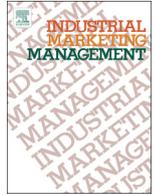




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Employing the business model concept to support the adoption of product–service systems (PSS)

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ABSTRACT

Although the existing literature indicates that the business model concept can be useful to implement product–service systems (PSS), there is still a paucity of guidelines to assist companies in this respect. Therefore, this paper proposes a framework to support the adoption of PSS employing the business model concept. This framework was developed based on literature review and intends to guide the company on the analysis of their business context, on the choice of the appropriate type of PSS and on the definition of their PSS characteristics. A single case study was then performed to illustrate an application of the framework in a machine tool manufacturer and provide research insights. Overall, results indicate that the framework can provide companies with a useful reference to PSS implementation, helping on the investigation of different PSS scenarios as well as the main barriers and challenges to be overcome.

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1. Introduction

A service oriented approach provides new ways of dealing with businesses, customers and with the value chain. As a result, this approach has received increasing attention from manufacturing companies seeking opportunities for competitive advantage. Although companies constantly offer services to the market, they have only in recent years seen the integration of products and services as a possibility for growth and competitiveness (Jacob & Ulaga, 2008).

Different research communities have studied the integration of product and services, adopting different terms for the same subject. Among them, three are of particular importance: servitization (Vandermerwe & Rada, 1988), service-dominant logic (Vargo & Lusch, 2004) and product–service systems (PSS) (Goedkoop, van Halen, te Riele, & Rommens, 1999). Despite the difference on terms, the central concept is the same: to shift the focus of traditional businesses based on the design and sale of physical products to a new business orientation that considers functionalities and benefits delivered through products and services (Manzini & Vezzoli, 2003). Special attention is given to the interaction between customers and companies, contributing to an improved value proposition based on the integration of resources, knowledge and skills (Kowalkowski, 2010). This study uses the term PSS throughout this paper.

Manzini and Vezzoli (2003) and Tan (2010) suggested that the adoption of PSS provides insights about aspects considered relevant to businesses, such as: types of products, customer needs, product and service strategies, relationships with stakeholders and financial income options. However, Tischner, Verkuil, and Tukker (2002) stated that there are questions without answer hindering companies in their attempts to implement. For example: How can companies create and offer value to their customers? How can this value be produced and delivered? How can companies interact with customers and partners? These questions, which are related to business logic, represent challenges that companies face when adopting PSS.

In fact, one of the main challenges for companies wishing to adopt PSS is to identify the changes required in their businesses (Meier & Massberg, 2004). These changes derive from the differences between PSS and the traditional way of developing and selling products. Since the business is a central point in this issue, the business model concept seems appropriate to be employed. Business models are representations of companies' strategies, operations and relationships that define their business logic. It can be considered a conceptual tool that helps companies to identify, understand, design, analyze, and change their business models (Osterwalder & Pigneur, 2010).

Tan (2010) states that the business model concept is useful to characterize PSS, since its implementation often requires the redefinition or creation of new business models (Tischner et al., 2002). Tukker and Tischner (2006) also believe that it is important to conceptualize PSS in terms of business models to facilitate its adoption. Because the success of a company depends on its operations, strategy and networks, the business model may be redesigned to support the PSS offer (Schuh, Schittny, & Gaus, 2009). Matthysens and Vandembemt

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(2010) brought up an important point by questioning why and how the transition toward PSS affects companies and how they can deal with it in terms of their business models. Richter, Sadek, Steven, and Welp (2009) highlighted the need of investigations which combine the viewpoint of PSS and business models, aiming to gain a better understanding of this context and to assist on PSS adoption.

Despite the importance of addressing the relationship between PSS and business models, the current paucity of information about how to use the business model concept to support the adoption of PSS is challenging for companies and offers opportunities for investigation (Mont, 2004). What PSS contents should business models encompass? Should companies adapt their business models to fit with PSS characteristics or should they create new business models? The literature appears to be unable to answer these questions.

This study proposes a framework based on a business model conceptual tool, named Canvas business model, which aims to analyze companies in terms of PSS requirements and to define actions to implement it. First, this study investigated the business model concept and PSS characteristics in the literature. The findings underpinned the definition of the framework's parts, which includes business context, types of PSS and its characteristics. The resulting framework was then applied to guide the adoption of PSS in a machine tool manufacturer, providing research insights and illustrating an attempt to introduce PSS using the business model concept.

The next section describes the research methodology. Following, this paper presents the literature review, the framework and the key results of its application. At the end, the empirical and theoretical contributions of this study are announced.

2. Methodology

This research follows an inductive approach, looking at specific cases to underpin further development in the field of product–service systems. Due to this fact, literature review and case study were employed, which are exploratory methods (Karlsson, 2009). The literature review shows the current state-of-the-art and leads to the development of a framework, which is then applied through a case study to complement theory and provide a reference for progress in the adoption of PSS. Although the case study illustrates the use of the framework in a real context, it has a conceptual nature. Thus, based on MacInnis (2011), this study follows a conceptual goal which can be defined as “explicating” with a “delineating” characteristic. This classification is appropriate since this research proposes a framework that describes the main entity, i.e., the product–service system, and can be used to guide its adoption.

The literature review and case study methods were used to set four research stages: the identification of characteristics and typology of PSS, the investigation of business model concepts, the development of the framework and the application of the framework by means of a case study.

The first two stages involved searches in academic journals and conferences. Case studies covering the description of the companies' businesses that have already implemented PSS were used to identify the PSS characteristics. In addition, an investigation of PSS typologies was conducted to show differences among PSS characteristics. At the end, an analysis of the business model literature clarified the topic and aided in the selection of a business model concept. Results of these two phases are presented in Section 3.

The third stage, development of the framework, started with the classification of the PSS characteristics according to the business model elements. Then, the business model concept and PSS types, defined in the first two stages, were used to establish the framework, which is presented in Section 4.

The last stage embraced the case study on a machine tool manufacturer. The adoption of a single case study is considered appropriate in cases of theoretical immaturity of the research topic, which fits into

the PSS research status. A benefit of a single case study is the possibility of a deep investigation of a specific phenomenon (Dyer & Wilkins, 1991). Guidelines proposed by Voss, Tsikriktsis, and Frohlich (2002) and Yin (2003) were employed to plan and execute the case study. They suggest three key activities for the execution of case studies: definition of a protocol for collecting data, data collection and data analysis. The protocol was built upon the framework and underpinned the development of a workshop attended by the company's board members. Data were collected during the workshop, through annotations of research team and the use of sticky notes filled by the participants with the most relevant facts. Then, the analysis focused on verifying whether the framework is capable of supporting the adoption of PSS through the application of the business model concept. It is important to mention that the data collection and analysis involved the participation of company's members and took into account their opinion. Results of the case study are presented in Section 5.

3. Literature review

3.1. Product–service systems (PSS)

3.1.1. Background on PSS

Product–service systems comprise combinations of products and services to fulfill customer needs (Goedkoop et al., 1999). According to Vargo and Lusch (2004), PSS focuses on offering services and the product becomes simply the means to provide the offer. In other words, products are seen as distribution mechanisms for service supply (Kowalkowski, 2010).

Exchange processes and relationships are central in PSS (Vargo & Lusch, 2004). The locus of value creation shifts from the PSS provider to the process of co-creation among different players (Jacob & Ulaga, 2008). Thus, the competitive advantage emerges through the co-creation and co-production of activities among PSS providers, customers and value network partners (Grönroos, 2011; Lusch, Vargo, & O'Brien, 2007; Vargo & Lusch, 2004).

Since value is provided to customers through services rather than products, the introduction of PSS requires changes in the way through which the business is conducted. An example is the involvement of the PSS provider with processes related to the use of products. PSS providers must support clients and ensure the usefulness of products throughout their lifecycle (Tan, 2010). Traditionally, customers purchase a product and become responsible for its performance, maintenance and disposal. In PSS, ownership of a product is not necessarily transferred to the customer. For example, a manufacturer can remain responsible for the product after its sale (Baines et al., 2007).

PSS brings benefits to both sides of the value chain – customers and companies (Baines et al., 2007; Tan, 2010), as indicated in Table 1, which describes advantages of each side.

Furthermore, PSS is considered a promising system towards a more sustainable society (UNEP, 2008). In fact, PSS supports a new mindset, with companies abandoning the transformation of resources to generate revenue and focusing on providing value and social quality to their customers (Sousa et al., 2010). An example of an environmental benefit

Table 1

PSS advantages for customers and companies (Baines et al., 2007; Tan, 2010).

Customers	Companies
More customized supply.	New market opportunities and competitive advantages.
New functionalities and combinations of products and services to better suit customers' needs.	Access to information about the product's performance during its use phase.
Responsibility for monitoring and end-of-life transferred to the manufacturer.	Higher profit margins achieved by providing services instead of products.
Higher total value delivered to the customer by increasing service elements.	Strengthening customer relationships increases loyalty.

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