

Editorial – Special Issue: Managing Smart Services and Smart Service Systems

By Nicola Bilstein*, Christian Stummer

Smart services are becoming increasingly present in our daily lives. The number of digital voice assistants (e.g., Amazon’s Alexa and Apple’s Siri) used in devices worldwide is expected to rise from 4.2 billion units in 2020 to 8.4 billion in 2024 (Laricchia 2022a), and the global voice recognition market is forecast to grow from USD 10.7 billion in 2020 to USD 27.2 billion by 2026 (Thormundsson 2022). The number of smart homes in Europe is expected to grow from 18.3 million in 2020 to 94.8 million in 2026, and the global revenue for the smart home market is expected to reach more than USD 200 billion in 2026 (Lasquety-Reyes 2021). Moreover, 30% of Germans use smart watches or health/fitness trackers (this percentage is about the same for US citizens but less than reported for citizens of India, where usage is 41%), and smart-watch market revenue worldwide is expected to grow to USD 59 billion in 2026 (Laricchia 2022b). This list of illustrative examples could be extended considerably, clearly indicating that smart services and smart service systems are finding their way into most industries and areas of life.

Smart services are delivered to or through smart products (e.g., Allmendinger and Lombreglia 2005; Wunderlich et al. 2015), which consist of both tangible (i.e., hardware) and intangible (i.e., software) components (Raff et al. 2020). A smart service system, in turn, is a configuration of smart products and service providers that offer

smart services (e.g., Beverungen et al. 2019; Henkens et al. 2021). The advent of smart services and smart service systems has challenged both companies and competition (Porter and Heppelmann 2014, 2015). On the one hand, we find completely new providers of smart services, frequently in the form of startups or corporate spin-offs, entering the market with new service offerings (e.g., appWash, a spin-off of Miele, offering a digital service for laundry rooms; Kaiser et al. 2022). On the other hand, we find traditional companies enhancing their formerly non-smart products or services by incorporating smart capabilities (see, e.g., Klos et al. 2023 (forthcoming)). As a result, even in a traditional sector such as agriculture, the vast majority of German farmers today use digital technologies or applications, such as GPS-controlled agricultural machinery, smart feeding systems, or smart systems, for the site-specific application of crop protection agents or fertilizers (Bitkom 2020). The corresponding digital transformation is perhaps the most pervasive managerial challenge for companies (Nadkarni and Prügl 2021). Whether it is a startup or incumbent firm, all market actors find the core elements of their company’s business model challenged in the rising era of smart services and service systems (Beverungen et al. 2019).

With this special issue, we seek to shed further light on the challenges and managerial implications arising from the transition toward smart service (systems), which could be mapped to a simplified version of the CANVAS business model (Osterwalder et al. 2005, see Figure 1). Specifically, we consider (1) the value proposition, (2) the customer side, (3) the required company infrastructure, and (4) the financial aspects. Additionally, the special issue links the business model to challenges driven by external factors, such as changes to the legal framework.



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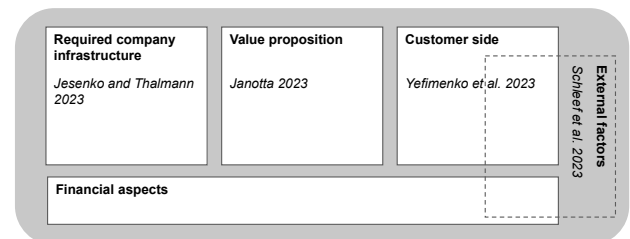


Fig. 1: Classification of the special issue papers in line with the CANVAS business model.

The *value proposition* is the main pillar in a business model. However, it is often difficult to make the value of smart offerings salient to customers. This is especially true for very innovative technologies, which can, to date, be experienced solely at the prototype level. The missing actual usage experience contributes to the danger of a failing innovation. In this regard, Frederica Janotta considers the case of automated driving in her article “Making Emergent Technologies More Tangible – Effects of Presentation Form on User Perceptions in the Context of Automated Mobility” to illustrate the difficulties of examining consumers’ perceptions and acceptance of such innovative technologies. With the help of a comparative study, she investigates the influence of three presentation forms (vignette, real-world video, and computer-generated virtual reality) on customers’ perceptions of emergent technologies and detects the high capability of real-world videos to make complex smart services, such as automated driving, more salient.

With respect to *customers*, smart services not only attract new customer segments or intensify relationships with existing customers by offering innovative value propositions but also offer new communication and distribution channels. Nevertheless, attracting customers to these channels can be challenging. Therefore, in their article “I’ll Have What Alexa’s Having... But Only If That’s What I’m Looking For! – The Impact of Personalization on Recommendation Capabilities of Smart Voice-Interaction Technology in Voice Commerce,” Olena Yefimenko, Jonas Foehr, and Class Christian Germelmann focus on voice assistants as an e-commerce channel and examine whether and when personalized recommendations may benefit voice commerce. They identify consumers’ purchase-related end goals (i.e., optimizing vs. satisfying) as an important boundary condition and reveal that perceived recommendation capability mediates the effect of personalization on purchase intention only for consumers pursuing an optimizing end goal. Thus, especially for optimizing end goals, highly personalized recommendations appear to be of utmost importance vis-à-vis increasing customers’ purchase intention.

The required *infrastructure* is also shaped by the advent of smart services. Today, many companies need to acquire information system competencies in particular as a means for developing smart services. The results of research by Berndt Jesenko and Stefan Thalmann on “Analysing the Introduction of Data-Driven Service Innovation Processes: Stages of Implementation, Success Factors, and Prerequisites” confirm the view that an organization must provide well-developed infrastructure that ensures access to and the operability of the data analysis tools used in the different areas of the organization and that both existing experts, who have the required domain knowledge, and newly recruited employees, who bring

along supplemental skills, need to be involved in the service innovation process. Beyond this, and on a more general note, Jesenko and Thalmann identify goals, opportunities, and (other) prerequisites for data analytics to improve the process. To this end, they interviewed service and innovation managers from diverse industry sectors, clustered these cases, and discussed the differences and similarities between the explorative and validative phases of the implementation process for data-driven service innovations.

At the intersection of customers, financial issues, and external factors (i.e., regulations as mandated by the legal framework), the article by Melina Schleef, Nicola Bilstein, Paul Schrader, and Christian Stummer, titled “When Smart Products Become Dumb (Again): Voluntary and Legally Required Service Updates and Their Impact on Consumers’ Purchase Intention,” scrutinizes whether customers’ purchase intention differs if service updates for smart products are provided either mandatorily (i.e., enforced by law) or voluntarily (i.e., due to the goodwill of the seller). Moreover, the authors test the option of complementing a mandatory update provision with a voluntary extension and find that such a combination can increase customers’ purchase intention. However, the positive effect of the length of the voluntary extension can be limited (e.g., more than two additional years do not seem to be valuable for the customers of the smart dog collar used in their experimental studies).

In summary, the special issue emphasizes that the core components of a company’s business model are affected by the transition toward smart service (systems). Some of these challenges and particularities are highlighted by the contributions of this special issue; however, further research is required.

With regard to the value proposition, the managerial implications of smart service systems may relate to both its tangible and intangible components. Consequently, future research might be directed, for example, toward the design of the tangible components with respect to anthropomorphism (e.g., Jörling et al. 2020) or toward the intervention design (Schweitzer and van den Hende 2016). Intangible components that are of particular relevance to the smart service system comprise awareness, connectivity, actuation, and dynamism (Henkens et al. 2021). These components allow for various types of new services, such as emergency detection in smart homes, which aims to facilitate independent living for elderly people (Fernando et al. 2016).

Considering the customer side, prior research suggests the existence of barriers to smart service adoption, such as perceived complexity or inertia (Mani and Chouk 2018); correspondingly, future research on drivers and barriers might examine smart service adoption within

particular customer segments. Another direction for further research may relate to new customer relationships that emerge in the context of smart services, as the constant data exchange turns former customer touchpoints into customer touchlines (Decker and Stummer 2017). Psychological aspects come into play when customers feel as if they are inferior, superior, or equal in their relationship with a smart service (Schweitzer et al. 2019), a perception that comes with various challenges for the management of smart services. In this regard, trust becomes pivotal to relationship building with smart services (Foehr and Germelmann 2020; Michler et al. 2020, 2022). To provide management with decision support regarding an attractive combination of smart services for their future products, scenario analysis and market simulations might be applied (Stummer et al. 2021).

When the required company infrastructure is scrutinized, it highlights organizational issues that allow for some form of ambidexterity to further the exploration and development of in-house digital innovation capabilities while ensuring that existing products and services are not sacrificed. Digital innovation labs can be a solution in this regard (e.g., Kaiser and Stummer 2020; Schleef et al. 2021), and it is certainly worth investigating the type of firm and market to which the management measure should be applied. Instead of setting up the infrastructure in-house and, to this end, acquiring required skills and expertise by hiring new employees (Porter and Heppelmann 2015)—which can, however, create the challenge of overcoming internal mindset barriers (Töytäri et al. 2018)—companies may also decide to cooperate with a startup. While such cooperation can help them master the challenges of the digital transformation, it also bears the risk of unwanted effects on customer perception (Schleef et al. 2020). Dealing with these challenges opens up a wide field for new research, including various other ways to incorporate third-party expertise or personnel development to prepare employees for the digital transformation.

Smart services can affect financial issues in a company's business model, as they establish new revenue streams through offers such as product-as-a-service, pay-per-X, or in-product purchases (Decker and Stummer 2017; Lassnig et al. 2018). However, more research on customer acceptance of these revenue models is needed, especially with regard to the meaning of the ownership barrier, which may hinder customers from using smart services with certain revenue models (Bilstein et al. 2022a). Moreover, feeless micropayments based on distributed ledger technologies—or any other blockchain that relates to the proof-of-work concept—can expand many current subscription models or pave the way for consumers to become prosumers as they sell self-generated data (e.g., Klein et al. 2022).

Finally, external factors, such as legal regulations, as well as societal and ethical questions, deserve further consideration. For example, when using smart services, many consumers are unaware of which data are collected from them and how, as well as which legal regulations are applicable to the data usage. Here, future research should address questions regarding consumers' data and legal literacy, as well as how to improve both. Moreover, smart services and smart service systems are also promising with regard to promoting transformative outcomes, such as mental and physical health, inclusion, or access (Anderson and Ostrom 2015). Future research should focus on such smart transformative services to assess, for example, when they provide transformative value to customers without destroying value for noncustomers (Bilstein et al. 2022b). Furthermore, when smart services are provided to vulnerable consumers, such as children, people with disabilities, and seniors, ethical questions also need to be considered, as they are closely linked to a company's smart business model.

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