Chapter 2
Engineering Value Co-Creation in Product-Service Systems: Processes, Methods, and Tools

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ABSTRACT

The integration process of products and services is still a growing trend in today's globally competitive market. To properly answer to the need of the companies to deliver integrated solution, from the mid-2000s, several research groups have worked on the development of methodologies to support companies along the engineering phase. Even if a plethora of methodologies and methods have been developed to support the Product-Service System (PSS) creation, there is still scarce attention on the way value is co-created with the customer. It becomes essential to change the perspective of the methodologies and to identify methods able to change the customer's role from a passive user to an active co-creator of value. In this context, the aim of this chapter is to understand which methods can be used to enhance value co-creation through an active involvement of the customers along the PSS engineering process.

INTRODUCTION

Recently, lots of manufacturing companies facing commoditization of offering and intense competition have been attracted by the possibility to differentiate themselves from competitors by introducing product related *services* in their traditional portfolio (Ostrom, et al., 2015). As a result, manufacturers are moving further up in their value chains and incorporating service related activities that may, previously, have been undertaken by their own customers (Bigdeli, 2016). This transition from a product-based to a

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service-based business model, defined as *servitization of business* (Vandermerwe & Rada, 1988), might allow companies to develop long-standing and secure relationships with their customers as well as long-term revenue streams that are not as reliant on the potential of new product sales in order to overcome low-cost competition and even shutting out competition (Bigdeli, 2016).

However, it is well documented that in order to this transition towards an enlarged and integrated product-service(s) value proposition to reach out its expected optimum payback, it can only happen if supported by the proper tools and methods for its design, implementation and management (Gebauer, Fleisch, & Friedli, 2005). Moreover, manufacturing companies are pushed nowadays by the market to create solutions integrating new technology-enabled services in their products. These changes and advances in technology (e.g. Internet of Things, Cyber-Physical Systems, etc.) are leading to a proliferation of revolutionary value-added services. Furthermore, they are also changing how the customers and all the stakeholders serve themselves and interact along the solution lifecycle (Ostrom, et al., 2015).

Therefore, the evolution towards a "service-based business model" creates a strong need for methods and tools to handle and support the engineering of integrated solutions, namely: *Product-Service Systems (PSS),* by better engaging customers in the engineering process.

From the mid-2000s, many researchers have worked on the development of methodologies to support companies in the design of such integrated solutions (Aurich, Mannweiler, & Schweitzer, 2010) (Marilungo, Peruzzini, & Germani, 2015) (Shimomura, Hara, & Arai, 2009) (Medini & Boucher, 2016) (Pezzotta, Cavalieri, & Gaiardelli, 2012) (Pezzotta, Pirola, Rondini, Pinto, & Ouertani, 2016). However, if we deeply analyze these methodologies, developed in the *Service Engineering* and *PSS Design* research fields, the majority of them exclusively focuses their attention on designing solutions able to satisfy technically customer needs, which have been identified thanks to traditional marketing methods where the customer is passively involved (Alonso-Rasgado, Thompson, & Elfström, 2004) (Baines, et al., 2007) (Kett, Voigt, Scheithauer, & Cardoso, 2008) (Rapaccini, Saccani, Pezzotta, Burger, & Ganz, 2013) (Aurich, Fuchs, & Wagenknecht, 2006) (Shimomura & Tomiyama, 2005) (Maussang, Zwolinski, & Brissaud, 2009).

This is in counter trend with the new paradigm proposed by the *Service Science, Management and Engineering* and *Service-Dominant Logic* where the customers are a new source of competence for the organization (Mukhtar, Ismail, & Yahya, 2012). In this sense, to properly engineer a PSS and in particular its service component, it becomes essential to change the perspective of the methodologies and to identify methods able to the change the customers' role from a passive user to an active co-creator of value.

The purpose of this chapter is to provide a comprehensive analysis of how the customers can be involved, and which of the existing customer engagement methods can be adopted along the service engineering process. In this chapter, it is posited that we first classify the customer by looking at the role they can play during the value co-creation process (Agrawal & Rahman, 2015) and then we link the design methods that can be used along the service engineering process to enhance such roles.

In Section 2, we introduce the Service Engineering discipline and the SErvice Engineering Methodology (SEEM) as main reference methodology used in this chapter book. In Section 3, the literature in the area of value co-creation is analyzed and the various roles the customer can play during the value co-creation process are illustrated. In Section 4, the classification of the customer role along the service engineering process and the methods to be adopted in the different phase to support the customer engagement are presented.

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