

Product-Service Systems across Life Cycle

The Last Border for Servitization

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**Abstract**

The search for flexibility in the new product development (NPD) entails an increasing need for integration of services and products (servitization). Hence, companies aim at maximizing the customer perceived value, which may demand new capabilities development, besides marketing, engineering and manufacturing. This paper suggests that the ‘customer service’ functional area has a central role in this context, since it deals with customers’ problems in a front-end position, and its knowledge can help other functional areas to develop required capabilities for servitization. Moreover, the level of knowledge transfer (KT) among different functional areas is also proposed as an essential activity to improve the servitization process. Thus, the aim of this paper is to investigate the moderator role of both the customer service area and the KT activities in the impact of the NPD related functional areas on servitization performance. For this purpose, the paper presents a cross-industry survey with 83 Brazilian companies, analyzed by means of an Ordinary Least Square (OLS) regression. Results show that the last border to transcend the servitization barriers in NPD is the integration of the customer service area to the other main functional areas of NPD. Moreover, our findings indicate which areas are the most critical ones in order to address an intensive KT activity to enhance the servitization performance.

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**1. Introduction**

Traditionally, the inter-functional integration in new product development (NPD) has been approached from three complementary perspectives: (i) marketing, (ii) engineering and (iii) manufacturing [1,2,3]. However, in last decades, the NPD process has evolved through flexibility increase according to the offer (i.e. adaptability to specific customers’ needs), and by means of services aggregation to maximize the customer perceived value [4,5]. This services’ aggregation process is understood in this paper as the servitization process of NPD activities [6]. In this context, the aforementioned three functional areas’ perspectives may have narrowed the contribution for servitization development, since they are restricted to the traditional NPD business model.

Therefore, there is another input that should be considered in cross-functional NPD teams: the Customer Service area. This area presents an important role, since it deals with the front-end customer’s experience and product utilization [7]. The application of the knowledge attained from the interaction between customers and products may help other functional areas to develop new capabilities in order to better integrate products and services’ solutions during NPD. Moreover, prior literature recognizes that the intensity of knowledge transfer (KT) among different functional areas is essential to improve innovation [8,9]. Therefore, this paper also proposes that inter-functional KT is an activity that enables to enhance the contribution of different functional areas to servitization performance, since it provides a shared vision of the servitization requirements.

Thus, the aim of this paper is to investigate the moderator effect of both the customer service area and the KT activities in the impact of the NPD related functional areas on servitization performance. The proposed method comprises a cross-industry survey which was carried out with 83 Brazilian companies. The outcomes of this research allow determining which functional areas have customer service area and KT activities as central moderators towards the achievement of a better servitization performance. Therefore, this paper offers a new perspective of inter-functional knowledge transfer by proposing that companies should look inside their processes to consolidate knowledge about customer experience in the customer services area and apply it to the NPD process. These inputs are key for servitization and may reinforce the initiatives on KT activities in order to promote better servitization performance.

## 2. Theoretical background

The service contribution for NPD has been confirmed in product-service system (PSS) and servitization literature. Both streams highlight common contributions, such as: product customization [10], adaptability, expandability and customization of the offer [11], improvement of customer's loyalty [12], extension of perceived value in products' offer [13] and change of the interaction with customers from transactions to relationships [14]. Due to a widely deemed relevance of services' inclusion in products, researchers have proposed several strategies to accomplish this offer integration.

Based on a bibliometric study, Oliveira *et al.* [15] identified four distinct theoretical streams applied to this matter: (i) servitization, business model and uncertainties in implementing PSS; (ii) technical aspects (production planning, Radio-Frequency Identification and industrial PSS); (iii) sustainability and PSS; and (iv) service engineering. The first and the fourth streams aim at proposing processes that allow the development of successful product-service joint solution. However, the first one focuses on strategy and capabilities [16], which are the main inputs of NPD; while the second one studies the actors for Integrated Product Service Offer (IPSO) [17], service engineering and design methods [7].

In order to combine both perspectives, the following topics of literature review focus on establishing a better understanding about the knowledge integration of the customer service area in the NPD process for servitization.

### 2.1. Customer Services role in Servitization Strategy

Customer Service is defined here as a specific functional area of the company responsible for providing customers with information and solutions during the product utilization. According to Tukker's [18] classification of services, this area may have the following responsibilities: (i) product orientation (e.g. product-related service and advice and consultancy); (ii) use orientation (e.g. product lease, product renting or sharing and product pooling); and (iii) result orientation (e.g. payment per service unit). Thus, this area has

an important contribution to the company's servitization process, since it plays a front-end role with customers.

Baines *et al.* [6] understand servitization of products as the process in which a company moves from a product offer to a PSS by adding services to products. Meanwhile, Tukker [18] sees it as a process in which the orientation of the offered service changes from just supporting products to being result oriented and the main component of the offer. This definition is aligned with the idea of Vargo and Lusch [19], who state that every product delivers a service. In both cases, the company starts with a pure product offer and needs to add service competences to its body of knowledge aiming an increase on customers' value perception.

In this sense, the service offering and customer experience knowledge is part of the company competences and, as suggested by Cohen and Levinthal [20] in absorptive capacity theory, could be the key to recognize the value of new external opportunities in the services domain, and apply it to commercial purposes. Within servitization context, the servitization performance is measured in terms of its capacity to promote products. The scale proposed by Raddats *et al.* [21] is representative of this point of view, since they consider the following services' achievements: (i) selling new products to existing customers; (ii) winning businesses with new customers; (iii) retaining existing customers; and (iv) enhancing products' performance.

### 2.2. Customer Services role in the Servitization of NPD

The NPD is a continuous [22] and multidisciplinary process in manufacturing companies that expect to be innovative [23]. It includes different disciplines and functional areas in order to make the strategy explicit and to meet customers' needs [24].

Initially, the engineering area was considered the first responsible for product innovation in a generation marked by technology push, in which the most significant investment was in R&D programs. Next, marketing gained space as a source of ideas for products and with a strategy focused on growth and diversification; this stage was called 'market-pull'. With regards to the manufacturing area, it has always been present since industrial revolution. It provided technology to enable the production of developed product and to obtain productive performance. Additionally, it became important in the scale economy for cost reduction [23].

A strong marketing orientation emerged from the need for customer services development based on experience creation [23]. In 1977, Shostack's work, "Breaking free from product marketing", highlighted the need to involve marketing in NPD processes, which triggered researchers attention to the influence of this functional area. This new field defended that, to be efficient, service marketing should demand an opposite view from conventional NPD practices [25]. Customer Services aimed at covering such gap in companies.

Information derived from servitization has been emphasized as one of the future sources of firm's revenue [26], and customer services' knowledge can provide it to the servitization strategy during the initial steps. Outsourcing this activity may present risks and deviate from market

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