Service implementation: a framework to assess readiness of manufacturing SMEs

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Abstract

This paper reports the initial results of a wider research programme that investigates how service design might positively contribute to the development of product-service systems (PSS) within manufacturing SMEs. The paper presents the results of interviews with two firms that have begun to embrace service design. The analysis of these results is used to produce a conceptual framework that aims to aid understanding of a company's potential readiness for servitization through service design.

KEYWORDS: service design, servitization, manufacturing, SMEs, PSS

Introduction

In the last decades companies have faced radical changes in the way people connect, think and work together (Pine and Gilmore, 2000; 2011). Historically, commodities and goods occupied the main role in the interactions between users and firms; however, more recently the concept of service has become increasingly important. As understanding of service has become more sophisticated, customers and stakeholders seek satisfying experiences and transformations from their interactions with both tangible and intangible products. Thus it may be considered that many things are no longer privately owned, but rather that users are paying for access to services and experiences (Rifkin, 2001). Manufacturers are encouraged to look at the value chain and go towards the customer (Wise and Baumgartner, 1999). In this context, service design has the potential to offer manufacturers a formalised route to better consider their service offering.

This paper deals with small to medium sized (SMEs) manufacturing firms involved in the servitization process. It is focussed on how service design can support them in developing in-house capabilities to implement product-service systems (PSS) and offer integrated products and services (Benedettini et al., 2009; Simons, 2013).

The extant literature provides many examples on how large organizations shifted from good-based production to service-based provision (Mathieu, 2001a; Oliva and Kallenberg, 2003; Brax, 2005). Drivers and barriers related to this phenomenon and the types of value propositions based on the integration of product and service (Baines et al., 2009; Lightfoot et al., 2013) is also discussed (Vargo and Lusch, 2004b; Baines et al., 2007). However there has been little exploration of manufacturing SMEs from a service design perspective (Sangiorgi et al., 2012; Iriarte et al., 2014); yet, this class of company represents the largest section of the economy (BIS, 2013).

This paper is part of a wider research programme that explores how service design might positively contribute to the development of effective PSS within manufacturing SMEs through the following questions:

» What is the willingness and capability of manufacturing SMEs for the development of services?
» Can SMEs get a positive outcome from deploying service design thinking?
» How can SMEs recognise their readiness for service design approaches?
» How might they be guided in service design implementation?

This paper aims at beginning to understand how service design applies to manufacturing SMEs; and, to begin to engage with SMEs through a framework that aids understanding of readiness for servitisation. This paper consists of a literature review that informs a research instrument, results from engagement with two manufacturing SMEs that have begun to embrace service design; and a conceptual framework for assessing service design readiness.

Background

Gebauer et al. (2011) argues that in the current marketplace competitive advantage can be gained by those firms that begin to offer a service component to their customers; this shift encourages companies to adopt a Service-Dominant Logic for the creation of value propositions to customers (Vargo and Lusch, 2004a). However, Service Dominant Logic requires much more than an increased emphasis on services since it implies a reframing of the firms' purpose and its role in value co-creation (Kowalkowski, 2010).

The literature review below explores three facets of this topic, as follows:

» Manufacturers vs. Service providers - The design process and the manufacturing legacy
» The transition from products to services in manufacturing companies: drivers and barriers
» Recognising heterogeneity in SMEs

Manufacturers vs. Service Providers

Manufacturing firms are facing major challenges when they start the transition from a purely product-based offering to solution-based offerings as product-service systems (PSS). They are characterized by a product-based heritage that comprises product specification terminology, development processes and practical knowledge. In the literature new product development and new service development are discussed separately and the level of description of PSS development processes is less detailed than the previous two. In both cases, the very first phases of the development process, the so-called 'fuzzy front-end' are

difficult to codify (Reid and De Brentani, 2004; Clatworthy, 2013). Kimbell (2009) investigated the differences between new product development and service design and found that service designers pay attention both at macro (service experience) and micro (touchpoints) level; they make a service tangible and visible; they think of the service as a system that consists of artefacts, people and practices. When designers and managers come up with new ideas, it occurs because they make use of abductive thinking. The role of abduction as strategic process has been studied (Dew, 2007; Kolko, 2010) in order to describe the process that designers and managers follow from a 'messy' liquid state to a crystalize state (Boland et al., 2007). The literature raises a number of questions on how to frame PSS; how product and service components relate to each in the development process and the related skills and capabilities needed at each stage. Companies have been stimulated to start designing services with the same attention as products (Polaine et al., 2013), but this does not imply that the process is the same.

The value co-creation process-based framework, shown in Figure 1 below (Payne et al., 2008) demonstrates that the value proposition exists in order to facilitate the co-creation of experiences. The importance of recognizing customer processes rests with the need to develop a full understanding of where a supplier's offering fits within the customer's overall activities. Customer process mapping takes this idea one step further by dismissing the 'silo mentality' and challenging the boundaries between supplier and customer. By designing prototypes, options can be tested or put into real life faster. The conceptual framework below summarises the complex landscape in value co-creation. For manufacturers to go downstream or upstream, a better understanding of customer and supplier is essential to build a relationship.

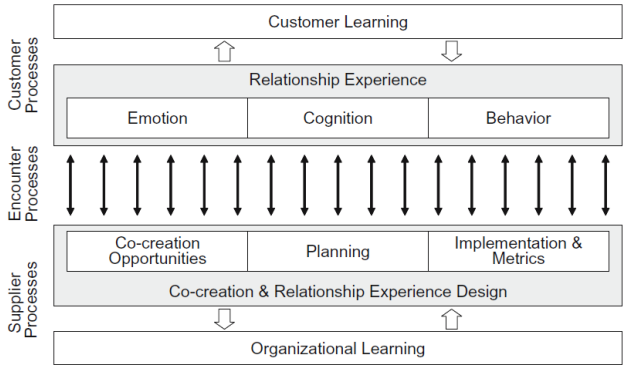

Figure 1 Conceptual framework for value co-creation (Payne et al., 2008)

Transition from products to services

Numerous authors assert that positive results can come from offering services (Brax, 2005; Gebauer et al., 2005) but a move into services is not a panacea and improvements in profits are not automatic (Baines and Lightfoot, 2013a). Some prerequisites are needed, for instance: a better core product platform for a service-based competitive advantage (Grönroos, 2007); an evaluation of the internal assets and resources available, the level of readiness to implement services. Certainly, manufacturing companies possess knowledge and the expertise about their products; but deeper knowledge about internal assets and resources is needed (Kowalkowski et al., 2013). It has been argued that companies that adopt a service-based approach gain more competitive advantage because services are more difficult to imitate due to the higher specialization; and they provide long-term relationships with users (Oliva and Kallenberg, 2003). However, a formalized service design process is yet to emerge.

Product-service systems (PSS) development process appears to be a path for manufacturing SMEs to follow, due to its analogous fit with their current skillset.

In this paper, the authors adopted the definition of PSS by Mont and Tukker (2006) as this concept 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.* Manzini and Vezzoli (2003) framed PSS into three categories: services that provide value added to product life cycle; services that provide final results to customer; and, services that provide enabling platforms to customer. Tukker (2004) categorises three types of PSS: product-oriented, use-oriented and result-oriented. Whereas services in the PSS field are usually presented as: basics, intermediate and advanced services (Baines and Lightfoot, 2013b; a).

Servitization is seen as an opportunity for service design to instil a User Centred Design approach within product-based businesses, and demonstrate how the user involvement brings value to the company. The social interaction in creating experiences is translated from service design logic in co-creation (Wetter Edman, 2009). In this context, Mathieu (2001a) point out the fact that the ultimate goal is to service the client not the product. From a design perspective, Morelli (2003) borrowed a set of criteria previously proposed by Bijker et al. (1989) to describe the technological frame applied to PSS. The new operative paradigm suggested by Morelli (2009) looks at the social and human components of the service as services are social constructions; thus, customers should be an active part of the value co-production process. Looking at the benefits of service innovation, Shostack (1993) suggested how to design a service and Clatworthy (2012) extends this process in the way a brand strategy transforms the customer experiences during the New Service Development (NSD), adding original insights into the transition from brand to concept and describing the transition from product to service as a semantic transformation.

Although the previous paragraphs describe the relationship between design of product and design of service and its implications, the transition from product to service generates a series of paradoxes and obstacles that span from the awareness of the concept of service (Gebauer et al., 2005) to the behavioural dimension involved in the organisational aspects and the willingness and commitment of managers to motivate people (Gebauer and Friedli, 2005) and the adoption of integrated product-service business model that present product and service as a bundle (Kastalli and Van Looy, 2013). In order to overcome them, Mathieu (2001b) introduced what she called 'service maneuvers' to indicate the typology of actions to take in manufacturing in terms of organizational intensity and service specificity. Brax (2005) stated that manufacturing businesses that approach services require a different organizational setting than goods, because an incremental approach to servitization is inadequate for anything other than the most basic of new service development. Since the transition occurs in stages (not through leaps) and during each stage, companies have a set of issues to focus on and address them through the development of new capabilities (Oliva and Kallenberg, 2003). In order to convince managers to believe in the economic potential of extended service business, they suggest focussing on understanding the potential of service companies; the competencies needed for such a transition; and, the deployment of a successful service strategy. For instance, increasing service quality and scope might extend the product's useful life, thus reducing its replacement sales and increasing the quality and durability of products might reduce future service revenues. Gebauer et al. (2005) introduced seven behavioral processes in order to increase the service awareness; to accept the risks of extending the service business; and, to believe in the economic potential of services. Extending the service business successfully requires various changes in the organizational structure of manufacturing companies. Generally, the decision-makers are subjected to the conflicting

biases of unjustified optimism and unreasonable risk aversion whether in high or low risky contexts, favouring inaction (Kahneman and Lovallo, 1993). To overcome the biases, they focus on the analysis of forecasting and choice and implications for organizational decisions.

In the literature, the servitization process has been mostly discussed through the lens of large manufacturing companies who have available resources to engage external consultants or can invest in the development of an in-house capability. Moreover, it has been discussed from an organizational lens, leaving a gap in the way the process really occurs from a practical point of view. There is much rhetoric amongst the design community on how design provides practical solutions to complex industrial problems; therefore, it is timely to begin to investigate how design, specifically service design, might play the role of the interface between theory and practice in the implementation of PSS in SMEs.

Recognising heterogeneity in SMEs

The differences between large and small companies is often emphasised; however the differences between small and small firms seem less often considered. The purpose of this research is to help small companies to start thinking from an inside-out to an outside-in perspective. SMEs are not 'miniature versions' of large firms (Welsh and White, 1981). For instance, large manufacturing organisations have been widely discussed in the literature and taken as representative of the servitization phenomenon, namely Rolls-Royce, Alstom Transport, MAN, Caterpillar, Xerox (Baines et al., 2009; Baines and Lightfoot, 2013a) but also Nokia, Ericsson, Michelin, Barclays, Virgin, Herman Miller, Philips Design, General Electric, ABB, Otis. Yet SMEs are regularly recognised as the engine of national economies. However, they are precluded from accessing or effectively utilising service design, as they have neither the resources to engage external consultants nor the knowledge to develop in-house capability. Focusing on small companies means understanding their attributes related to the context they are inserted in, therefore the underlying social and economic dynamics that influence the day-to-day working activities. Berends et al. (2014) states that prior studies found that small firms do not deploy the formalized processes identified as best practice for the management of new product development (NPD) in large firms. Developing competitive advantage in the contemporary marketplace is at the core of the debate for all sizes and sectors in the industry, and this phenomenon affects established SMEs too. Specifically, this paper examines the role that service design plays in this context. Generally, while invention is seen as a cognitive process, innovation is a social process (Reid and De Brentani, 2004); and it explains why Von Hippel (2005) and Rogers (2003) widely described the innovation process in terms of the creation of new products and services, and how it spreads within a community. Hence, the user-centred innovation process overcomes the traditional manufacturer-centric innovation development system, because it encourages manufacturing companies to listen to lead users (Von Hippel, 2005) in order to put forward improvements or new radical ideas. For a manufacturer to choose between innovate-or-buy, she must consider transaction costs to cover and information asymmetries to align (Von Hippel, 2005). In his research on public sector organisations Bailey (2012) developed three hypotheses related to the embedding of service design in organisations: design readiness is crucial for an organisation to absorb design thinking principles and practices; having an in-house 'design office' is essential to disseminate design thinking and practices; and, a change in business working practices and organisational behaviour are required to implement design thinking and methods. Two further essential aspects are: the translation of service design propositions and blueprints into practical projects and the replication of design tools. However, it should be noted that despite Bailey's study appearing to be relevant to the

practical implementation of service design in a broad range of organisations, the main focus was on public sector. Therefore, it remains to be tested if these hypotheses related as well to an industrial context.

As a result of the literature review, the following gaps were found: a lack of studies on servitization related to this size of manufacturing company; a lack of studies that explicitly applied the user centred design (UCD) approach and service design thinking, other than lists of recommendations; and, guidance on the transition from established practices/routines to new ones (renewal, reconfiguration, restructure the organization). Identifying these gaps is an indicator of the research problem because developing integrated systems require a higher degree of service and a supportive infrastructure where interactions between customer, front-office staff and back-office staff - both oral (e.g. scripts) and written (e.g. interfaces) are regulated.

Methodology

Two manufacturing companies have been selected to this research. They have already been involved in a previous service design programme leaded from the design centre the authors work in. All the firms showed interest in understanding how service design can offer to them and expressed their intention to approach services. The number of case studies has been limited to allow an in-depth exploratory investigation of the topic and a regular interaction/update with them. This paper reports preliminary findings on the first phase of a wider research programme that will develop multiple case studies via a longitudinal analysis of manufacturing companies in the UK.

In the literature review, the servitization process deals with the configuration of internal capabilities and resources of the development team throughout the product development process. As a result a template of semi-structured interview was created and questions on routine activities, design strategy, design process and service perception were developed for were asked to senior staff at manufacturing companies.

At the time of writing, this paper reports the results of interviews with: 1) Director of Marketing of Company A; 2) the Technical Director and CEO, the Operations Manager and a Product Development Technician for Company B. In Company B, the author also interviewed two further members of the development team. The interviews took around an hour and a half, the audio from which was recorded, transcribed and analysed using the software Nvivo. Along with the template of the semi-structured interview, a leaflet (see figure 2) providing more information about the author, the design centre, the research aims and the relevance of the topic were given to participants to increase the level of interactivity between the researcher and the interviewees and to trigger a discussion on the barriers and their level of importance along three axes: culture, technology and organisation. The diagram with written notes from participants were scanned and analysed with the same software used for the interviews. In this phase of the study, the role of the researcher is of participant observer. Findings from the interviews provided insights into service awareness and readiness for servitization, assessing internal capabilities and exploring how service design thinking can play a supportive role in service implementation.

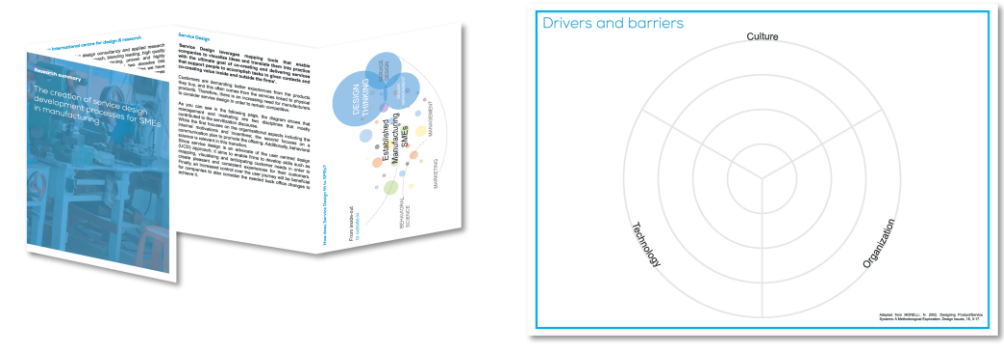

Figure 2 Leaflet presented during the interviews

Results

From the analysis of the interviews, service design was seen as a potential foundation to build a user-centred design (UCD) approach to PSS, however a formalised service design process had not emerged and companies needed to be assessed on their readiness for the implementation of services. The insights are grouped as follows: identity and legacy on making; service awareness; and service design making. Table 1 below is based on the managers perspectives expressed during the interviews.

Identity and legacy on making	Manufacturing companies routinely develop, perceiving changes and using previous iterations as guidelines to experiment and advance the prototype until the final result. For instance, Company B describes the slow pace of fabricating (e.g. feeling the vibrations) as a way to take time, stop and think while doing with the ultimate goal of demonstrating the working product. The service component of the product establishes a relationship with the client (e.g. trials) and extends the lifespan of the product (e.g. contracts).
Service awareness	In order to build a value proposition around the concept of a total solution, manufacturing companies are aware of the importance of engaging with customers and involving them in the early phases of the development process (e.g. first prototype early market). Lead by the goal of enabling their clients through technology, they are able to develop reliable products as a starting point to build a PSS value proposition.
Service design making	The Companies see service design thinking as a bridge between pure service and pure product; thus, service design tools are considered as operative tools used at the very front end. Both Companies state that service design is not only designing a new service and, conversely, manufacturing is not just making one thing in one place. In between there is the potential for the development team to implement services in their offering. For instance, the visual component plays a key role for customers in the pre-purchase phase (e.g. software to configure the components of the ventilation system or the walk-through drawing of the water treatment plant).

Table 1 Findings from the interviews

Moreover, while one of the two manufacturing companies follows a structured product development process that starts from a product design proposal where everybody from the different departments can contribute to the decision-making process at weekly, monthly, and board-level meetings; in the second case, ideas come mainly from the Technical Director/CEO with an overview of the entire process and is then further discussed with a small development group, adding a financial component in order for the team to evaluate the feasibility of the new project.

In the previous section heterogeneity is discussed, noting that best practices, skillsets and assets differ from one company to another. Consideration of how different configurations affect a firm's readiness to implement services is explored in the following section.

Discussion – Readiness framework

While a number of ready to use design toolkits is currently available, there is lack of knowledge on how to tackle servitization from a SMEs' perspective. Taking a step back, an assessment of the level of willingness and readiness of manufacturing SMEs to be servitized stresses the fact that the implementation of a PSS goes beyond a definition of service design and deals with the configuration of a development process that considers products and services as a bundle. The conditions that affect companies' readiness to implement services and guidance on how to re-configure their development processes to address these challenges have not yet emerged. Since the boundaries between the disciplines involved in the servitization process are blurred, a definition that brings together different perspectives to see PSS as a PS continuum is presented below:

> *The servitization process is supposed to enable manufacturers to shift from a categorization of objects to a categorization of actions and activities. Given their characteristics, SMEs should be encouraged to formalize their current development processes into User-Centred Service Innovation ones and to grow their digital capabilities.*

In this context an appropriate definition of service design is also presented:

> *Service Design is a potential enabler for manufacturing firms to take a step back from the production line to explore how interactions with customers (and how they relate to stakeholders) can be formalised for innovation and development of more relevant value propositions. In the process: recognising that user value encompasses all the activities before, during and after the sales transaction (provision, relationship-based with service).*

As long as the transition occurs in stages (Oliva and Kallenberg, 2003), the creation of a framework around the assessment of the readiness of manufacturing SMEs shows a set of issues to overcome. The readiness framework is based on two leverages of service design: being and making. The first one comprises the meta-design skills associated with SMEs; while the second relies on the operational tasks needed to implement the value proposition whose product and service ratio depends on the first leverage. Then, the framework assesses the prerequisites (in terms of readiness and willingness) for manufacturing SMEs to make the transition from product-only offering to product-service continuum offering. The user-centred service innovation perspective (Walters et al., 2012) instils a human perspective in the organisation and recognises individuals' skillset and enables people to accomplish their goals. In fact, when companies start putting themselves into their client's shoes, they start seeing the world from outside in: how clients see the company and why they look for a

solution other than just a tangible product. Making is transforming the insights (observing soft-qualitative and hard-quantitative aspects) into data (finding what the real problem is and formulating new hypotheses) and then into practice (prototyping the touchpoints whether with product or service components). An alignment of the internal activities to make the value proposition relevant to customers is essential.

When it comes to firms' capabilities, Acklin (2013) introduces a framework to understand how SMEs with little or no design experience acquire new design knowledge. Primarily she focuses on how design fits into the company. Similarly, Süße (2015) leverages the concept of improvisation as a promising mechanism and design principle for an organization's capacity for learning, adaptability and innovation within the servitization process. More generally, the concept of absorptive capacity has been investigated by Laursen and Salter (2006) and Chesbrough (2010), but this has not been explored from a manufacturing SME or design perspective.

The following readiness framework is intended to highlight which are the changes or organisational developments a firm should consider in order to increase the likelihood of successful service design implementation. In light of the interviews the focus shifted on the prerequisites to undertake service in value proposition creation.

Drawn from the literature, the framework has been created to align design, management, marketing and engineering in the development process through:

» Being (assess design thinking awareness and develop a user-centred design mindset)
» Making: from paper to pixels (list of things to prototype the experience; product and service components); what do you have? What do you need?
» Delivering (assemble and configure)
» Following up (control and check regularly)

As a result of the review of the literature and the preliminary results, it became clear that the companies struggled to understand both the meaning and the potential of design jointly with the concept of service. Therefore, similarities between the Design Ladder (Danish Design Centre, 2003) and the transition from good-production to service-provision started to be explored. As shown in the figure 3, the first part of the framework examines the levels of readiness of companies and to what extent they struggle to embed design and service concepts. The synthetized vision shows the Design Ladder on the left (Danish Design Centre, 2003) and the three categories of PSS (Tukker, 2004) on the right. In assessing the readiness of manufacturing companies, the prerequisites to look at are: motivations and expectation in adopting design and services, the dependence of the size of the firm, the types of companies that find major difficulties than other according to where they are positioned in the supply chain. Since the way of framing and implementing PSS (whether the ratio between product and service) is relatively emergent for service design research further exploration is needed.

The challenge behind the framework is to train non-service designers to implement ideas, starting from a formalisation of the interactions (channels and touchpoints) between manufacturers, customers and stakeholders where services are seen as the glue (Lipparini and Sobrero, 1994) between products and experiences that allows transformation. The conceptual framework aims at making firms aware of how to create services by moving away from established product-focused procedures and how to configure operations to deliver an advanced services offering. Thus, the framework presented shows that company decisions on development of a bundle of product and service with services as add-ons to existing products; supportive services to increase product sales at the bottom; or the provision of a

long-term solution for customers at the top once servitization has been achieved. According to the results, Company A offer product-oriented services as 99% of the turn over came from the purchase of the ventilation systems; while Company B develops result-oriented PSS since their prototypes first, and their final products later, demonstrate the amount of water treated. In both cases technology and digital tools informed the way the offering is created and the way the firms are building a dialogue with customers.

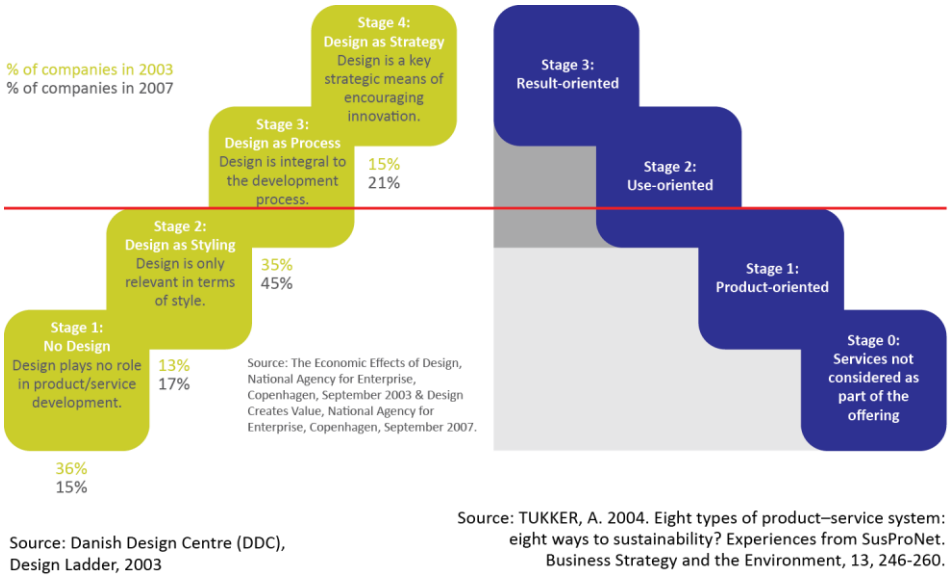

Figure 3 Readiness framework

Conclusions

The results presented in this paper have been used to conceptualise a framework that aims to assist SMEs in assessing their readiness for the implementation of service design. As noted above, this paper forms part of a wider investigation into the potential use of service design as an approach to the development of PSS in manufacturing SMEs. The next stages of the research will be concerned with further development, testing and refinement of the framework. The timeliness of this research is indicated by the gaps found in the extant literature in relation to SMEs, which include:

» How do SMEs recognise service design?
» If SMEs are already offering services, how are they currently developing and selling them (structured and unstructured process)?
» To what extent is manufacturing vocabulary affected by servitization?
» Can service design be assessed as a mechanism to develop PSS?

This paper reports an attempt to begin to address some of these questions (i.e. what is the willingness and capability of manufacturing SMEs for the development of services? Can SMEs get a positive outcome from deploying service design thinking? How can SMEs recognise their readiness for service design approaches? How might they be guided in service design implementation?). The framework presented here begins to explore these issues; however, there is clearly still much work to be done to understand what benefits service design can bring to SMEs. Findings from the first phase of this study will inform a set of dimensions for companies to self-assess.

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