; Kindström & Kowalkowski, 2014) and multifunctional teams (Gebauer et al., 2008; J. Trischler, Kristensson, & Scott, 2018).

Formalisation and replication capabilities are important in order to specify and standardise locally developed services (Kindström & Kowalkowski, 2014). Generally, successful service development requires qualified development staff, support from management, the presence of product champions and explicitly defined roles for employees in development projects (de Jong & Vermeulen, 2003). The prerequisites for resources are defined as follows:

- At the *Supportive* level, service development takes place in the context of temporary projects. Resources are allocated for service development on a case-by-case basis. Development teams have strong support from management. Responsibility is clearly assigned to development managers. Teams may work on a part-time basis and must have a good understanding of customer processes and the technological skills related to the service solution. Employees at the local level are encouraged to identify and develop services with customers.

- At the *Strategic* level, multifunctional teams are employed. Service development is perceived as a relatively permanent function. Employees are explicitly assigned to development projects, and at least a few team members work on a full-time basis. The team is responsible for scaling local services to larger groups of customers. In addition, the team reflects on its experience of past projects, cumulates knowledge and skills and disseminates these to the organisation.
- At the *Explorative level,* service development is part of strategic planning. Moreover, the management of the service development portfolio is continuous and strategic.

4.2 Strategy

A clearly articulated and communicated service development strategy is regarded as essential for consistently successful development (Jin et al., 2014). In the SODD tool, strategy is manifest in how a company defines the goal and focus of service development and aligns these with the overall business strategy.

Kowalkowski et al. (2013) found that companies develop services for different purposes. Some companies support their product business by adding new services, while others strive to create flourishing service businesses independent of current product sales (Kindström & Kowalkowski, 2014). We assume that, when the strategic importance of services increases in a company, service development ought to be integrated into the business strategy. The prerequisites related to **goal** capabilities are described below:

- At the *Supportive* level, service development aims to create services that support product sales by increasing the attractiveness or ease of use of the product. Services are based on the company's current capabilities, are grounded in product functionalities, and take account of competitors' services.
- At the *Strategic* level, services are seen as an integrated part of the business. Service development has its own strategy, including objectives, resources and target markets. The achievements in service development are monitored, and this information is strategically used. Services and products have equal priority when evaluating project proposals.
- At the *Explorative* level, services are regarded as a key driver of innovation. Service development is tightly integrated with and established in the company's development strategy. Service development objectives are conveyed to and adopted by personnel.

For those companies taking their first steps towards services, the literature suggests beginning service development by focusing on the initial mapping and packaging of current services, including the invisible ones (Kindström & Kowalkowski, 2009; Oliva & Kallenberg, 2003). However, when proceeding deeper into services, more fundamental transitional shifts are needed (Kindström & Kowalkowski, 2014). When the focus shifts, 'a process of assisting customer[s] in their own value-creation process' (Vargo & Lusch, 2008) and end-users' process-oriented services (Oliva & Kallenberg, 2003) enter into the service innovation agenda. In the SODD tool, the prerequisites for **focus** capabilities are described as follows:

- At the *Supportive* level, service development is focused on mapping, fine-tuning and packaging current services into a more understandable and attractive form. Service development also aims to optimise the service production process.
- At the *Strategic* level, customer experience and customer value drive service development. The focus is on the demand side as well as the supply side of the

service. Customer service experiences are investigated in order to understand which elements are important in creating desirable services.

- At the *Explorative* level, service development is focused on understanding customer value creation processes and supporting customers in their business processes (i.e., to create value in context). Service development is based on anticipated future customer needs and the identification of external factors that hold the potential to change the market. Service development aims to create innovative services that revitalise current ways of doing business in the market. Services aim to take advantage of wider service systems and create new partnerships.

4.3 Customer involvement

As a human-centred approach to creating new services, service design advocates intensive customer involvement as a crucial part of the design process (Sanders & Stappers, 2014; Steen, Manschot, & Koning, 2011). Collaboration with customers has been widely regarded as important in successful NSD (Edvardsson et al., 2013; Jin et al., 2014; Storey & Larbig, 2018; Jakob, Trischler, Pervan, Kelly, & Scott, 2018). In the SODD tool, customer involvement capabilities relate to two questions: What type of role is given to customers in the service development process, and how should customer needs be accessed and fulfilled?

Customers are given different roles, which can vary from that of information provider (feedback and ideas) to those of co-creator and partner in service innovation (Chen, Tsou, & Ching, 2011; Nambisan, 2002). The research suggests that customers should be seen as active contributors in the service innovation process rather than solely as a source of information (Witell, Kristensson, Gustafsson, & Löfgren, 2011). The recent emphasis on understanding customers, their service use and the context of use (value-in-use) demands that companies initiate joint, co-creative design actions with customers (Wetter-Edman et al., 2014). Active collaboration is paramount, especially in the case of services that are highly integrated with customer business processes. The following prerequisites describe the **role** of the customer in service orientation levels:

- At the *Supportive* level, customers do not participate in the service development process but are acknowledged to provide important information for the process. Service development is primarily based on current customer knowledge. Sales, exhibitions, problem reports and satisfaction surveys are used to gather customer information. Customer information is stored, and the quality, accuracy and validity of accumulated information are regularly evaluated.
- At the *Strategic* level, customers actively participate in different phases of service development. The company is in direct contact with customers in order to utilise their knowledge and expertise. The company has lead-user partners who are willing to participate in development actions by sharing their experiences, processes, systems, goals and strategies. In addition, the company has adequate skills in selecting the most suitable methods for customer involvement, for instance, interviews, workshops and observations.
- At the *Explorative* level, customers are seen as collaborating partners in service development. The focus of customer involvement is on joint learning, where new opportunities are identified and new service concepts are collaboratively developed. Service development is based on an understanding of how customer value emerges, both at present and in the future. This requires ongoing discussion with customers.

Service development has dedicated partner-customers, who have knowledge of and capabilities in service development.

Engaging customers throughout a service development process can provide access to customer information and skills, as well as enhance the ability to anticipate latent customer needs (Edvardsson et al., 2013). Active engagement with customers will provide important contextual knowledge about their tacit **needs** and service use, as well as knowledge about how customers will perceive service value (Storey & Larbig, 2018).

- At the *Supportive* level, the expressed needs of customers create a starting point for service development. The company listens to its customers and reacts to their requests. As the company pursues offering at least the same services as its competitors, it must monitor how its main competitors operate in the field and the types of services they offer.
- At the *Strategic* level, service development is based on customers' expressed and latent needs, which are identified by exploring the customer value creation processes. In order to reveal new service opportunities, the company must analyse customers' operations, processes and goals. At this level, customers' needs – both the expressed ones and the latent ones rooted in current operations – drive service development.
- At the *Explorative* level, the company aims to anticipate customers' future needs by monitoring and envisioning changes in the business environment, that is, the trends, technologies and regulations that may alter customers' strategies and goals. The company identifies hidden customer needs and transforms these insights into innovations that will differentiate it from its competitors (see, e.g., Ostrom et al., 2010).

4.4 Solution generation

Conceptualising, designing and prototyping fuzzy service ideas is a specific kind of capability (den Hertog, van der Aa, & de Jong, 2010). This is strongly contributed by the service design practices of generating and proposing new service concepts, representing the relational and temporal nature of service in visual form, and facilitating the development process between multiple stakeholders (Kimbell, 2009, 2011; Miettinen, 2017). In the SODD tool, solution generation aims at capturing the capabilities related to actual design work, in which service ideas are visualised and designed into viable services.

As firms enhance their product-based offering with services, they require the visualisation capability to communicate and demonstrate the value of these new services-based offerings, not only to customers, but also internally and to other actors in their business networks (Kindström, Kowalkowski, & Nordin, 2012). The use of visualisations and prototypes defines service design and is closely related to similar activities in service development, such as blueprinting (Holmlid & Evenson, 2008). Visualisations in service design are either used as a tool for translating raw data into insights or as a way of communicating insights (Segelström & Holmlid, 2009). The prerequisites related to **visualisation** extend from supporting service sales and gaining internal support to facilitating the identification and testing of new service opportunities in collaboration with customers.

- At the *Supportive* level, visualisations support service sales and facilitate internal discussion when support is being sought for service development projects. The visualisations for service sales tend to be based on customer value and focus on business issues, as the purchase decisions in industrial companies are often made at the level of strategic management (see, e.g., Kindström et al., 2012). Visualisations

aimed at gaining internal support emphasise the tangible and temporal aspects of a service idea (e.g., the touchpoints along the customer journey).
- At the *Strategic* level, visualisations are used as tools for translating raw user data into insights. They focus on creating an understanding of customer processes. The role of visualisation is to interpret and communicate how services can create value in customers' practices.
- At the *Explorative* level, visualisations facilitate the identification of service opportunities and the conceptualisation and testing of service ideas with key customers and other actors.

A service concept is a 'picture or statement that encapsulates the nature of the service business and captures the value, form and function, experience, and outcomes of the service' (Clark, Johnston, & Shulver, 2000, p. 73). It guides the development of a service system and a service process (Edvardsson & Olsson, 1996). **Concept design** refers to the capability of designing insights and service ideas into tangible service proposals (den Hertog et al., 2010) that are aligned with strategy and competitive intentions (Goldstein, Johnston, Duffy, & Rao, 2002). The prerequisites extend from elaborating existing services to facilitating co-development.

- At the *Supportive* level, service concepts are based on supporting the product offering. The role of concept design is to elaborate existing services and service ideas into an accessible, viable and desirable form. The service concept defines what is done for the customer and how this is achieved.
- At the *Strategic* level, concept design is driven by customer value. Service concepts are based on customer processes and encapsulate customer benefits and experiences.
- At the *Explorative* level, concept design strives to facilitate the co-development of services with customers and external development partners. In addition, concept design aligns innovative service concepts with organisational strategy.

5. Implementation of SODD tool

The potential users of the SODD tool are those responsible for managing service businesses and service development in manufacturing SMEs. For example, managing directors or product development managers can use the tool to facilitate strategic planning and discussions in board meetings, define development actions, and schedule and track progress.

The process of using the tool comprises four phases (Figure 3). The process begins with an assessment of the present state of service development and design within the organisation. The assessment covers eight capabilities, as described in the previous chapter. In practice, the company selects the most representative statement from a set of four statements, each of which describes a specific level of capability. Even though the dimensions are presented as being on a continuum, implying progression, the tool does not assume that the higher-level position is superior to the lower one.

Figure 3. The process of using the SODD tool

The current state of a company's capabilities is visualised as a radar chart. The spokes of the radar represent the capabilities and the plot displays the current position in each capability dimension. The profile represents a company's current service orientation and reveals potential capability gaps.

In the third phase, the company is asked to define the level of service-orientation to which it aspires within the following three years. The tool provides the dynamics of shifting from one level to another by proposing a set of prerequisites as concrete practices and principles that management might need to consider and develop. At this point, the company is asked to select prerequisites that it sees as critical to its own progress.

The last phase aims to support the implementation and follow-up of the concrete development actions. Prerequisites are discussed and revised into concrete, company-specific actions, which are then allocated to responsible persons. This phase will lead to the development of a roadmap setting out tasks allocated to quartile periods for the next three years.

6. Conclusion

This study proposed a novel tool for assessing and improving the organisation and implementation of service design and development capabilities in industrial manufacturing companies. The SODD tool is built around eight capabilities hypothesised into four logically progressive levels that reflect the required changes in service orientation. With the SODD tool, managers are able to assess current practices and take actions to strengthen the capabilities needed in the future. The tool raises awareness of the gaps in service design and development capabilities and supports the evaluation of the current level of service orientation. It also directs the strategic discussion towards consideration of the position that a company strives to attain in the future and the steps that must be taken to achieve that goal.

Our tool is aimed at facilitating the discussion related to the service design and service development efforts in companies and may therefore provide a critical link between strategic decisions and operational actions. We assume that the integration of service design into organisational practices and processes will continue to deepen in the industrial manufacturing context. This emphasises the need for a shared language and practical tools and methods in the development work. For example, convincing case examples are needed to illustrate successful ways of integrating service design into industrial service development.

There are some potential limitations to this study. For example, the tool was developed in the context of Finnish industrial SMEs. More research is needed in order to evaluate the wider applicability of the tool in manufacturing companies in the international context. As further research, we plan to conduct a qualitative study where the SODD tool is used in practice. This will provide hands-on empirical data related to the applicability of the tool. In addition, the first part of the SODD tool (capability assessment) will be tested in a quantitative study in order to create a broader

understanding of the current level of service orientation in manufacturing companies. From the large-scale survey data, service orientation typologies could be identified based on companies' current design and development capabilities.

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About the Authors:

Janne Pekkala is a concept designer having over 15 years experience on designing products and services with Finnish manufacturing companies. He is a doctoral candidate at the School of Arts, Design and Architecture, Aalto University. His research concerns concept design.

Sanna Peltonen has over 15 years' experience in research and applying customer-oriented design in research and business. The research interests focus on customer engagement in service development. Peltonen is also a doctoral student in University of Vaasa.

Miia Lammi has researched service design over 10 years and applied it to value creation, business transformation and ecosystem renewal in company collaboration. Her research interests focus on the adoption of service design in business transformation.

Acknowledgements: This study was supported by EU European Social Fund, ELY Centre Osthrobotnia, VASEK, University of Vaasa and VAMK Ltd. University of Applied Sciences, which financed DIGIKASVU project. The participating companies opened their business and made this research possible.