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Design Principles For The Organization Of Sales Of Smart Product Service Systems

Günther Schuh¹, Wolfgang Boos¹, Lennard Holst¹, Benedikt Moser¹¹Institute for Industrial Management (FIR) at RWTH Aachen University, Aachen, Germany

Abstract

Industrial companies are moving from a product driven to a solution driven business by offering smart product service systems (Smart PSS). In addition to an existing portfolio of physical goods and technical services, companies develop new digital services and combine all three offerings to an integrated solution business. While the development of new digital offerings does not pose any major challenges for companies and is rather well researched, the successful sale of Smart PSS does. Due to changing customer requirements and value propositions of a solution, the sale of Smart PSS requires new design principles for the sales organization compared to the simple sale of physical goods or technical services. While there are already many publications on the topic of industrial sales in research, the description of Smart PSS in particular represents a new field of research. The combination of both topics is therefore not only interesting from a theoretical point of view, but also has a high practical relevance and impact for industrial companies.

This paper therefore describes on the one hand, which characteristics can be used to derive typical customer requirements and on the other hand, which effects these requirements have on the sales organization. The design principles give recommendations for the organizational structure, the resources, the information systems and the culture of the company depending on the addressed customer type. In order to identify and describe both the customer requirements and the design principles, two morphological frameworks were developed based on a literature research and semi-structured interviews with industrial companies. The paper gives an outlook on the different characteristics of the design recommendations and describes first best practices for the successful transformation of the sales organization.

Keywords

Smart Product Service Systems; Smart Servitization; Design Principles; Sales Management; Sales Organization; Morphological Framework

1. Introduction

The transformation of companies from product to solution providers and the introduction of digital technologies play a major role. Digital services such as machine monitoring or remote services not only offer companies the opportunity to distinguish. This development challenges companies to exploit the opportunities for long-term competitive advantages [1]. To avoid becoming the subcontractor of a new type of system integrator, companies must leverage their expertise and advantages from the product and service business to smart product service systems (Smart PSS) [2]. Studies show that 80% of the top performing companies offer a combination of products, traditional services and digital services and are thus successful, while only 30% of the followers do so [3]. Smart PSS combine physical products, traditional services and

digital services to meet individual customer needs [4][5][6]. The focus is always on the physical product, which is supplemented by additional services. Smart PSS are "smart" because they carry characteristics of digital technologies that make products intelligent, increase the capabilities and value of physical components and optimize the flow of information between customer and provider [7][8]. However, the expected added value potentials have not yet been generated [9]. A study by an association of German mechanical engineering companies with around 530 companies found that the challenge lies less in technical development than in the strategic organization of the sales of digital services [1]. Likewise, *Leoni and Chirumalla's* findings show that the transition to becoming a provider of digital services not only involves technical development and data collection, but also requires new qualifications, processes, organizational structures, and partnerships [10]. *Belz and Lee* describe the need to create appropriate organizational conditions in terms of responsibilities, processes, and qualifications for the emerging broadening of sales [11][12]. There appear to be contradictions between the requirements from the sales of Smart PSS and the current organizational design in sales. Research contributions on Smart PSS still do not adequately address sales organizations. There is a lack of a holistic view of the design of the sales organization Smart PSS depending on the customer type. The purpose of this paper is to contribute to this research gap and to derive design recommendations for companies with which they can meet the challenges.

2. Research Background

2.1 Sales Organization

As a functional organizational unit, sales is part of the operational value chain in companies [13]. Its task is to sell products and services with the aim of satisfying the needs of customers [14][15]. According to the marketing mix, sales represents the fourth component for achieving marketing plans, in addition to product, price and communication policy [16]. *Belz et al.* point out that when selling complex services to customers with high demands, marketing is part of sales and not vice versa [19]. In sales between companies, a distinction can be made between different sales channels. In direct distribution, services are sold directly to a customer by the supplier, while in indirect distribution, the service is sold to an economically and legally independent distribution company, which then sells it to the customer [20]. In the context of this paper, the focus is limited to direct sales, since other sales channels result in extended requirements for the sales organization and industrial companies are characterized by direct sales due to their product complexity [21]. B2B sales is characterized by four features [18]. First, in contrast to B2C, offerings are not consumed in B2B, but further processed and/or invested to generate new offerings. Secondly, the demand for the supplier's offerings is derived from the demand for offerings from his customer. Therefore, this is referred to as derived demand. The complexity of the offering and the decision-making process leads to several people from different departments being involved in the purchasing process on both the customer and supplier side. Finally, the degree of formalization of demand and processes is linked to requirements and guidelines for the provision of services.

2.2 Smart Product Service Systems

The term Smart Product Service Systems generally describes a bundle of offerings consisting of a combination of partial offerings of products, services and digital services for customer-oriented problem solving [20]. In the scientific literature, there are other approaches to define product service systems that have this basic idea in common [21][22]. Thus, product service systems are also characterized by their modularity, from which customer-specific offerings can be developed. For the customer, the added value of Smart PSS compared with the purchase of individual partial services lies in the integration of the components. Providers of Smart PSS effectively different from competition while simultaneously increasing the customer's willingness to pay [20]. A definition by *Chowdhury et al.* is used in this paper: Smart PSS can be defined in terms of the combinations and interactions between smart technologies, physical products,

digital and non-digital services, and digital business models [8]. An overview of definitions of the terminology mentioned in this subsection is also provided by *Liu et al.* [23]. The strategic transformation of a company from the sale of physical products to the sale of PSS is described as servitization or smart servitization [24][25].

3. Methodology

The derivation of design principles for the organization of sales of smart product service systems follows a five-step approach as shown in fig. 1 based on the procedure of *Welter* [32] to derive consistent types and design recommendations which was also used by *Ansorge* [29] and *Kolz* [34].

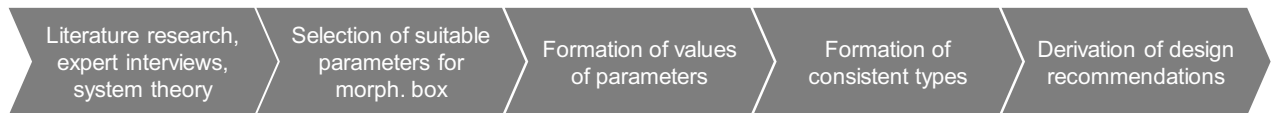


Figure 1: Procedure to derive a framework for the organization of sales of smart product service systems

First, existing frameworks to describe sales organizations of smart product service systems of eight authors (e.g. *Binckebanck* [26], *Belz a. Weibel* [27] *Storbacka et al.* [28]) were analyzed. The authors define varying segments, which in their opinion represent the structure of a sales organization. Based on this literature research, an initial system based on system theory and model building was created that represents the relevant scope of the interaction system between supplier and customer [29][30]. To further deepen the insights gained from the literature and to expand them with insights relevant to practice, semi structured expert interviews were conducted with managers from industrial companies [31]. Based on the interviews and the literature reviewed, two morphological boxes were developed. These describe on the one hand the customer side as a relevant external factor for sales and on the other hand the organization of sales itself. The morphological boxes each consist of characteristic features and their characteristics and are described in detail in the following chapter. Based on the morphological boxes, different consistent types are subsequently formed using the Fit-concept and recommendations for practice developed on their basis.

4. Results

4.1 System Theoretical Reference Framework

The aim of the systems theory study is to identify and elaborate elements and their relationships for organizing the distribution of integrated digital service systems. Following the structure of the regulatory framework for the management of industrial services, the three sub-areas of corporate structure, processes and development form the top level [20] (s. Fig. 2).

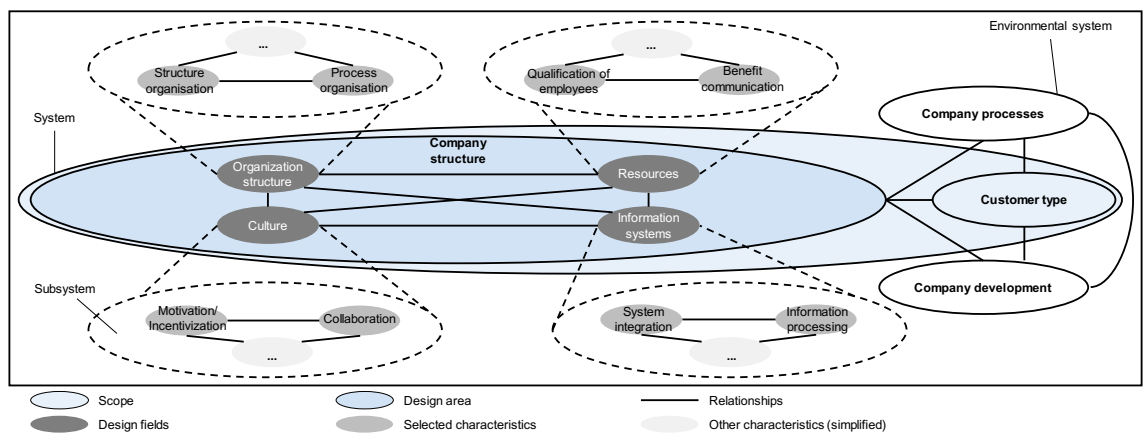


Figure 2: Graphical representation of the system-theoretical reference frame

These three systems are influenced by the customer type system, which describes the customer side from the supply-demand relationship between supplier and customer. That is the customer type has influence on the organization of the other systems and stands therefore in relationship to these. In the area of consideration of the paper lies the company structure, the customer type and the relationship between these two systems. However, the focus is on the supplier side, so although the customer types are in the scope of consideration because they must be considered in the design of the sales organization, the customer side and its design are not considered in detail. The design area as a subset is thus limited to the corporate structure, which must be set up appropriately for the customer type. Both sides of the interaction model are presented and described in more detail in the following chapters via two individual morphologies.

4.2 Morphological framework and consistent types of customer requirements

Based on the literature review and expert interviews and the customer characteristics described therein, this chapter presents the customer morphology and the consistent types (s. Fig. 3).

Components of the performance system	① Physical product	② Phys. product + services	③④ Phys. product + service + dig. services	
Service strategy	① Make (own contribution)		②③④ Buy (external reference)	
Cooperation intensity	① Low	② Partial	③ Distinct	④ Completely
Individualization of services	① Comb. of standardized services	②③ Individual customer-specific partial services	④ Completely customized service system	
Digital affinity	① Skeptical	②③ Interested	④ Convinced	
Demand for digital services	①②③ Push demand		④ Pull demand	
Revenue model for digital services	①② Free Add-on	③ Single transaction	④ Recurring transaction	
Customer review	①② Not a key customer		③④ Key customer (Key Account)	
	① Sceptical product customer	② Interested product customer	③ Interested digital customer	④ Convinced digital customer

Figure 3: Morphology and consistent types of customer characteristics

The *components of the product service system* describe the customer's interest in and willingness to purchase individual partial services. Partial services can be physical products, traditional services, and digital services. The components of the service system also depend on the *service strategy* pursued by the customer. In particular, the question of in-house service or external procurement must be clarified. The characteristic of *collaboration intensity* that is willing to pay indicates the form of collaboration for which a customer is willing to pay. A company is only successful if there is a fit between collaboration intensity and willingness to pay [33]. *Individualization of services* describes the extent to which the customer demands a service system consisting of highly standardized or specific, customer-specific partial services [34]. The *digital affinity* of the customer and the decision-makers plays an important role in the acquisition of digital subservices. According to Gartner, this describes "a set of beliefs, mindsets, and behaviours that help employees achieve faster and more valuable results from digital initiatives" and is strongly influenced by corporate culture [35]. *Demand for digital services* is used to describe the difference between customers with push and pull demand, following the push and pull method from customer acquisition. The *revenue model for digital services* describes the price mechanism that customers are willing to pay when purchasing digital services, depending on their willingness to pay [34]. *Customer review and categorization* is applied in various forms to identify key customers. These key customers, also known as key accounts, are indispensable to the company because of their revenue, their customer value, their reference effect, their future potential, their function as a development customer, or other quantitative and qualitative factors [35].

Based of the morphological framework four different consistent types of customer requirements were derived with the characteristics mentioned in Fig. 3. The first type of customer is the sceptical product

customer. His PSS consists only of physical products. Both classic services and digital services are of no particular interest to him. Compared to the first, the service system of the second customer type is expanded to include classic services for maintenance, repair, training and financing. This interest is closely linked to the service strategy for external procurement of such services. The distinguishing feature of the third customer type is that digital services are now part of the PSS. Like the second customer type, this customer uses external procurement for classic services and digital services. This means that components such as remote monitoring or smart factory solutions are also part of the external service strategy. The fourth customer type also describes a customer who purchases a service system consisting of all three components. The service strategy is also focused on the external procurement of classic services and digital services, so that the customer largely dispenses with independent maintenance and the development of its own digital solutions. Instead, it relies on close cooperation with the provider not only to obtain all partial services, but also to achieve the most comprehensive integration possible. This integration refers both to the integration of the Smart PSS and to the integration into its value chain.

4.3 Morphological framework and consistent types of sales organization

The other side of the interaction model represents the corporate structure of the offering company and is described in the following morphology (s. Fig. 4). The system of the company structure divides thereby into the four subsystems organizational structure, resources, information systems and culture. The *organizational structure* serves as the structuring of a company into organizational units and responsibilities. Organizational units describe the grouping and assignment of (partial) tasks to human task bearers. The *process organization*, on the other hand, describes the goal-oriented planning of work and information processes [36]. Sales in industrial companies is a "people business". Sales employees are the link between the company and the customer and play a decisive role, particularly in the sale of smart product service systems. Therefore, the *qualification of employees* in the sales organization is an important aspect [37]. A service is only successful in the long term if the customer has a perceivable benefit. Therefore, *benefit communication* is an important factor in the distribution of service systems [38]. For sales, the *integration of information systems* is very significant to have a holistic information base available in real time in fluctuating markets with dynamic customer requirements [39]. In the sales of product service systems and smart product service

Org. structure	Organizational structure	① Product-focused	② Service-integrated	③ Completely separated	④ Moderated	⑤⑥ Fully integrated
	Process organization	⑤ Free workflow		①②③ Sequenced workflow		④⑥ Flex. reconfiguration of existing processes
Resources	Qualification of employees	① Technical expertise	② Expertise in processes	③ Expertise in customer business	④⑤ Expertise in solution selling ⑥	
	Benefit communication	① Product & technology oriented		②③ Performance-oriented		④⑤⑥ Customer results-oriented
Informat. systems	System integration	① Passive Customer Data Base		②③ Active Customer Data Base		④⑤⑥ Integrated Customer Data Platform
	Information Processing	① Descriptive		②③ Predictive		④⑤⑥ Prescriptive
Culture	Motivation/Incentivisation	Laissez-Faire Leadership		①③ Transactional leadership		④⑤⑥ Transformational leadership
	Collaboration	⑤ Ad-hoc collaboration	①③ Trying out collaboration		② Controlled collaboration	④⑥ Optimizing collaboration
Real types:		① Typical product provider	② Typical service provider	③ Separated partial service provider		
Ideal types:		④ Orchestrating solution provider		⑤ Independent solution provider	⑥ Integrated solution provider	

Figure 4: Morphology and consistent types of the supplier side as a framework for the organization of the sales

systems, in particular, numerous disciplines and experts are involved who must provide their input for the development of the system at the appropriate time [40]. In many companies, systematic *information processing* is still poorly developed compared to information collection. However, the systematic evaluation of customer information offers the opportunity to identify buying habits, churn intentions or potentials by bundling products [39]. In addition to the organizational structure, an informal organization exists in every company and can be influenced by the management culture. This is because it addresses values, norms and the way of working together, so that there is a great influence on the corporate culture [41]. In this context, the *motivation and incentivisation* describe the behavioural control of employees, which is created by the leadership behaviour and the personal appearance of the superior [42]. Another important aspect of the informal structure that shapes the culture is *collaboration*. Collaboration is understood as the working together of individuals and groups on a common project or a task that can only be solved together to achieve a defined goal. Collaboration is particularly necessary for cross-functional work or for new subject areas. This achieves results that the individuals could not have achieved on their own. It is an integral part of a culture that promotes innovation [43].

When considering the types of sales organization, a distinction is made between real and ideal types. Real types represent reality and can be determined empirically. Ideal types are created by abstracting phenomena from reality and are mental models. The first three types represent descriptive real types that are or were common in this form in companies. The last three types, on the other hand, are to be regarded as ideal-typical target images for the sale of integrated digital service systems, whose implementation and suitable design recommendations are shown [44]. The first type of sales organization is based on a product-focused organizational structure. As the name suggests, the focus of the PSS is on the classic product area, which has characterized many machine manufacturers over the years and in which they have a great deal of expertise. Compared to the first type, the organizational structure is service-integrated, so that the digital business is in the traditional customer service. In comparison to the two types presented above, the digital business is represented as a separate unit with positions in the regional structure. This means that there are responsible salespeople for all three business units. However, they offer their services separately from one another, as integration is given little attention and there is no overarching customer-oriented link for integration between the business units and the customer. The orchestrating solution provider shows a first ideal-typical design of the sales organization. The basic idea is based on a customer-oriented process organization with a moderator as process owner. The moderator forms the front end to the customer and integrates the individual business units in the back end in a needs-oriented and targeted manner, so that the distance between the units is closed by the moderator [3][44]. The fifth type identified is based on the idea of a project organization that can serve as an efficient sales organization for companies or regions in which the development and establishment of permanent processes to integrate all business units would be too costly and the hierarchies are flat. This is especially true for smaller companies. Due to the uniqueness of the projects, a free workflow is offered. The sixth type makes sense if the teams are not only formed for one-off, time-limited projects, but the team organization is used permanently and as the decisive structural organization. This is particularly suitable for complex integration projects with strong customer involvement and third-party participation. In order to efficiently manage and implement such a team organization in the long term, basic processes must be established [36].

4.4 Fit between customer types and types of sales organization and design principles

Now that the previous two chapters have identified and described four customer types and six types for sales organization, the two sides are jointly analyzed with the help of the fit concept. For this purpose, a distinction is made between the three degrees of effectiveness - beneficial (+), obstructive (-) and neutral (o) - to describe the fit between the individual types. The result of this analysis can be seen in Figure 5. The figure shows that only the three ideal types can fulfil the requirements of all four customer types in a beneficial or at least neutral manner, while the existing real types exclude the digitally convinced customer. The focus of the

design principles in this paper is therefore on showing how companies can succeed in developing in the direction of these ideal types. Many companies are at the beginning of their transformation. They are product providers with a functional and/or divisional organizational structure.

Fit between customer types and types of sales organization			Types of customer characteristics			
			Sceptical product customer	Interested product customer	Interested digital customer	Convinced digital customer
Types of sales organization	Real types	Typical product provider	+	o	-	-
		Typical service provider	o	+	o	-
		Separated partial service provider	o	o	+	-
	Ideal types	Orchestrating solution provider	o	o	+	+
		Independent solution provider	o	o	o	+
		Integrated solution provider	o	o	o	+

Figure 5: Fit between customer types and types of sales organization

Therefore, the existing organization must be broken up in this first phase. Employees must be made aware of the need for change so that they are convinced to participate. Existing processes and structures must be discarded and questioned. A clear sales strategy and target picture must be presented so that the direction of development and the required steps become clear. Customer segments and priorities for the new strategy must be defined. It is important to align sales with the corporate strategy and to involve the sales staff in the implementation. The intermediate phase is the most important stage for building new structures, processes and capabilities for a new shared vision. In addition to reducing hierarchies and shifting responsibility to employees, this can be done by setting up a separate solution selling unit that is responsible for selling integrated digital service systems independently of the existing organization [45]. It is not subject to the organizational restrictions and initially develops solutions with a limited number of key customers. The type *independent solution provider* is suitable for describing this separate solution selling unit. In the final step, the experiences and best practices from the intermediate phase are used to carry the new culture into the company and solidify it. This is done by deploying the employees from the previously autonomous unit as transformational leaders in the company as a whole. The resources are gradually developed throughout the company through further qualification. The processes developed and tested on a small scale by the independent unit can now serve as a starting point for processes that can be flexibly reconfigured. The best practices and information exchange help the employees of the existing organization to change. The organizational structure can either evolve into a matrix process organization, so that the traditional functional and divisional structure is structured more strongly around the customer on the basis of processes, or it can be designed holistically as a team organization, using the separate solution selling unit as an example. In the advanced phase, this corresponds to the ideal types of *orchestrating and integrating solution providers*. The organizational structure thus depends on the choice between these two ideal types. The types are suitable in different cases depending on the initial situation and company structure.

5. Discussion and conclusion

In this paper, design principles for the organization of sales of Smart PSS have been presented to fill the gap that currently exists in both research and practical applications. For this purpose, the interaction model was first shown in a systemic representation based on a literature review and expert interviews. Based on this, the two sides of the interaction model between customers and providers were each described using a morphology with eight characteristics.

The next step in the research process is now the formation of exemplary types on both the customer and supplier side. Based on these types, it is important to see which types from both sides harmonize with each other and thus promise the greatest possible success in the sale of smart product service systems. It should be noted, however, that the customer side is to be regarded as an external factor and is difficult or impossible to influence. Accordingly, the customer side sets the requirements to which the sales organization on the supplier side must respond. The complexity of this interaction increases with the complexity of the smart

product service system offered, since many features and value propositions must be served. This paper can only lay the foundation for approaching both the requirements of the customer side and the response of the provider side in a structured manner and deriving corresponding design proposals for the organization of sales of smart product service systems. The need for this arises not only from the existing gap in the scientific literature, but from the need for practical solutions from industrial companies.

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Biography

Günther Schuh holds the Chair of Production Systems at the Machine Tool Laboratory (WZL), is a member of the Board of Directors at the Fraunhofer Institute for Production Technology (IPT), Director of the Institute for Industrial Management (FIR) at the RWTH Aachen University and head of the Production Technology Cluster.

Wolfgang Boos has been head of the Institute for Industrial Management (FIR) at RWTH Aachen University since 2023. Wolfgang Boos studied mechanical engineering with a specialization in production engineering at RWTH Aachen University and is responsible for the WBA Tooling Academy at RWTH Aachen Campus as a managing director.

Lennard Holst has been head of the department Service Management at the Institute for Industrial Management (FIR) at RWTH Aachen University since 2021. Lennard Holst leads several research and industrial projects in the fields of subscription management, digital business model transformation as well as industrial service management.

Benedikt Moser studied industrial engineering at RWTH Aachen University and did his doctoral studies at the Institute for Industrial Management (FIR) at RWTH Aachen University, where he was deputy head of the Service Management department. In the meantime, he has co-founded a start-up in the field of online platforms for industrial spare parts and works there as Head of Vendor Management.