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Value-Based Marketing and Sales of Industrial Services: A systematic literature review in the age of digital technologies

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Abstract

With digital technologies, smart services become a cornerstone of industrial product-service systems. Services are increasingly delivered by digital means and thereby become difficult to grasp for customers. For manufacturing companies, this is an opportunity to leverage value-based marketing and sales (VBMS). Despite this approach appearing promising in the age of digital technologies, no research combined so far the perspectives of VBMS, servitization and digital technologies. This paper fills this gap through a systematic literature review. We find that a limited number of authors and papers discuss this topic, but using a plethora of different terms. We consolidate the extant terminology in an overarching framework for VBMS. Furthermore, we identify four pillars of digital technologies that influence VBMS of industrial services. Finally, we suggest that in the age of digital technologies, the effectiveness of VBMS is contingent on relational rather than technological factors.

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Keywords: product-service systems, industrial services, digital technologies, value-based marketing, value-based selling, value-based pricing

1. Introduction

Digital technologies transform the configuration of product-service systems (PSS), both technologically and commercially. PSS are "a marketable set of products and services capable of jointly fulfilling a user's need. The product/service ratio can vary, either in terms of function fulfilment or economic value" [1]. On the one hand, digital technologies allow manufacturing companies to turn their business models towards new services enabled by the collection and analysis of data [2]. These new industrial services are called *smart services* [3]. On the other hand, literature has emphasized providing superior customer value as a key driver for differentiation [4,5]. Smart services induces the dominant business perspective to move from a "cost logic" to a "value logic", where the guiding principle is holistic maximization of customer value [6].

Yet, research on value-based marketing and sales (VBMS) is still young. Value-based marketing (VBM) builds upon quantified evidence of an offering's superior value [7]. Value-based selling is the implementation of VBM on salesperson level [8,9]. In this paper, we subsume both concepts under VBMS. Empirical research on VBMS in general is scarce [8], let alone in the context of digital technologies.

VBMS is a practice with remarkable potential for smart services. For instance, value-based pricing (VBP), one element of VBMS, is considered a superior pricing tactic by marketing scholars and practitioners [10,11]. There is also empirical evidence for its positive contribution to firm performance [12]. This makes a case for applying it to industrial services. In addition, services are less tangible than products. Smart services can be delivered partly or entirely by digital means. Accordingly, they are even less tangible and therefore difficult to grasp for customers [6]. Thus, we would expect to see a surge of literature describing the use of VBMS for industrial services, especially with the rise of digital technologies. However, literature that discusses VBMS in this context is limited. This leads us to raise the following research question (RQ):

RQ: How does literature discuss the impact of digital technologies on VBMS of industrial services?

We answer this RQ by conducting a systematic literature review. From 54 sources reviewed, only 17 address digital technologies either implicitly or explicitly. Our findings suggest that research on VBMS is driven by a limited number of authors and outlets, but uses inconsistent terminology. This paper provides an overarching framework that attempts to streamline this terminology. Furthermore, literature reports

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positive and negative effects of digital technologies on VBMS of industrial services. We sort these along four pillars of digital technologies: service digitalization, data, data processing infrastructure and the digital marketplace. Our findings suggest that while digital technologies have laid the technological foundation for VBMS of industrial services, relational and trust issues become more prominent.

The remainder of this paper is structured as follows. The next section outlines the theoretical background of digital technologies, servitization and VBMS. Section 3 describes the methodology of the structured literature review. Its findings are presented in the following section and subsequently discussed, before coming to a conclusion.

2. Research background

Combining digital technologies and servitization holds the potential to create ever more advanced PSS. Paschou et al. call this phenomenon "*digital servitization*" and define it as "the development of new services […] through digital technologies that enable new business models and the shift to the service business of product-centric companies" [2]. The fundament of these digital technologies are industrial machines and equipment furnished with sensors that collect and transmit data to external and internal networks [13]. Big Data techniques, such as data mining and machine learning, are enabled by cloud computing and allow to process this vast amount of data, thereby extracting valuable insights for business decisions [14]. Manufacturers use these digital technologies to enhance the value of their product-service offerings and to develop new services [2]. Smart services are a subset of PSS and often draw from a number of basic building blocks, notably product monitoring, analytics, communication and information provision, optimization, remote control, on-demand functions, etc. [15]. Hence, with digital servitization, digital technologies form the core of smart services.

Customer value is the *raison d'être* for industrial PSS [16]. In business markets, customer value is the "perceived worth in monetary units of the set of economic, technical, service and social benefits received by a customer firm in exchange for the price paid for [an offering]" [17]. PSS deliver value in use, hence customers benefit from PSS in the moment of usage, which may be decoupled from the moment of purchase [18]. This rationale draws from service-dominant logic [19], where service is the core of a company's mission and value can only be created by involving customers in a co-creation process [20]. Digital technologies' contribution to a smart service's value creation varies along a continuum. On the lower end of the continuum, digital technologies support the execution of physical services. For example, with remote monitoring [21], sensor data is used to trigger physical operator action. At the upper end of the continuum, there are entirely digital services, such as online configurators (e.g. [22]). In these cases, digital technologies account for the entire value creation. Thus, digital technologies form a central component of the delivery and value creation of smart services [23].

In consequence, VBMS appears promising to support manufacturing companies' efforts to earn revenue from smart services. Customer value management is used in Business-to-Business (B2B) marketing to demonstrate the higher value of an offering with quantified evidence [7]. If communicated convincingly, higher-value offerings can lead to higher revenue [24]. Value-based selling (VBS) is the operationalization and implementation of VBM at the individual salesperson level [8,9]. As VBMS focusses on helping customers to increase profits, it requires in-depth knowledge about customers' value-creation process and is therefore a challenging and time-consuming task for the seller organization [8]. Consequently, a value-based sales approach is less adequate for commodity offerings of minor importance to business customers [5]. However, numerous smart services are new offerings that rely on digital technologies to support a customer's value creation process [21]. Thereby, they have the potential to provide superior customer value [6]. Against this backdrop, value-based approaches seem highly relevant for manufacturing companies to market and sell smart services.

This paper investigates how literature discusses the impact of digital technologies on VBMS of industrial services. To the best of our knowledge, no research paper has combined the three lenses of VBMS, servitization and digital technologies. The paper at hand aims at filling this gap through a systematic literature review.

3. Methodology

We conducted a three-stage systematic literature review in October 2018. The search process included database, keyword as well as for- and backward search, as suggested by vom Brocke et al. [25]. The initial search was performed in the databases Scopus and Web of Science. We searched titles, abstracts and keywords for the terms "value-based" AND (marketing OR sales OR selling OR pric*). The search term "service" was not included at this stage, as several seminal articles appeared relevant, yet did not explicitly address service as separate topic. The types of documents researched were articles, book chapters and conference proceedings papers. Subject areas were limited to business, economics and engineering. The initial research yielded 699 results from Scopus and 400 results from Web of Science (WoS). After removing duplicates, the initial sample contained 922 documents (see Figure 1).

In the second stage, we reviewed the abstracts of the initial sample according to five consecutive criteria to ensure their thematic relevance. First, we assessed whether the document concerned VBM. Everything that did not address *customer-perceived* value was dismissed, e.g. *asset* value (estate, land, …), *financial* valuation (of companies, share prices) or *customer lifetime* value. Second, we checked if the abstracts mentioned manufacturing companies. This excluded cases of pure service providers (such as banks, insurances, software, energy, tourism or transport) and a number of studies on VBP of cattle. Third, we reviewed whether the document related to business customers. Applications of VBM in Business-to-Consumer (B2C) markets, as in the pharmaceutical industry, were disregarded. Next, we assessed whether the document could apply to industrial services. This excluded approaches applicable exclusively to hardware products. Then, availability of the full texts from the authors' network was checked, resulting in 101 remaining documents. We inspected the full texts, assessing whether they conformed to the four criteria of content relevance. The second stage ended with a first review sample of 40 documents that we read entirely.

In the third stage, this first review sample was complemented by a forward-backward search. Forward, we used Google

Scholar to determine if the documents in the sample were cited in other sources obeying to the four aforementioned criteria. Backward, we screened the documents' references for any missing publications that we considered relevant. Forward-backward search produced 14 results that we added to the sample. The final sample consisted of 54 documents that we read and reviewed thoroughly. The findings of the literature review are reported next.

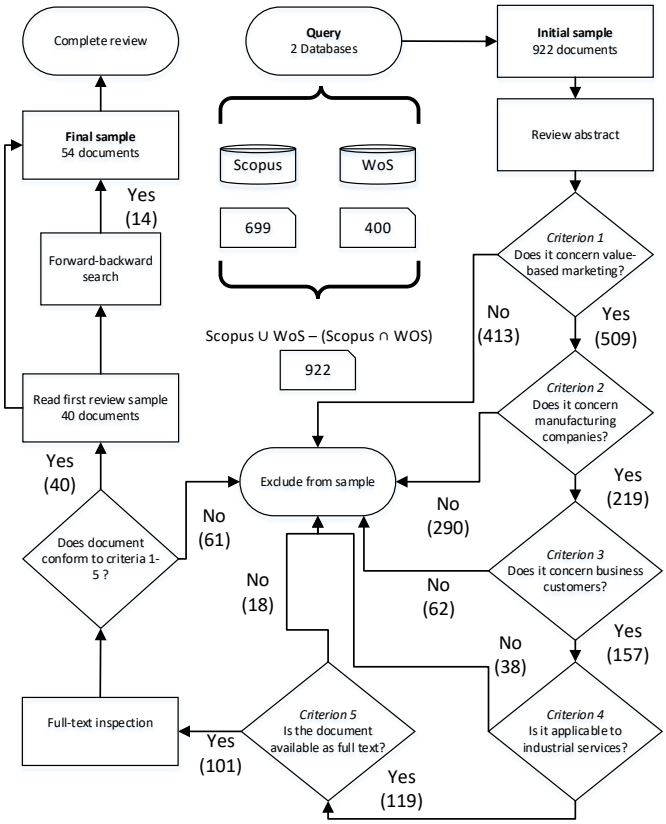

Figure 1: Literature search process

4. Findings

The findings from the literature review are threefold. First, VBMS of industrial services has gained increasing attention in recent years, but within a somewhat restricted circle of scholars and outlets. Second, while there seems to be an overall agreement about the activities in VBMS, the corresponding terminology is dispersed. Third, literature discusses both positive and negative effects of digital technologies on VBMS of industrial services, with the main object of inquiry moving from technological to relational factors.

4.1. Descriptive statistics

Research output on VBMS of industrial services has steadily increased over the years, with a dozen or so outstanding scholars publishing in a few focal outlets. Since the cornerstone article of Anderson et al. in 1993 [17], there is a clear upwards trend of annual publications on VBMS. From the 54 documents in the final sample, 25 have been published since 2015 (see Figure 2). This suggests an increasing relevance of the topic. As depicted in Table 1, the lion's share of publications stems from just two journals: Industrial Marketing Management (15 articles) and Journal of Revenue and Pricing Management (8). This indicates that VBMS has been examined predominantly from a marketing perspective.

Table 1: Frequency of publication outlets

Outlet	Count	Sources
Industrial Marketing Management	15	[26], [27], [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [8], [38], [39]
Journal of Revenue and Pricing Management	8	[40], [41], [11], [42], [43], [44], [45], [46]
Journal of Business-to-Business Marketing	2	[17], [24]
Journal of Business Research	2	[47], [48]
Management Decision	2	[12], [19]
Journal of Marketing	2	[49], [4]
Other	1 (each)	[50], [51], [52], [53], [54], [7], [55], [56], [57], [58], [10], [16], [59], [23], [60], [61], [62], [63], [64], [65], [66], [67], [6]

The circle of academics publishing on this topic is just as concentrated. Authors having published three or more documents in the sample originate from just three cultural areas. First, Finland, with Töytäri (appearing 8 times as (co-) author), Rajala (5), Terho (3) and Luotola (3). Second, the German-speaking countries, with Hinterhuber (7), Ulaga (6), Eggert (5) and Haas (3). Third, USA, with Liozu (5), Anderson (4) and Woodruff (3). Hence, there are plenty of opportunities to extend the current body of knowledge with perspectives complementary to marketing, as well as insights from other cultural areas.

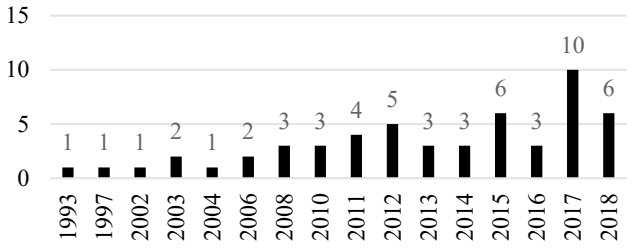

Figure 2: Number of publications per year

4.2. Building blocks of VBMS

Our findings suggest that the terminology describing the constituent parts of VBMS is scattered. A number of seminal articles (e.g. [27], [30], [34], [37]) have proposed comprehensive frameworks encompassing the main activities in VBMS. Yet, the authors use different terms to designate comparable concepts. In Table 2, we group these different terms in classes of equivalent activities. Thereby, we propose a framework that distinguishes four building blocks (BB) of VBMS: Value Identification, Value Quantification, Value-Based Pricing and Value Communication.

Table 2: Building blocks of VBMS

BB	Activity	Equivalent activities
Value Identification	"Value potential identification" [30]	"Value opportunity" [29]; "Opportunity assessment" [42]
	Segment and customer selection [28]	
	"Value research" [28,35,61,64]	"Value proposition initialization" [63]; "Value analysis" [27,35,42,49,56]; "Customer value determination" [50]; "Customer value-oriented marketing information system" [50]; "Understanding the customer's business model" [29]; "Identifying the customer's explicated needs" [30]; "Problem identification" [37]; "Identification of value elements" [57]
	"Value proposition development" [63]	"Crafting a (customer) value proposition" [29,65]; "Preparing qualitative and quantitative value proposition" [64]
Value Quantification	"Activity blueprinting" [52]	"Customer activity mapping" [52]; "Understanding the customer's processes" [30]; "Analysis of the customer's business scenarios" [57]
	"Baseline assessment" [30]	"Baseline fixing" [36]; "Identify cost of next-best alternative" [27]
	"Performance evaluation" [30]	"Value capture potential" [37]; "Value (in-use) assessment" [17,30,52,57]; "Value impact on customer's performance" [30]; "Economic impact" [64]; "Productivity impact" [37]; "Analysis of the impacts of the services on costs" [57] "Determine value of differentiating factors" [27]; "calculation of differentiation value" [42];
Value-Based Pricing	"Price analysis" [40]	"Market conditions" [36]; "Segment market" [27]
	"Price definition" [40]	"Pricing approach" [52]; "Pricing logic" [64]; "Pricing model" [37]; "Set pricing" [44]; "Monetary amount" [19]
	"Revenue model" [40]	"Amount and timing of payment" [52]; "Contract model: profit gain, pricing, scope of solution" [64]; "Value sharing" [37]; "Conditions of payment" [19]; "Cash flow model" [37]; "Estimate future sales" [27]
Value Communication	"Selecting sales force" [32]	"Sales force training and development" [53]
	"Customer-facing interaction" [39]	
	"Value communication" [29,53]	"Value demonstration" [7,37]; "Value evidence" [24]; "Value visualization" [23]; "Influencing the customer's value perception" [36]; "Customer value education and communication" [38]; "Credible demonstration of the offering's contribution to the customer's business profits" [29]
	"Value verification" [28,35]	"Value documentation" [28,54]; "Value-realized case examples" [46]

4.3. Impact of digital technologies on VBMS of industrial services

No clear tendency regarding the impact of digital technologies on VBMS of industrial services emerges from the literature reviewed. In the final review sample, we found only 17 sources that mentioned either explicitly or implicitly an impact of digital technologies on VBMS of industrial services. Using the framework introduced in Table 2, we distinguished positive and negative impacts and allocated them to the main VBMS activities. Results are reported in Table 3.

Table 3: Impact of digital technologies on VBMS of industrial services

BB	Activity	Positive impact	Negative impact
Value Identi-fication	Value potential identification		[32], [54]
	Value research	[48], [62]	
	Value proposition development	[29], [62]	
Value Quanti-fication	Baseline assessment	[36], [34], [48], [61], [67], [35], [41]	
	Performance evaluation	[48]	
Value-Based Pricing	Price analysis	[66], [37]	
	Price definition	[61]	
	Revenue model		[6]
Value Communi-cation	Selecting sales force		[32]
	Customer-facing interaction	[39], [62]	[39], [62]
	Value communication	[35], [62]	[8], [23]
	Value verification	[35], [60]	

We distinguish four elements of digital technologies that appear to have the largest impact on VBMS of industrial services. First, the increasing share of digital activities in service delivery, in short *service digitalization*. Second, the *data* required to market, sell and deliver these services. Third, we label *data processing infrastructure* the hard- and software necessary to transfer, store, analyze and visualize this data. Fourth, we subsume under *digital marketplace* the increasing shift of marketing and sales activities to digital channels.

Service digitalization: It is unclear whether value-based approaches are adequate for earning higher revenues from the growing digitalization of service delivery. With smart services, an increasing share of service delivery becomes digital, thereby less tangible for the customer [23]. This implies that the primary determinant for service prices is no longer delivery cost, but the value created [61]. Nevertheless, it is crucial in VBMS to make the intangible elements of a PSS tangible [32]. It is therefore problematic when a salesperson does not fully understand the service offered and, in consequence, underreports its value [23]. In addition, industrial buyers today are often reluctant to pay for smart services as they appear to require no tangible effort from the supplier [6].

Data: Access to customer data is a cornerstone of VBMS and facilitated by digital technologies. Crafting an effective value proposition requires customer-specific data [29]. Thus, it is fundamental for VBMS to acquire strategic data about customers, their operations and business models [29,35].

Consequently, executives should dedicate resources to collect and analyze this data systematically [8]. Collecting this data and obtaining access to it has been frequently reported as a major barrier to VBMS (e.g. [35,36,41,48,61]). A remedy suggested is to equip new machines and the installed base with sensors to gain access to customers' operations data [34,35]. Exactly this is happening with the help of digital technologies, with a growing volume of contextual [62] and production data [67] gathered at different levels of detail.

Data processing infrastructure: The rapid development of data analytics, software tools and IT infrastructure facilitates all four building blocks of VBMS. First, new IT systems that provide customer intelligence support value identification [48]. Second, for value quantification, data collection needs to be accompanied by investments in data exchange infrastructure and simulation resources [36]. Corresponding value assessment software supports sales meetings [48]. Third, increasingly sophisticated software tools to calculate value-based prices appear. For instance, authors report the use of simulation tools to estimate future market behaviors [37] or machine learning to determine value-based market prices of spare parts [66]. Fourth, a number of novel software solutions support value communication. Some make success stories available for marketing and sales [35]. Others offer advanced analysis and reporting of value creation [60]. Context-aware applications allow for communicating personalized value propositions [62].

Digital marketplace: The shift of marketing and sales activities to digital channels has ambiguous consequences for VBMS of industrial services. On the one hand, with servitization, the pursuit of closing large sales deals has become less relevant than developing and nurturing longer-term relationships with customers [32,54]. This is reinforced by the finding that sales – and especially value-based sales – of industrial services are rather time-consuming [23]. Against this backdrop, it appears that some industrial services require rather close buyer-seller relationships. In such cases, VBMS is pertinent. On the other hand, most industrial buyers prefer the convenience of online shopping to relying on a sales representative [39]. With the growing importance of B2B e-commerce and subsequently diminishing face time with customers, uncovering latent customer needs becomes difficult [39,62][*]. Hence, the reduced personal interaction coming along with service digitalization could impede the use of consultation-intensive methods such as VBMS. Nonetheless, customer insights are gained differently as service digitalization progresses. For instance, context-aware applications [62] or data analytics [39] may trigger a salesperson's intervention. From this point, an off-line sales process can be initiated. Overall, our findings suggest that digital technologies could fundamentally change the ways how customer insights essential for VBMS of industrial services are obtained.

5. Discussion

Digital technologies change industrial services dramatically, but literature has not kept up. In our final review sample of 54 publications on VBMS of industrial services, only 17 address matters relating to digital technologies. This is somewhat in contrast to the growing complexity and intangibility of these services, which calls for a marketing and sales approach that puts customer value first, as is the case with VBMS.

As for *service digitalization*, intangibility of smart services is discussed as both a barrier and driver for VBMS. The intangibility of smart services makes it difficult for sellers to communicate and for customers to understand their value [3]. However, the other two strategies, cost- and competition-based pricing [11,41], do not appear more appropriate. With service digitalization, marginal cost of service delivery tends to zero. Hence, cost-based pricing is ill-suited. In addition, novel smart services feature unique, customer-specific functions (see, e.g. [22]). Thus, there are not necessarily any competitor services available as reference for competition-based pricing. Overall, value-based approaches seem promising for marketing and selling smart services that provide superior customer value.

In consequence, making the intangible components of a smart service tangible becomes a prerequisite for successful VBMS. This literature review supports the findings from Liozu et al. [11] that literature remains largely silent on the definition and quantification of intangible value elements. More research on the intangible aspects of value is necessary to operationalize VBMS for smart services.

Our findings on *data* suggest that collecting customer data is obstructed for relational rather than technological reasons. Smart, connected products that collect condition, operational and environmental data are becoming ubiquitous [68]. Hence, the technological prerequisites to gather the customer data needed for VBMS [29,35] are increasingly fulfilled. Conversely, issues of trust and data privacy [39] become preponderant. Customers unwilling to exchange information or to outsource, their fear of losing control over information and the unclear status of data ownership are barriers to smart services [3]. In the age of digital technologies, we anticipate these relational issues to become a major hurdle for leveraging VBMS for industrial services. However, the literature reviewed remains silent on mechanisms to overcome them.

In the same vein, the advancements in *data processing infrastructure* move the needle towards issues of trust. We found that novel data analytics, software tools and IT infrastructure can support all four building blocks of VBMS. In particular, value realization can be predicted and monitored more accurately than ever before. Yet, even if these tools permit to substantiate claims of higher value, they may not resolve all barriers that stem from purchasing organizations, such as short-term orientation [44] or the prejudice amongst buyers that VBP is greedy and unfair [35]. Moreover, advanced data processing tools may reduce the uncertainty of value creation, but are unlikely to eliminate it entirely. Ambiguity subsists and will be dragged into any resulting service contract, which is prone to cause friction between industrial buyers and sellers [36]. We therefore expect trust to become pivotal in deciding the success of VBMS of industrial services.

The ambiguous findings on the *digital marketplace* call for further differentiation between industrial services. The rise of e-commerce in B2B markets could prove detrimental for obtaining customer insights and communication, two key elements of VBMS. However, this phenomenon might be

[*] Arli et al. [39] raise this issue for relational selling, which is a prerequisite for VBS [23]. Thus, we inferred the validity of these concerns for VBMS.

contingent upon the type of industrial services. For PSS and integrated solutions [28], where the provider develops comprehensive services for customer-specific needs, e-commerce is unlikely to replace personal interaction with salespeople. Value-based approaches seem highly relevant in such cases. Nevertheless, some digital industrial services resemble to what buyers know from B2C markets, such as e-shops or mobile phone applications. These services depend less on salesperson interaction, as buyers most likely prefer fast sales transactions as known from B2C online portals. Using VBMS for such services seems questionable and begs for further inquiry.

Our findings support strategic, tactical and operational decision-making for managers planning to sell industrial services value-based. Neither are all services suitable for VBMS, nor are all industries and customers receptive to value-based offerings. Hence, managers need first to choose strategically the set of services, industries and customers where VBMS should be pursued.

On a tactical level, our findings imply four competences necessary for VBMS of industrial services. Our findings suggest that salespeople cannot rely solely on digital technologies for that purpose. Digital technologies can support value creation and its subsequent verification, but only as long as potential customers share the same perceptions of value and are willing to grant access to relevant data. Thus, managers should seek salespeople that are able to (1) understand and communicate the value of a service, especially in times of service digitalization, (2) reach a common understanding with customers on the salient dimensions of value, (3) identify the data and processing infrastructure required to document value creation and (4) build a relationship of trust with the customer that permits access to this data.

Finally, the framework presented in Table 2 provides advice for operationalizing VBMS. The number and diversity of activities described in the four building blocks should raise managerial awareness about the heavy resource deployment in VBMS.

6. Conclusion

This article adds to the extant body of literature in three ways. First, it is the first literature review to combine the lenses of VBMS, servitization and digital technologies. Second, it synthesizes the extant myriad of terminologies and concepts in VBMS into one overarching framework. Third, it contributes to the current discussion on VBMS that is firmly grounded in marketing research by taking a PSS perspective. We study VBMS in the context of digital servitization, where digital technologies form the core of PSS and smart services.

Further, this review reveals several gaps in the extant literature that offer promising avenues for further research. In general, the use of VBMS for industrial services in the age of digital technologies has not been investigated in great depth. Further empirical research could study how digital technologies are used in different industries to support the key activities of VBMS. In particular, the use of digital marketplaces as enabler for VBMS of industrial services could be investigated. Next, our findings suggest that digital technologies have ambiguous implications for VBMS, so that relational issues become more prominent. New research endeavors could opt for a dyadic approach and study the process of building trust for VBMS of smart services through the lenses of both provider and customer. Finally, much more research is needed to understand how the vast amount of data collected in PSS is used with advanced analytic methods in order to quantify value and derive a value-based price that accurately reflects the superior value of a smart service.

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