

Risk management in hybrid value creation

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ABSTRACT

In the market for tangible goods, there is an increasing shift from the production of single individual products towards individualized mass customization. In contrast to this, so-called hybrid value bundles are getting more and more importance in achieving market share and in allowing for differentiation from competitors. Hybrid value bundles are integrated solutions combined of tangible and intangible goods. For these complex solutions, subparts are delivered from different suppliers and are bundled by a focal supplier. These bundles are delivered as a single solution to the customer. Heterogeneous suppliers within the supplier network require a complex supplier relationship management. Classic supply chain management techniques fail because of the specific requirements of hybrid value bundles, e.g. strong customer integration, different product lifecycles of the individual components or incompatible product specification. One key issue in supplier management is risk management. For this, the focal supplier has to evaluate its suppliers according to risk characteristics and then choose to take those that implicate the lowest risk. In hybrid value creation, one serious problem is the availability of guaranteed information. Especially for service components, relevant information is not available, not assured, or the supplier does not want to provide them. Therefore, a risk management model for hybrid value creation has to deal with incomplete, varying information. In this article, a risk management model is presented, which takes care of the specific requirements of hybrid value bundles in complex supply networks. This risk management model serves as a risk assessment framework for a focal supplier to identify supply chains with the lowest risk for a specific offering.

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1. Introduction

Gaining sustainable competitive advantage towards competitors is a challenging task for every company. One possible answer to this challenge is the offering of innovative, customer-focused products. Central to this strategy is the development and offering of so-called hybrid value bundles or product-service systems. Hybrid value bundles are a specific kind of product bundle, which consist of synchronized, highly-integrated products and services with the goal to solve a specific customer problem [27]. This tight integration increases the customer value of hybrid value bundles which exceed the sum of the values of the individual sub-services [30]. With these integrated solutions in their product portfolio, companies are able to distinguish from their market competitors to generate higher margins and promote the development of long-term, strong customer loyalty [12]. In addition, product efficiency can be increased by the individual adaptation to customer needs [4] and higher added-value is generated for both the producer and the customer [19].

Current research results show that the management of value bundles leads established commercial processes to new challenges in

information systems. Thus, value bundles cannot be managed sufficiently in commercial processes like supply chain management for example. The research in the range of the hybrid added value concentrates upon models and methods of the construction of such solutions. From a procurement perspective, we note first results in a reference model for the strategic procurement process of value bundles in supply networks [46]. The discussion about more specific aspects of value bundles in value networks like risk management is still incomplete.

The development and provisioning of a hybrid value bundle do not usually only involve a single company, but often an entire network of independent companies that make a contribution to the hybrid value bundle. Reiss and Präuer showed in an empirical study that the most appropriate structure for the development and provisioning of value bundles is strategic value-added partnerships, networks and cross-company project-oriented cooperations [40].

Regardless of the origin of the network, usually a large number of suppliers and subcontractors are involved. Each of these participants engenders a risk to the network, and it changes the risk assessment of individual supply chains. The larger and more branched the network is, the more complex the associated risk is. Classical risk management methods for supply chains are not suitable for the specific requirements of value bundles [44]. But in industrial practice, the need exists for risk management adapted to the specific characteristics of hybrid value creation. This article closes this gap in research and industrial practice by

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proposing a risk management model suitable for hybrid value creation. The proposed model is developed in three steps. First based on a literature study, we identify specific requirements for hybrid value creation, which may be regarded for risk management. Second we make use of a scoring model as the foundation for the new model, since a scoring model might be the one of the best approximations for risk management in hybrid value creation [44]. In a third step we formulate the basic concepts of the model and the model itself in a formalized way.

The article has several objectives: In the first part (Sections 2 and 3), we give an introduction to the current state of research of risk management for hybrid value creation, and we describe our research approach. This work makes use of a design science approach with the main goal of the construction of a risk management model. The second part (Section 4) describes the construction of the risk management model. The model consists of several definitions for key concepts and the main definition of the risk management model. The third part (Section 5) covers the evaluation of the proposed model. This evaluation consists of two parts: first a formal evaluation to prove the validity and the consistency of the model. Second, a simulation is conducted by using a software artifact to study the behavior of the model in certain settings. The fourth part (Section 6) discusses the results from the evaluation. In this discussion, two main aspects are identified: calculation costs and risk control. The final section concludes with a summary of the work and an outlook for further investigations on the topic of risk management for hybrid value bundles.

2. Research background

2.1. Hybrid value creation

With the decline in economic importance of pure products and services because of lacking differentiation, combinations of physical products and services being offered as bundles have become more and more influential in the industry. These combinations are called value bundles and are a combination of physical products and services as well as additional intangible values like warranty extensions for example. These combinations are specially tailored to solve an individual customer problem [24,47]. Value bundles can be subdivided in standardized physical products and standardized services as well as customized products and customized services (see Fig. 1). The division into these four elements is not dichotomous, but the transitions between these elements are linear in the sense that there are several possibilities to combine these elements into a value bundle.

The main goal in the offering of value bundles is solving a customer problem [9,41]. Examples for service components which may be bundled with physical products are extended service level agreements, availability guarantees, the output of a machine, performance/full

service contracts, performance guarantees, financial offerings, consulting, licenses or rights include. However, services, rights, or service level agreements may be involved in a hybrid value bundle.

Integration is a key concept in developing and providing value bundles. This integration means not only the bundling of products and services for the purpose of a combined solution, but also process integration on customer and supplier side [29]. The degree of integration between different services is variable [17] and has a direct impact on the services. On the one hand, there are standardized physical products combined with services directly related to the physical product (e.g. a mobile phone with a price plan). On the other hand, there is the business case of performance contracting where the offer of a value bundle consists of several service agreements, to the customer with no tangible asset at all (e.g. the guaranteed output of a laser printer, counted in printing pages per day) [13]. With a high level of integration between the two units, the provision of the service component is strongly dependent on the tangible good component. These highly integrated value bundles are often offered to customers as service agreements and from a customer perspective it is not possible to separate the tangible goods from the services (see Fig. 2).

The customer orientated creation of value bundles offers companies the possibility of diversification and leads them to significant market advantages. But it also presents new challenges for the subprocesses along the value chain. A key design feature of a hybrid value-added process is the foundation of network structures. Reiss and Präuer [40] showed in an empirical study that cooperative organizational forms, such as strategic value-added partnerships, networks and cross-company project-orientated cooperations are the most appropriate organization forms to provide value bundles. Because of the high dynamic customer orientated variations of value bundles, they cannot be produced as bulk goods, so the network must be created by the offering company at the beginning of the manufacturing process. This also means that a value-added network might not be used for another value bundle. The cooperating companies have to join forces in dynamic networks that can be configured according to requirements of a specific value bundle at its added-value processes (see Fig. 3).

Hybrid value bundles require a specific supply chain management adapted to the characteristics of hybrid value creation [7]. There is a need to adapt existing management methods, which are primarily focused on the supply chain management for tangible goods to fulfill the specific requirements of hybrid value creation. Recent research on this issue has shown that hybrid value bundles create new issues in procurement environments like SCOR [5] or cloud computing [6].

2.2. Risk management for suppliers

For the definition of risk, several definitions appear in the literature. In general, risk can be considered as the possibility for danger, damage, loss, injury or other unwanted effects [23]. Following Warner, risk can be regarded as a possibility for a certain unfavorable incident during a given time period or as a result of a particular challenge [52]. A more formal definition of risk can be obtained by Mitchell. He defines risk as a combination of the probability of loss $P(loss_n)$ and the impact of the loss $I(loss_n)$ for the organization, whereas n denotes the number of different risks, losses or impacts [36]. This means that risk in general can be decomposed into several partial risks. Every partial risk is related to its own loss and its own impact. These partial risks may be combined to a global risk by applying formal probability theory [23].

In industrial practice, risk management of suppliers and supply chains has a long tradition and several established methods. Risk of a supply chain may be defined as “...any threat of an event that might disrupt normal flows of materials or stop things happening as planned.” [2]. In the building industry, for example, the risk of a supply chain may be described as “...uncertainty as to the final cost, duration and quality of the project.” [2]. In this research, we define the risk for a supply chain as the probability, that some delivery provisions might not be

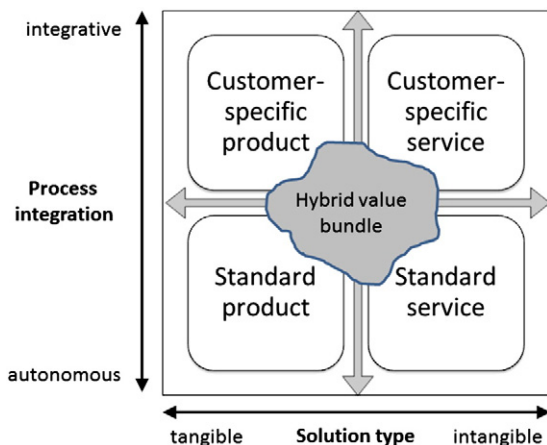


Fig. 1. Component types of hybrid value bundles.

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