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Designing Customer-Specific Product-Service Systems in B2B Markets

A Consecutive Framework for Development and Configuration Management

Suppliers of Product-Service Systems (PSS) pursue the objective of creating long-term customer relationships. In order to achieve that, PSS in Business to Business (B2B) markets need to be designed as a tool for PSS suppliers and clients, supporting them in achieving their certain business goals. One approach can be applied by identifying common goals and aligning all PSS-related management activities. This paper shows how this approach can be designed in a systematic way. Therefore, a consecutive framework for the development and configuration management of customer-specific PSS in B2B markets is derived. Applying it to a case study of food industry, the framework's relevance and its transferability into practice is demonstrated.

1 Introduction

Product-Service Systems (PSS) help combining complementary products and services to an integrated solution. According to their relevance for customers' business processes, they become part of strategic concepts (Meier et al. 2010). That is due to the fact that supplying complete solutions means "servitizing" (Kastalli and Van Looy 2013) and being integrated into the customer's process of value creation. Consequently, changes in the market of a PSS customer might require adjustments of the PSS. PSS suppliers make use of that by supplying individual customized PSS and thereby standing out from competitors (Azarenko et al. 2009). Nevertheless, PSS suppliers need to keep their PSS portfolio aligned with individual customer requirements while managing PSS development activities (Barquet et al. 2013). Since the aspired long term customer relationships are mainly realized through services, the focus for PSS management activities lies on the service component of a PSS (Laurischkat 2012). However, designing and developing a PSS is a complex task since an unpredictable lifecycle of the solution and a high number of interactions between actors exist. All the same, profit generation the commercial success critically depend on the conceptualization and development of PSS (Pezzotta et al. 2014).

This paper introduces an approach for the required development and configuration management, when supplying individually customized PSS. Addressing PSS suppliers, this approach helps to perform PSS management activities efficiently and targeted, assuming that the establishment of long term customer relationships is considered as an universal strategic goal. Therefore, a conceptual framework is derived comprising the layers strategy as well as configuration and development as fields of interaction and cooperation between PSS suppliers and customers. The relevance of such a framework can furthermore be attributed to growing collaboration needs of different departments such as sales or key account management, marketing, and (product-) development. Especially in the field of product

development the application of standardized instruments like market analysis and representative surveys is problematic if the focal point in Business to Business (B2B)-relations lies in customer-specific requirements.

This article is structured as follows. Section 2 introduces the methodology we have used to conduct our research. Section 3 investigates key-account-specific PSS, focussing on customer-specific PSS and the pertinence of PSS in B2B markets. Section 4 deals with management aspects of PSS in B2B markets, providing five fundamental design hypotheses and connecting them within a consecutive framework. Transferring the results into practice, we apply our framework within a case study of the food industry presented in section 5. Followed by a discussion in section 6, we reflect our results with respect to related work and further PSS-related methodologies. Section 7 draws conclusions from our research approach and gives an outlook for further research activities.

2 Research Methodology

The research presented in this paper aims at a theoretical placement of the product-service systems concept in B2B segments. Most of the literature investigating in the research field of PSS mainly focus on the design of PSS exemplified by manufacturing companies producing cost intensive capital goods and providing product-related services, like field service (Aurich et al. 2009; Niemöller et al. 2014). Only little research has been done, regarding the design and configuration of PSS as a function of their placement in B2B or B2C markets. Indeed, this virtuality affects the product and service development of the PSS provider since in B2B markets the customer is not always the final consumer which pays for a traditional product (Isaksson et al. 2011). Employing the concept of explanatory theory according to Gregor 2006 a framework is derived serving as a point of origin to situate the domain of PSS management in B2B markets. The framework will provide theoretical insights in order to provide a knowledge base about how the management of PSS for key accounts can be implemented in enterprises. The latter claim is validated by applying the framework in an explanatory case study (Oates 2006).

The research framework was constructed considering three different aspects of epistemology, especially in the field of information systems research. These three aspects are the proceeding, the role model and the artefact. Overall, the research approach is construction orientated so that it is essentially supported by the spectrum of design science (Hevner et al. 2004). Because of the low availability of references that examine PSS within B2B markets in a design science manner, a proposition for proceeding design-science-orientated research was selected, which enables a general view and a possible customization (Peffers et al. 2007). Furthermore, since this research was targeted as collaboration between theory and practice, the role model follows the scientific approach of action-design research (Sein et al. 2011). Therefore, the roles “Researcher”, “Practitioner” and “End-User” were included. The ultimate aspect refers to the type of artefact, which should be targeted as research result. On account of the intense communication between the different participants, a conceptual model was chosen for representing the respective framework (March and Smith 1995; Hevner et al. 2004). Next to the commitment on a conceptual model, it was decided that the possibility of deriving meaningful action for both academic research and practice is a mandatory requirement for the model. The different aspects are integrated as outlined in Figure 1.

The research process begins with the identification and motivation of the research problem. This step triggers the definition of objectives

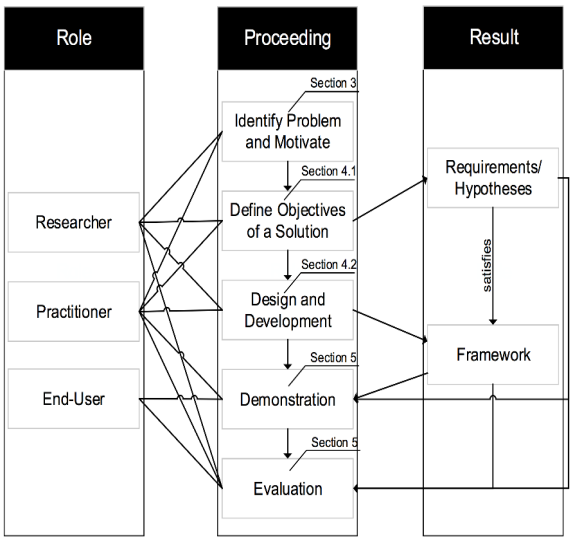

Figure 1: Process model of the research process, associated research artefacts and roles

of the solution, which was acquired in conjunction between the researchers and practitioners. Within these steps, hypotheses, namely requirements for developing an according framework for PSS development and configuration in B2B markets were specified (c.f. Section 4.1). In the subsequent step design and development, the framework was derived (c.f. Section 4.2). The end-users were included into the design process within the steps demonstration and evaluation. The demonstration was performed within the business context of the practitioner. Based on the feedback of the end-users, the setting for a specific case study was derived, which is part of the evaluation phase (c.f. Section 5). Throughout the steps, the framework was iteratively refined based on insights of the researchers and practitioners.

3 Key-Account-Specific Product-Service Systems

3.1 Customer-Specific Product-Service Systems

PSS emerge from the combination of products and services that form an additional value, often called "solution", when put together. While a product is characterized by its material attributes, a service encompasses the intangible components of value creation. Altogether, these elements and their mutual relations build a system (Baines et al. 2007). A wide variety of PSS is seen in practice today and attended in academic literature (Boehm and Thomas 2013) as well as in standardization outputs from the German Institute for Standardization (DIN), e.g. Publicly Available Specification DIN PAS 1094 "Product-Service Systems – Value Creation by Integrating Goods and Services" (Thomas and Brocke 2009) or DIN SPEC 91294 "Use Cases for Mobile Assistance Systems in the Field of Technical Customer Service" (Nüttgens et al. 2014). The tendency to integrate material assets with services is caused by increasing global competitive pressures and rising customer requirements. In order to meet the objectives of setting apart from competitors, companies need to develop customized solutions which strengthen their competitiveness and maintain sustainable long-term customer relationships (Berkovich et al. 2011). This provides the opportunity to see new strategic market opportunities, market trends and developments (Mont 2002). The embedding of services into a product lifecycle enables the producer of products to add value to the underlying products (Tan et al. 2007). However, there are certain aspects of interdependencies within the product lifecycle phases of PSS which need to be considered while providing PSS. Figure 2 demonstrates the product lifecycle of a customer-specific PSS according to Laurischkat 2012.

External network partners supplying intangible assets such as services need to be identified within the phase of PSS-potential constitution and coordination. Within this phase, the division of work takes place if both components of the PSS is not provided by the same company. These network partners also

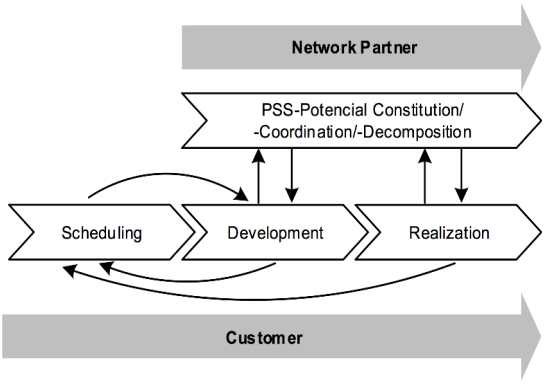

Figure 2: The customer-specific PSS lifecycle (according to Laurischkat 2012)

have an effect on the development phase of the PSS, which needs to be aligned to their service portfolio. This is the phase where the integration of different competences and services actually happens (Laurischkat 2012). In the case of a customer-specific PSS, the customer's perspective needs to be considered throughout the whole product lifecycle. Analyzing the customer's requirements and aligning the service offers of all participating actors, the PSS supplier needs to develop a PSS in a needs-oriented and customized way (Gruenblatt 2010). Integrating the customer as early as possible into the scheduling phase and, further on, into the development phase, is a significant premise for success (Baines et al. 2007). Moreover, the PSS provider needs to integrate all participating actors (network partners), establishing a synergetic partnership in the process of value creation and service delivery.

3.2 Product-Service Systems in B2B Markets

While PSS designed for anonymous customer markets focus on general satisfaction of customer needs (Thomas et al. 2008), PSS that address B2B markets require the analysis of specific demands in order to realize particular benefits and advantages for business clients.

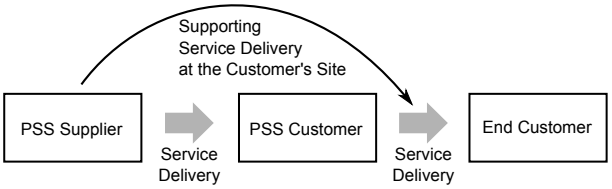

Figure 3: PSS in the context of a supply chain partnership

A crucial characteristic that separates B2B markets from Business to Consumer (B2C) markets is the relatively little number of buyers and their tendency to purchase higher amounts (Serve et al. 2002). Large buyers within B2B markets (key accounts) tend to play a more important role in a PSS provider's business model since their loss or recovery may cause major implications for business relations. Therefore, vendors are willing to invest into the process of creating and maintaining relationships to key accounts (Easton and Araujo 2003). While the buyer site of a B2B relationship focuses on service delivery for anonymous customer markets, the supplier site performs for a specific market segment, containing commercial buyers solely. Service offers are extensively evaluated by demanders, before establishing a cooperation with the supply site (Kittinger 2011). This sort of collaboration which is also called "vertical cooperation" allows an optimization across different levels of a supply chain (Gruenblatt 2010; Pawar et al. 2009). From a PSS supplier's point of view, who needs to consider his client's interest in fulfilling end-customer needs (Meier et al. 2010), the process of requirements analysis gains a new dimension (c.f. Figure 3).

Consequently, PSS suppliers need to integrate not only their own sales strategy principles but also those of their clients into the process of PSS development and configuration (Manzini and Vezzoli 2003). This strategy is inherent in common approaches of PSS engineering. A B2B relationship in this particular

case can be seen as a socio-technical system which is characterized by interdependencies between product, service and participating actors (Meier et al. 2010).

4 Development and Configuration Management of Product-Service Systems in B2B Markets

Based on the previous explanations and theoretical considerations, five design hypotheses for the management of PSS addressing commercial customers are deduced in the following section. Based on this, the hypotheses are transferred into a consecutive management framework.

4.1 Design Hypotheses for the Management of Customer-Specific Product-Service Systems

Winning new customers is often harder than maintaining existing customer relationships. This occurs particularly in B2B markets where products and services have customer-specific characteristics and therefore cause high development efforts. The smaller the potential client base is, the more a PSS supplier is forced to focus on only few accounts. This leads to the following hypothesis:

Hypothesis 1 *Establishing long-term customer relationships is an universal strategic goal of PSS suppliers in B2B markets.*

Long-term business relationships can only exist if both the supplier and its client reap benefit from the relation. This is only possible if the relationship corresponds to both partners' strategic principles. Therefore, the design of PSS must adapt mutual and strategically relevant goals of a PSS supplier and its client. It is important to operationalize strategic goals, ideally making them measurable. Measurable goals provide more precise requirements for PSS design. By their observation conclusions for further development and configuration of existing PSS may be drawn. Thus, a PSS supplier's task is to support its client reaching mutual (operational) goals by configuring an adequate customer-specific PSS. If he succeeds, the concerned PSS - and therewith the customer relationship - gains strategic importance for the PSS customer who advances in realizing his strategy by accomplishing corresponding operational goals. This holds if operational goals are derived from strategic goals. Thereby, the customer relationship is strengthened by making the PSS supplier become a long-term partner and thus achieving his own strategic goal. This conclusion provides the following hypothesis:

Hypothesis 2 *The design of PSS needs to be aligned with (ideally operative) goals, which are derived from either partner's strategy and which represent the PSS-associated value proposition.*

Due to possible changes in the customer's environment and possibly in the field of a concrete PSS application, continuous observation is necessary in order to verify if the value proposition is held. If goal achievement is compromised or threatened, reconfiguring the PSS makes it possible to counteract. Since the development of new service or product features is normally costly and time-consuming, it cannot be applied as a short-term countermeasure:

Hypothesis 3 *The value proposition of the provided PSS needs to be observed continuously. In the case of divergence, short-term countermeasures can be launched by reconfiguring the PSS.*

As globalization progresses, companies are exposed to increasing competitive pressures,

challenging them for creating innovative solutions. Surviving these challenges in the long-term means to adapt shifting customer requirements on the one hand while realizing new technological advancements and integrating them into the PSS portfolio on the other (Spiller 2012). This implies that missing trends can threaten existing customer relationships. Thus, in order to preserve long-term customer relationships, continuous adaption and optimization of PSS is required (Morelli 2002). Ideally, innovations are evolved and integrated into the PSS portfolio within this process. Thus, the management of development and innovation activities is of great importance:

Hypothesis 4 *The management of PSS needs to be conducted predictively in order to identify shifting customer requirements and emerging technological advancements that can be integrated into the existing PSS portfolio in atimely manner.*

The provision of services gains more importance in global businesses as a further channel for generating added value. In this context, knowledge intensive services are of particular interest, since they serve as a basis for innovation and modernization. This applies especially in the case of IT-based provision of knowledge intensive services. This principle can be transferred directly to the service component of PSS. The relevance of information systems regarding PSS development has been worked out by Morelli 2002 and Mont et al. 2006. In conclusion, the following hypothesis can be confirmed:

Hypothesis 5 *Information systems play an important role in terms of creating innovations within the service component of PSS.*

In the following section, the five design hypotheses are brought together within a framework with the aim to form a solid foundation for classifying PSS-related management activities from a PSS supplier's perspective.

4.2 A Consecutive Framework for Development and Configuration Management

The design of the following framework underlies the former mentioned hypotheses and focusses on three main layers which are relevant for corresponding management activities (c.f. Figure 4). As a first step, the strategic goals of both the PSS supplier and the PSS client need to be determined. Thereby, the establishment of long-term customer relationships is assumed as a strategic goal of the PSS supplier. Based upon the identified strategic goals, mutual and appropriate operative goals must be derived (strategy alignment) (Avison et al. 2004). They form the basis for configuring and applying a customer-specific PSS (configuration management) and thereby supporting the client to achieve his goals. As value proposition and goal achievement is the key for success and long-term customer relationships, the supplier's task is to observe the PSS performance continuously. In case of deviations regarding goal achievement, the configuration needs to be adjusted in agreement with the client. Where necessary, network partners need to be involved. Since it is conceivable to exchange network partners during reconfiguration, they play a minor role with respect to the main actors. Therefore, they are not depicted in the framework. Continuous development management, which needs to be conducted by the PSS supplier, ensures that relevant technological advancements or variations in the customer's requirements are identified in early stages. Decisions about the adaption of new technologies or about the development of new product or service features will be made by the PSS supplier, considering strategic and economical aspects. Ideally, innovations are created and integrated into the PSS portfolio, strengthening the company's competitiveness. In the context of development management, only the roles of PSS supplier and customer are distinguished in order

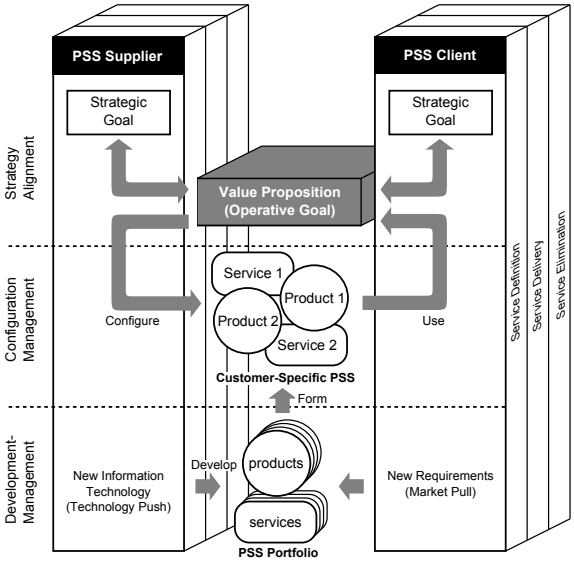

Figure 4: A framework for PSS development and configuration management

to protect development activities from possible limitations caused by external network partners. However, this is not intended to exclude the possibility of positive impulses from external network partners.

PSS management needs to be considered in the context of lifecycle management (Goedkoop et al. 1999). This makes it necessary to regard the PSS related management activities in the phases of service definition, service delivery and service elimination. In the sphere of strategy alignment, the determination of operative goals and a corresponding value proposition can be seen as an abstract service definition. The proposed value gets delivered by applying an appropriate PSS at the customer site. In case a PSS is not or no longer able to fulfil the defined value proposition, it needs to be eliminated (Gounaris et al. 2006). In this case elimination is seen as a strategic measure, reflecting how resources can be more effectively reallocated.

For configuration management, detailed service specifications are needed as it is important to focus on concrete issues in this process. This requires the consideration of real resources like available product and service features as well as the availability of network partners and their actual capacity as well as their potential to perform. In that respect, service definition implies to plan a PSS including its configuration details and required supply chain partners while service delivery involves the execution of this specific task. Furthermore, customer requirements or environmental circumstances might change over time (Thomas et al. 2008). Therefore, the elimination of ineffective products or services - respectively product or service features - or existing cooperation with network partners must be taken into account as a necessary option in order to maintain overall service effectiveness and economy.

In the area of development management, service definition denotes the identification of relevant technological innovations and market trends and, even more important, their concrete implications on the existing PSS portfolio. In this way, PSS suppliers aim to generate valuable research results. With respect to that, service delivery denotes the application of search results by integrating new or enhanced products and services into the portfolio, anticipating innovative technologies and the latest market trends. According to the special character of PSS, particularly the integration of products and (complementary) services itself is the key for innovative approaches opening up new market potentials. Similarly to the formerly described management layers, service elimination needs to be considered as an associated process of its own, since there might be development findings and outcomes that sustainably fail in creating market potentials.

Providing general guidelines, the proposed framework serves as a basis for structuring PSS related management activities. Hence, it can serve as a tool for implementing PSS portfolio management, including customer-specific characteristics. In the following, the

application of the framework is demonstrated by a case study of the food industry.

5 Case Study

5.1 Company Description

Spices & Delicatessen Inc. (S&D) is a leading vendor of spice and delicatessen products in Germany, comprising a portfolio of more than 3.000 articles (name and specific data have been anonymized). A range of 100.000 up to 200.000 products get shipped daily to Germany's food retail branch network, which includes over 30.000 locations. In addition, S&D offers specialized services for its customers, including logistic and merchandising tasks like distribution, replenishment, rack jobbing, tagging of goods and return management.

5.2 Application of the Framework

5.2.1 PSS Portfolio

S&D serves most of the approximately over 30.000 retail stores, as its products are included in the basic portfolio of most retailers. Product ranges and appropriate shelves can be customized individually, consulting S&D's customer service for portfolio conception. A major activity is given by the disposition of goods. With respect to regional and seasonal criteria, the right order quantity needs to be determined for each product before submitting the purchase order. Having placed an order, goods are shipped to retail stores by transport service providers (distribution). After the arrival, the goods have to be put into the retails shelves (stock replenishment). In the case of initial stocking or changes in the assortment, goods tagging is required. This makes it necessary to replace shelf bars, including each product's price and EAN (European Article Code). For replenishment and related work, S&D engages rack jobbing service providers that have to be supplied with specific know how and equipment. Overall, S&D delivers a hybrid service bundle consisting of products and complementary services for the supplied retail stores.

5.2.2 Strategy Alignment

Limited shop space needs to be used as efficiently as possible, in order to ensure profitability across the retail branch network. As a consequence, the utilization of space is a key aspect for assortment planning. The assortment is defined as the entirety of all products being offered by a retailer at a specific point of time. The assortment needs to be configured in order to maximize sales productivity per area (revenue per square meter). This assumes that the area elasticity of each product is known. This ratio indicates how much the revenues of an article increase (at the cost of remaining articles), when being presented in higher quantities. Since area elasticity is generally unknown and needs to be estimated, assortment planning and optimization is difficult.

The establishment of long-term relationships or respectively the positioning as a strategic partner can be seen as a primary goal of S&D as it is a way for maximizing revenues and achieving growth objectives. S&D's revenues depend on the achieved area productivity. Assuming a constant assortment and thus a constant demand of area, increasing area productivity implicates higher revenues for S&D products. Furthermore, retailers are likely to place higher quantities of S&D products, the higher their area productivity is, which again leads to higher revenues. This connection can be used for defining a common objective or, respectively, a service that S&D must deliver: increasing the area productivity of S&D products.

5.2.3 Configuration Management

High area productivity is difficult to achieve for retailers, as optimizing assortments and especially product disposition requires deep knowledge of S&D's products and the particular demand for spice products. Stock replenishment is time-consuming, since high numbers of products are placed in small areas. For

retailers who do not want to face the details of that certain market niche, this service can be delivered by S&D itself, based upon its product-specific market know how. However, S&D doesn't want to achieve the goal of maximizing area productivity at all costs. As an example, reducing the assortment by eliminating low selling products while reducing the needed area would lead to increased area productivity, assuming that no loss of attraction is caused by this action. This would cause revenue losses, and thus conflict with S&D's goal of maximizing revenues. From S&D's point of view, the maximization of area productivity shall apply on condition that revenues stay constantly or even increase. This is only possible if the number of placed products does not decrease e.g. by replacing low-selling products through high-selling ones or through the addition of new top sellers. S&D is interested in building long-term relationships with its customers. Therefore, the offered services need to resolve potential conflicts with respect to the economic interests of both business partners. Hence, it is necessary to define service levels and constraints. This helps to configure the PSS appropriately and thereby deliver services as defined (c.f. Table 1).

S&D's service for assortment planning and configuring individual product shelves within a portfolio conception (service 1) directly addresses the maximization of area productivity. S&D uses its knowledge regarding regional and seasonal determining sales factors when providing consulting services to its customers. Based on that, the design of individually customized, optimized shelves makes it possible to place more products per area, maximizing area productivity. At the same time, S&D secures a minimum amount of products being placed, depending on the selected shelf type, supporting its own revenue goals. Overall, an agreement concerning the business partners' cooperation is made and can be adjusted by the number, size and internal configuration (assortment) of the selected product shelves.

Disposition (service 2) is a further service offered by S&D. This service requires product-specific sales knowledge, including regional and seasonal determining factors. Too low order quantities lead to out-of-stock situations and imply revenue losses whereas overestimated order quantities create over-inflated costs of working capital. Despite of that, the risk of exceeding the date of durability increases, provocating returns. This shows that variations from the optimal order quantity lead to suboptimal stock situations and decrease area productivity. Therefore, S&D engages specialized service staff, using product-specific sales knowledge when making order decisions. Thus, using the disposition service creates value for either of the business partners.

Goods distribution (service 3) includes shipping directly to the retail shops. By accessing this service, retailers can free themselves from reserving central warehouse, commissioning and shipping capacities. Depending on a retailer's central warehouse capacities and his overall supply chain strategy, this may reduce costs, since the certain category of spice products includes numerous articles. Area productivity is affected by distribution services, in so far as misperformances (e.g. insufficient delivery reliability, caused by delayed or incomplete shipments) have a negative impact on it. Keeping that in mind, retail companies can choose freely to consume or discard the service.

Stock replenishment goods tagging and return management (service 4) can be seen as a basic service bundle without necessarily having its own strategic character. Nevertheless, S&D offers this service in order to complete its overall service portfolio. Accessing all offered services (1 to 4), supplying sales space and encashing product purchases are the only remaining activities a retailer needs to conduct.

Table 1: S&D's offered Services and Value Propositions

	Service	Value Proposition	*Service Definition* Service Level	Constraints	*Service Delivery* Action
1	Portfolio conception	Area productivity	Concrete area productivity, e.g. [€/m^2/day]	Minimum number of products placed, minimum area	Plan and optimize assortments, design and ship optimized product shelves
2	Disposition	Area productivity	Visiting frequency, order frequency	Access to market inventory	Continuous stock optimization and order management
3	Distribution	No central warehouse capacities needed	Delivery time, transport service contractor, pallet or packet types	Goods receiving times	Warehouse management, goods picking/packing and shipping
4	Replenishment	Full service level (in combination with remaining services)	Visiting frequency	Access to retail stores/point of sale	Goods replenishment and tagging, goods return management

As a key performance indicator (KPI), area productivity is constantly observed by S&D. By integrating data from underlying information systems, S&D tries to determine this KPI as precisely as possible. In case of deviations, taking countermeasures is possible through reconfiguring assortments and associated product shelves. The latter particularly allows adjusting the required sales area and thus influencing the indicator of area productivity directly.

In conclusion, it becomes clear that by supplying a configurable system of products and services, S&D provides a framework for balancing the goals that have been derived from the business partners' strategies. Moreover, S&D's offered services may be used and configured to support goal achievement, addressing the KPI of area productivity directly. Hence, the business partner receives support in the achievement of superior strategic goals which are connected to that certain KPI. Not least because each service is optional, the issues of lifecycle management play an important role, since each service is being defined, delivered and may be eliminated if no longer needed.

5.2.4 Development

In order to achieve sustainable success, S&D is investigating opportunities for further PSS development. On the one hand, the identification and realization of technological innovations is needed while, on the other hand, searching for trends and new potentials in the customer's environment is necessary for understanding customer requirements and integrating appropriate solutions into the PSS portfolio. As an example a trend in the retail environment is given by current surveys showing that clean and clear structures in the product presentation simplify the purchase decision and thus can contribute to increase sales performance. Therefore, S&D examines the implementation of so-called category placements. These category placements aim to place appropriate products next to each other from a consumer's point of view (category management). Under the shelves offered by

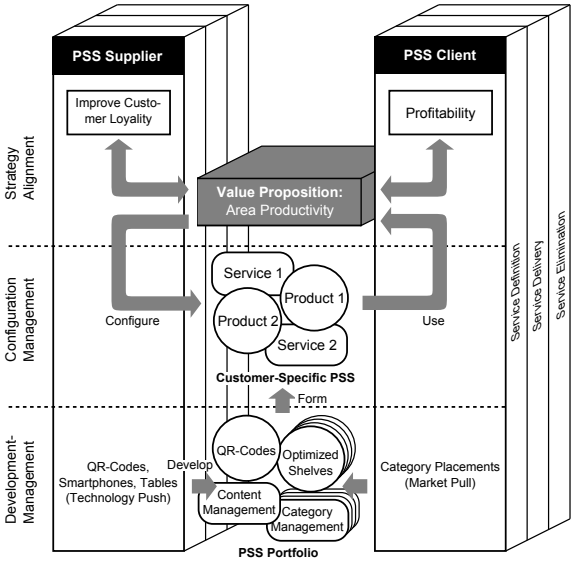

Figure 5: Application of the framework in the food retail industry

S&D, category management could be accomplished by dividing the presentation area into sections in which each section contains one certain product category. This would facilitate the end users' orientation and stimulate composite purchases within different categories (cross-selling). A service aligned to this special goal of cross-selling could consist of the development and placement of appropriate shelves and a measurement of the influence of these concepts on the sales result. This would require the analysis of clearance sales of particular stores in order to identify products belonging together more precisely from a customer view. Out of that, especially coherences can be analyzed that may go beyond the offered product range by S&D so that other food products can be included. The derivable findings out of the analysis can serve as a basis for the design of new shelving and product placement concepts (Figure 5), allowing continuous optimization of product presentation concepts.

Another trend is given by the provision of product specific information and services through the internet, addressing the end customers' needs. The editorial maintenance of conforming product information websites would be provided by S&D as a service. In this way it is possible to supply potential customers with up to date product content and data, facilitating their final purchasing decision. Examples for this in the food sector would be nutritional information or recipe suggestions with recommendations for the usage of the products. As a further development stage blog or chat services might be provided in order to respond to customer requests, sharing valuable product knowledge over the internet. Moreover, recommendations for composite purchases ("Customers who bought this product are also interested in ...") can be given in order to generate additional sales incentives and thus to encourage the achievement of the partners' objectives regarding sales and area productivity. To achieve all this in an easy and efficient way, S&D places Quick Response (QR)-Codes on product packages. Each of them encode a specific URL, directing the customer to the corresponding product website when scanning it with a smartphone. The concept of QR codes originally has been invented in 1994 in the context of vehicle and car parts tracking. The application of this technology in the consumer market started in 2011, helping to connect physical and virtual world.

Upon closer examination of the service component offered by S&D it is noticeable that some services are very knowledge-intensive. Thus, the disposition of the products requires knowledge about seasonally and regionally dependent demands of end customers at the point of sale. Although the rack jobbers engaged by S&D have product- and market-specific knowledge and experience, which they consider for their scheduling decisions, it would be conceivable to improve decision quality furthermore by providing information on product and market-specific historical clearance sales in real time. This could be achieved through

mobile devices used in the ordering process. In this regard, information technology would be an enabler for the implementation of a process innovation.

Also, consulting activities regarding the product line design represent a further knowledge-intensive service. These could be supported by information systems that allow an easy and intuitive configuration of product ranges and matching shelving systems. Ideally, applications like that need to be able to run on mobile devices so that those can be used as a presentation tool in sales and consultation conversations. Overall, the contribution and importance of information systems in the further development of innovative processes and services becomes clear. All these aspects are investigated systematically by S&D as part of the PSS development.

6 Discussion

This paper presents an integrated and consecutive framework for designing PSS in the context of B2B markets. As the field of PSS is complex, respective research approaches tackle various areas including engineering, coordination, management and alignment. Hence, the approach of conceptual modeling by using enterprise modeling frameworks (Jorysz and Vernadat 1990; Vernadat 2002) on this topic is an obvious instrument at a first glance. In fact, common enterprise modeling frameworks are capable of providing modeling artifacts and even languages for the conceptualization of products and services. However, as qualitative requirements with respect to PSS in B2B scenarios only play a minor role in the existing formal approaches, the don't help solving the problem this paper deals with. Such formal approaches are rather applicable in the context of artificial intelligence for example, particularly with the usage of agents for developing and configuring PSS (Wang et al. 2009; Tso et al. 1999). This would be unrealistic in B2B markets since key accounts require individual support over a long period of time in complex and unforeseen phases. There are several other common examples of semi-formal enterprise modeling frameworks (like Scheer and Schneider 2006 or Frank 2002), which are used for designing integrated information systems in enterprises. Even more specific frameworks exist, supporting the application of modeling languages in dedicated industries or enterprise domains, such as the Trading-H, which conceptualizes modeling in trading industries (Becker et al. 2004). Usually, all of these frameworks provide a wide scale of different aspects and perspectives and therefore don't focus on the specific business scenario presented in this paper.

Although a variety of PSS methodologies exist, most of the conceptualizations are of rigid nature, encompassing only the process steps of problem identification, PSS solution objectives, and furthermore PSS design and development. Particularly in B2C markets, the consumer is often seen in its entirety as a group of customers due to the expenses and complexity of production processes. In clear contrast to that, B2B markets are characterized by individual customers in terms of key accounts, motivating the development of highly customized and specialized products and services. This consequently makes the customer to an integral part within the development and configuration management of customer-specific PSS. As this paper arguments, structuring PSS lifecycle management activities with the aim customer integration is a key factor for creating customer loyalty, fulfilling a defined value proposition and thus making it possible to operate adjustable PSS successfully over a long period of time in the special context B2B markets.

7 Conclusion

This paper shows that PSS suppliers can create competitive advantages by developing customer-specific PSS and thereby differentiate

themselves from competitors. Particularly today, PSS engineering becomes a central subject of business integration and strategic alignment. At the same time, the management of such a service portfolio represents challenges. To meet these challenges, design hypotheses for the management of customer-specific PSS were derived from literature as well as from theoretical and practical considerations. They have been combined within a framework for PSS management, aiming to support PSS suppliers structuring their PSS management activities and aligning them to concentrate on building long-term customers relationships. In order to demonstrate the framework's practical relevance a case study has been presented, fulfilling the roles of PSS supplier and customer with a company from the food industry on the one hand and the food retailing industry on the other. The case study demonstrates the framework's suitability for describing the required development and configuration management activities from the PSS supplier's point of view in this certain scenario. As the framework takes strategic aspects not only on the supplier's site but also on the client's site into account, it can serve the PSS supplier as a basis for creating sales concepts. Due to its descriptive character the framework can also be used for further applications, e.g. for the design of processes and information systems in the context of PSS development and operations.

In order to gain an even more holistic view to PSS-management activities, the inclusion of network partners might be a next step for the framework's further extension. Since the realization of value proposition depends directly or at least indirectly on the performance of the business network partners, it would be conceivable to identify correlations between the value proposition as a central operational goal and the corresponding sub-goals that need to be accomplished by the network partners. In the scenario of the case study, such a sub-goal would be to achieve on-time delivery, which has to be contrived by a transport service provider as part of the good distribution. This framework has been created out of the combination of five design hypothesis for the management of customer-specific PSS. The validity of the first hypotheses is largely accepted in literature. For the remaining four hypotheses there is no claim to represent an entitlement to universal validity, since only one case is covered in the case study. However, not least because of the theoretically founded derivation, it is conceivable that they can be applied in an identical or similar way in other market scenarios which indicates the framework's practicability.

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