

Product-Service Systems across Life Cycle

Requirements for product-service description at e-marketplaces in the manufacturing domain

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Abstract

Industrial procurement is exposed to an increased service-oriented supplier market. However, industrial e-marketplaces for product-services that are accepted by buying experts are rare. Possible buyer benefits of e-markets such as access to a wider range of markets, accumulation of required information, and increase of market transparency cannot be utilized. Currently, product-services are at best traded within closed silos that offer mainly manual search and comparison capabilities through a web storefront. A lack of existing “generic” industry-sector-specific concepts for service description is a main problem that the potential of e-commerce is not utilized for product-services. This article analyzes the requirements for service representation at e-markets regarding the manufacturing domain. State-of-the-art concepts of business service description are considered at the beginning of this research. Because of the heterogeneity of product-services, a case study was conducted in order to identify relevant product-services in the manufacturing domain. In order to study a real case scenario, a “first-tier supplier” in the automotive industry was used in this research study. This company is specialized in systems engineering and systems serial assembly. Typical product-services of this company source are manufactured products needed for serial production, for example, casting, milling, turning, or injecting molding parts, alongside a wide range of services. Investigating the professional purchasing department was necessary to analyze the requirements in service description throughout the complete buying process, commencing with the conceptual product design stage until the serial product delivery.

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1. Introduction

Industrialized countries are subject to structural change toward a service society, while the industrial sector drifts to emerging and developing countries [1]. Because of the increased competitive pressure resulted from the globalization of markets, manufacturing companies of industrial countries are forced to add service offerings to their product portfolio to differentiate their portfolio from the competitors. Manufacturing companies try to keep their competitiveness by shifting to more service-oriented businesses [2]. Another reason for the increased service orientation in the

manufacturing domain is the concentration toward core competencies and outsourcing of activities, which was an important management focus within the last decades. Last but not least, market requirements force industrial corporations to provide customized solutions rather than simple mass products, which imply the need to add service offerings to products [3,4]. Since the industrial revolution, the research focus has been mainly upon the manufacturing of goods rather than on the provision of services. The importance of service provision increased in industrial countries and leads to a lack of research because of the essential differences in the nature of services compared with products [5]. In most economies,

the service sector is growing; however, the productivity in this sector is typically much lower than that in the industry sector. Service science tries to understand services to improve the efficiency of creating new services and to improve the productivity in this sector [6]. Despite the fundamental change of paradigm, the current state of research regarding the integration of products and services is insufficient, certainly because of the novelty of the topic [7]. Research in product-service systems (PSSs) is one specialism of service science, because of the importance of the combination of products with services. The term “product-service systems” has been defined as “a marketable set of products and services capable of jointly fulfilling a user’s need” [4]. The expression PSS is mainly used in B2C context while “industrial product-service systems” (IPSS) is rather used in the B2B environment. This article focusses on IPSS.

2. Problem description

Industrial procurement is already exposed to an increased service-oriented supplier market. However, no appropriate public e-marketplace for product-services could be identified, that is, both well-known to buying experts and widely accepted by them. Neither the supplier search and evaluation process nor the order execution process is supported by e-marketplaces appropriately, considering industrial services [8]. Dorloff et al. [9] claim that industrial procurement does not utilize possible benefits given by the use of electronic marketplaces at sourcing of services and service-enhanced products. Possible buyer benefits of e-markets exemplarily mentioned by Stockdale and Standing [10] are access to a wider range of markets, accumulation of required information, reduction of transaction costs, or increase of market transparency cannot be utilized. Only sell-side systems are currently used for description-complex offerings as product-services imply. Services are at best traded within closed silos that mainly offer manual search and comparison capabilities through a web storefront [8]. This proprietary approach leads to deficient information to service offerings and a poor comparability.

A main problem that the potential of e-commerce is not utilized for IPSS is a lack of existing “generic” industry-sector-specific or intersectoral concepts for service description [9]. Services are compared with products that are more difficult to describe because of manifold reasons. A service is the process of doing something, transforming provider’s resources and even input of the consumer to an individualized outcome. Hence, service description needs to specify the service provision process besides the service result. Product description only needs to specify the outcome/result, thus the product. Another reason that makes service very difficult to describe is its heterogeneity. The emergence of Internet marketplaces for business services is driving the need to describe services, not only from a technical level as web service requires, but also from a business and operational perspective [11].

3. Methodology

This article commences with a view into the literature to the state-of-the-art concepts to service description. Services are very heterogeneous, and hence, subsequently a case study was chosen to identify IPSS with a set of relevant product-enhancing services in the manufacturing domain (automotive domain). The identified services are analyzed according to their specific characteristics, in order to understand their specificities compared with other service domains. Industrial e-markets are used within industrial buying departments. Hence, the observation of the real case took place in the purchasing department. Last but not least, expert interviews with these purchasers were conducted, so that a discovery of the purchasers’ requirements for service representation in e-markets could be completed.

4. State of the art

One of the most cited articles at the beginning of service science was written by Vargo and Lusch in 2004 [12], “Evolving to a New Dominant Logic for Marketing,” which sees service as the process of doing something—for and with another party. This concept of “value co-creation” moves the view from the producer to a collaborative process. Value is co-created with the customer in the service provision process. The basic abstraction is the service system, a configuration of people, technologies, and other resources that interact with other service systems to create mutual value. Many systems can be viewed as service systems, including families, cities, and companies, among many others [5].

4.1. Non-functional properties

O’Sullivan [13] describes non-functional properties (NFPs) of services aiming to represent all types of services domain independent, that is, conventional, electronic, and web services. He made extensive use of object-role modeling (ORM) to develop a taxonomy that includes derivation rules. He describes a comprehensive set of NFPs consisting of temporal and locative information to describe the availability of a service. He specifies service obligations, such as price or payment and models discounts and penalties. Also, service “Rights” are described only to mention the access to a service, a recourse, suspension, termination, privacy, refusal, disclosure, extension, or the warranty rights of a service. A further descriptive NFP is the language that is used for interaction between service stakeholders. Properties that describe trust, quality, and security are also part of this taxonomy.

The taxonomy of O’Sullivan gives a very comprehensive understandable overview of NFPs even if some described properties are very abstract such as the quality of services. In the approach of NFP, the area of capability, the functional perspective to services, is seen as the boundary of the taxonomy.

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