

How Do Consumers Evaluate Value Propositions of Connected Car Services?

Full paper

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Abstract

The failure to clarify the value proposition, based upon a profound misunderstanding of different values that consumers attribute to connected car services, is the root cause of failed business models. Beyond practice, value propositions also play a central role in research on business models. Posing the research question of how consumers evaluate value propositions of connected car services, we address the research gap on value propositions in business models for the Connected Car. Informed by S-D logic, we conceptualize the perceived value on the consequence level and show empirically that consumers evaluate value propositions of connected car services not only in terms of their direct, but also in terms of their indirect and option value-in-context—both so far disregarded components of value-in-context.

Keywords

Connected car services, Value proposition, Service-Dominant logic, Value-in-context, Conjoint analysis

Introduction

Understanding the Connected Car as beyond “internet in the car” but instead “car in the internet”, we focus on smart services that are based on the intelligent connection of the vehicle with its environment (transportation infrastructure, other vehicles, driver, etc.)—labeling these connected car services. Practitioners foresee that annual sales of connected car technologies (including services) will triple to more than €122 billion by 2021. Almost at the same time, the value of digital product parts (including services) in new premium cars will increase from 35% to 50% (Viereckl et al. 2015, p. 4, 19). This means that the physical materiality of the car is representing more and more a simple commodity (KPMG 2015, p.24). In contrast, the digital materiality of the (connected) car is already radically reshaping competition (Porter and Heppelmann 2015) and could disrupt the entire automotive ecosystem within the next years.

The currently undergoing major market changes from the provider’s perspective are paralleled by shifted consumers’ expectations towards greater connectivity (Danne and Hofer 2014, p. 3). On average, 20% of new car buyers state that they would be willing to switch to a different car brand for better connected car services (McKinsey 2014, p. 7). On the other hand, a greater proportion would not be willing to pay for connected car services, which might reflect the low awareness level of benefits that these services can offer (Morris and Savill 2013, p. 9). One could argue that many connected car services are just “me too” offerings without a considerable value for the customer (Heßeler and Hofmann 2015, p. 3). As existing connected car business models have had limited success, providers need to reassess basic strategic questions on identifying different beneficiaries of connected car services and what value they derive from such services (GSMA 2012, p. 2). The failure to clarify the value proposition, based upon a profound misunderstanding of different values that beneficiaries attribute to services, is the root cause of significant misalignments between value, cost and pricing for a number of connected car services (GSMA, 2012, p.9).

Value propositions play a central role in research on business models. Zott et al. (2011, p. 1040) identify value propositions in different business model conceptualizations as the dominating and reoccurring element. Ehret et al. (2013, p. 649) reason that business models define a business based on its unique value proposition in a network of collaborating users, organizations and other stakeholders. With regard to the Internet of Things (IoT) field, which also includes the Connected Car, a survey from Dijkman et al. (2015,

p. 677) indicates that the value proposition is the most important building block in IoT business models. The same survey further points out that the research area of IoT business models is relatively unexplored and has not yet been empirically validated (Dijkman et al. 2015, p. 673).

Posing the research question „How do consumers evaluate value propositions of connected car services”, we address the research gap on value propositions in business models for the Connected Car. The paper is structured as follows: In the next chapter, we provide the conceptual background of our study (S-D logic). Then, we introduce on this basis two components of value—“indirect” and “option” value-in-context that are derived from S-D logic’s initial understanding of value-in-context applied to the IoT field. Assuming that both are important factors in customers’ evaluations of value propositions of connected car services, we conduct a conjoint analysis in order to answer the research question (chapters “Method” and “Data analysis and results”). We conclude by drawing implications for practice and research, and acknowledging limitations of our work.

Conceptual Background

To fully understand value propositions in business models for the Connected Car and how customers evaluate them, we believe that it is necessary to conceptualize perceived value on the consequence level (subjective experience resulting from the use of an offering, e.g. greater quality or customization) rather than at the attribute level (physical characteristics of an offering) (Holbrook 2006; Dong 2015). For example, the ability to cooperate, i.e. the capability of the product to communicate and interact with other products, users and systems (Rijsdijk and Hultink 2009, p.7), has no value for the customer per se. Value evolves from affordances of this attribute, namely cooperatively brought out services like multi-modal routing.

In this regard, service-dominant logic (S-D logic) refers to the concepts of value-in-use and value-in-context. S-D logic is a thinking framework that conceptualizes value creation and service innovation from a service-based perspective. In essence, S-D logic argues that value can only be created contextually and by cooperation. Service generation is a cooperative and interactive value creation process in which different actors—labeled as resource integrators—use a number of different resources to support the value-adding processes of the customer. In this collaborative and interactive value added process, the distinction between producer and consumer dissolves and leads to value co-creation where also the customer is a co-creator of value; All involved actors form a value co-creation network (Vargo and Lusch 2008; Lusch et al. 2010).

According to S-D logic, value is fundamentally derived and determined in use (consequence level) rather than in exchange (attribute level) (Vargo et al. 2008). A firm’s offering is not embedded with value (value-in-exchange; attribute level), instead, value only occurs when the offering is useful to the customer or beneficiary (value-in-use in a certain context; consequence level). Hence, value can only be created through consistent alignment of the service provision to a customer’s context of use (value-in-context; consequence level) (Lusch and Nambisan 2015, p. 159f.). In this way, S-D logic with its inherent customer focus moves away from perspectives traditionally rooted in technological product inventions and defines innovation with regard to service provision. The critical factor in this context is not how smart the product is but how it makes the beneficiary smarter (Vargo et al. 2008; Michel et al. 2008).

Advancements in IT have enabled the rise of service-provisioning networks that are consistent with S-D logic principles—what S-D logic refers to as service ecosystems. With the increase in IT, tangible goods (e.g. cars) have become digitally enhanced with intelligence and thus turned into platforms for service provision (Rust 2004; Lusch et al. 2010; Lusch and Vargo 2014; Lusch and Nambisan 2015). Lusch and Nambisan (2015) direct the attention to three key dimensions of their framework of digitally enabled service innovation: service ecosystems, service platforms, and value co-creation. In this tripartite interplay, value co-creation is enacted within and enabled by service ecosystems.

Based on the same abstraction layers and constructs as Lusch and Nambisan’s (2015) framework, Mikusz (2015a) proposes a conceptual framework for Cyber-physical systems (CPS) from the S-D logic perspective. CPS are integrations of computation and physical processes and enable a wide range of services that are far beyond the scope of today’s capabilities of embedded systems that are externally not networked. The Connected Car fits well with CPS’ characteristics, i.e. it can be seen as a CPS: The Connected Car (CPS) includes connected subsystems (e.g. telematics components) that immediately collect physical data by means of sensors (e.g. GPS, vehicle condition-based sensor data), combine these with additional available

data and services (e.g. real time traffic information), and interact on this basis with the physical and digital world, including other connected cars (e.g. dynamic routing, eCall). This interaction takes place by means of actuators acting on physical processes (e.g. (un)locking doors), via system interfaces (e.g. remote maintenance), and via human machine interfaces (e.g. permanently installed, accident-proof telephone).

The framework decomposes CPS into its single components that are essential for the service architecture, i.e. value propositions, configuration of actors, resources, and activities of value co-creation. Relevant for this work is its understanding of value and value propositions: The framework assumes that value-in-context can only be generated by complex service systems that are assembled from different service contexts (Glushko 2010)—i.e. by (ad-hoc) composed value propositions of a value co-creation network, all transmitted by specific interaction channels via a service platform. This understanding leads the author to propose a differentiated, tripartite anatomy of value-in-context for the platform mediated value co-creation—splitting the overall value-in-context into three components that may be added, all on a conceptually equal level: “direct value-in-context”, “indirect value-in-context”, and “option value-in-context”. Whereas the direct value-in-context essentially equals S-D logic’s original understanding of value-in-context (e.g. Vargo and Lusch 2004; Vargo and Lusch 2008; Lusch and Nambisan 2015), the author newly introduce the two other components on the assumption that both are (also) decisive factors in customers’ perceptions of value-in-context. Thus, both substantially contribute to the service experience in platform mediated value co-creation that applies to the field of connected cars (Mikusz 2015b).

We adapt this value-in-context anatomy and—focusing on the, so far disregarded, option and indirect value-in-context components—break down our research question: (1a) How do consumers evaluate value propositions (VPs) of connected car services with a high option value-in-context? (1b) How do consumers evaluate VPs of connected car services with a high indirect value-in-context?

Indirect and Option Value-in-context

S-D logic assumes that the co-creation of value is a cooperative and interactive process. It considers all involved actors as resource integrators—they offer their resources for collaborative value creation and together form a value co-creation network. S-D logic differentiates between two types of resources: Operand resources and operant resources. The former are usually tangible and static resources that require some action to make them valuable—e.g. a vehicle. The latter on the other hand are usually intangible and dynamic resources capable of acting on operand and other operant resources to create value (Wieland et al. 2012)—e.g. knowledge or certain competences. From the perspective of S-D logic, added value can result only from the application of operant resources that may be directly transmitted, or through operand resources (Vargo et al. 2008).

In platform mediated value co-creation, data gathered by the customer needs to be turned into a main operant resource. The data is fundamental to value creation and competitive advantage in smart, connected service offerings and is a core asset of the corporation (Porter and Heppelmann 2014; Porter and Heppelmann 2015). The user is not a passive actor, but rather an active resource integrator and thus co-creator of value—a “data co-creator” in a network of actors.

Data as operant resource is associated with network effects. For example, the value proposition of a real-time traffic information service is to keep the driver informed on the traffic situation on the planned route and potential alternative routes at all times. In order to be as precise as possible, the system takes among others also data from movement profiles of other connected cars in real time. In this way, all cars function as resource integrators by supplying the required sensor data. In other words, by driving from A to B, customers simultaneously co-create (overall) value-in-context for themselves, as well as indirectly co-produce the core offering for others by enabling precise information—i.e. they increase potential (overall) value-in-context (also) of other customers (Mikusz 2015a). The more users co-produce the service by simply using it, the higher the (overall) value-in-context of the service becomes to all users.

Network effects are generally associated with platform mediated value co-creation and service innovation in the digital age (Gawer 2014; Gawer and Cusumano 2014). Innovation in digitally enabled service offerings relies not only on algorithms but also on the crowds that generate content or data (Barrett et al. 2015). We assume that this kind of customer participation offers not only benefits such as better quality, but also is intrinsically attractive to customers who derive enjoyment simply from their experience of participation in service delivery (Yim et al. 2012; Dong 2015)—despite of potential data privacy concerns.

To sum up, indirect value-in-context results from data as operant resource that the customer integrates as “data co-creator” in the value co-creation. The value arises for the user and all other actors (customers) in the value co-creation network (Mikusz 2015b).

Similar to indirect value-in-context, also the option value-in-context is inherent to platform mediated value co-creation. Option value-in-context results from the option to accept complementary value propositions that enhance or even enable the value proposition in that they are embedded—even without being accepted (used) by the customer. For example, (optional) complementary value propositions significantly enhance the overall value proposition of an intelligent and sustainable navigation service for connected electric cars that is already in the market. Using this service, the driver may be certain that, in any case, there will be a fast and convenient way to reach the destination. If the service detects that either the charge level of the battery, driving style, topography, or current traffic conditions will prevent the driver from reaching the destination, the service displays charging stations located on the way to the destination and offers intermodal routing solutions including public transportation. Both complementary value propositions increase the overall value-in-context of navigation services for electronic driving, regardless if actually used by the customer.

We argue that option value-in-context may arise from the existence of such open options, i.e. of the possibility to use something anytime if eventually needed in a particular context. For example, flexibility is a consequence of constantly feasible open options (Berkers and Roelands 2013, p. 131). Digital infrastructures enable the dynamic construction of complementary value propositions and their wide dissemination, and facilitate the identification of appropriate complementary value propositions. S-D logic addresses this point with the concept of resource density. If S-D logic is the application of resources for the benefit of others or oneself, a central issue is whether resources can be quickly mobilized in order to offer value propositions. The concept of resource density underlies this key issue—maximum resource density occurs when the best combination of resources can be mobilized for a particular situation (Lusch and Nambisan 2015).

In table 1 (on the next page) we illustrate using the hypothetical connected car service “smart navigation” how the overall value-in-context anatomy can appear in connected car services. The illustration is mainly based on existing and best-of offerings and should be read as follows: “Smart navigation” is a connected car service that is provided by platform mediated value co-creation. Its overall value-in-context results from its direct, option, and indirect value in-context. To operationalize this, we separate “smart navigation” in three service components with certain features, whose values for the customer arise (almost) exclusively by one of the three value components of the tripartite value-in-context anatomy.

Method

We investigate how consumers evaluate value propositions of connected car services with a high option and/or indirect value-in-context using a conjoint analysis (CA). In order to do so, we examine if both are decisive factors involved in consumers’ choice process for connected car services. In other words, we test if they both are perceived important factors for customers’ perceptions of the (overall) value-in-context and thus substantially contribute to the service experience in platform mediated value co-creation. With regard to value propositions of connected car services with a high indirect value-in-context, we also explicitly test if customers perceive their role as “data co-creators” in a positive or negative way.

CA is a multivariate technique developed specifically to understand how respondents develop preferences for any type of object such as products, services, or ideas. It is based on the simple premise that consumers evaluate the value of an object, real or hypothetical, by combining separate amounts of value provided by each factor (component, feature, attribute, or simply part of the object) (Hair et al. 2010, p. 266). By constructing specific combinations of the objects’ factors, i.e. object profiles, researchers attempt to understand a respondent’s preference structure. The preference structure depicts not only how important each factor is in the overall decision, but also how differing levels within a factor influence the formation of an overall preference (utility value) (Hair et al. 2010, p. 268).

All variants of "smart navigation" described below provide a basic set of street navigation functions and of setting options. Examples: Dynamic routing, points of interests, usual 2D view, etc.	
High direct value-in-context	<p style="text-align: center;">Component A: Customization (available / not av.)</p> <p>Features: State of the art customization and ease of operation of "smart navigation", far beyond the basic functionality of street navigation and basic setting options.</p> <p>Example 1: Customized display profiles with real street view, crossroads in 3D, and fully interactive screen with your preferred point of interest categories.</p> <p>Example 2: Customized operation profiles with, e.g., voice-activated operation and smartphone integration</p>
High option value-in-context	<p style="text-align: center;">Component B: Situational services (available / not av.)</p> <p>Features: This component automatically offers smart choices of specific services (displayed on your navigation device or smartphone), which seem to make sense in your current situation. It is always completely up to you whether you accept these proposed services either immediately or later, or prefer to ignore them completely. The services are therefore optional. In addition, these services can go beyond the scope of street navigation in a strict sense.</p> <p>Example 1: Reservation of a parking space (or a charging station for an electric car) on the way to, or at the destination, once "smart navigation" has determined bottlenecks.</p> <p>Example 2: Proposal for a seamless continuation of your journey by other means of transport (public transport, train, taxi, car-sharing, etc.) with continuing the navigation on the smartphone, once "smart navigation" has identified some factors that would prevent you from reaching your destination otherwise (in time) (e.g. traffic jam, insufficient range, technical defects or other limitations).</p>
High indirect value-in-context	<p style="text-align: center;">Component C: Data co-creation (available / not av.)</p> <p>Features: Features that you and other users "co-produce" by allowing clearly defined and secure access to specific sensor data of your vehicle. Otherwise, these features would not be possible. That is, your data enhances the functionalities of "smart navigation" for you and for all other users (likewise, you also benefit from the other users' data transfer).</p> <p>Example 1: "Real time module"—Highly accurate predictions of traffic and congestion, (free) parking spaces and charging stations; security alerts about approaching road sections (all in real time using your and other users' sensor data).</p> <p>Example 2: "Eco driving analysis function"—you can compare your driving behavior with other drivers and optimize it, so you will get e.g. fuel-saving recommendations (using your and other users' sensor data).</p>

Table 1. Overall Value-in-context using the example of "smart navigation"

Of the three general options—traditional CA, adaptive CA, and choice based CA—we chose the traditional CA. Given our small number of factors (three) and due to our emphasis on a throughout understanding of the preference structure, we have regarded the traditional CA as suitable in terms of response burden on the respondents and the depth of information portrayed. Among others, a no-choice-option was not needed and the fact that choice-based conjoint approaches do not allow the estimation of part-worths on individual level led us not to select this variant. The small number of factors obviates the need for an adaptive or a hybrid CA. Instead, the traditional CA is widely used when the number of factors is around six or less.

Using the traditional CA with our chosen design, respondents rank a number of object profiles as stimuli that represent products or services with predefined factors and their predefined levels. The 'holistic' ranking can then be mathematically decomposed, delivering utility values (part-worths) for each factor level. Due to the estimation of part-worths on a common scale, it is also possible compute the relative importance of each factor. The importance of a factor is represented by the range of its levels, i.e. by the difference between the highest and lowest values, divided by the sum of the ranges across all factors. Factors with a larger range for their part-worths have a greater impact on the calculated utility values and thus are deemed of greater importance (Hair et al. 2010, p. 270).

We conducted the CA based on our "smart navigation" example in table 1. The overall value-in-context of its value proposition results from direct, option and indirect value in-context. For operationalization, we separate the overall service into three components (A, B, C) with certain features, whose values for the consumer arise (almost) exclusively by one of the three components. With "available / not available", we have an equal number of two levels the factor (a) with (same) extreme end-points (b)—in order to avoid the

number of levels effect (a) and to decrease task complexity (b) (Hair et al. 2010, p. 282). As these eight combinations in total still allow a full evaluation of the respondent, we are able to perform a full factorial design: All respondents evaluated all possible profiles that were described in terms of all factors without information overload, thereby facing a large number of trade-offs regarding availability of the components. All in all, we were able to create an orthogonal and balanced profile design (Hair et al. 2010, p. 265).

The full-profile method can evaluate preferences either by asking respondents to rank-order the profiles in terms of preference, or rate each combination on a preference scale. We decided to obtain a rank-order preference measure. This method is likely to be more reliable because ranking is easier than rating for a reasonably small number (20 or fewer) of profiles (Hair et al. 2010, p.291), as in our case. We asked participants to sort the eight variants of "smart navigation" according to the usefulness for them.

The survey was set up using the online survey software questback EFS Survey. To begin with, the context of the experiment and all factors and factor levels were explained to ensure that participants clearly understand the stimuli. Then, the participants were asked to rank the variants of "smart navigation" (combined visual and textual representation in randomized order), always having the opportunity to adjust the ranking and to rank profiles equivalent. The survey was initiated in October 2015 and ran for about 2 months. Prior to the survey, small-scale pre-studies were conducted to ensure that the measures were understood and represented reasonable alternatives when formed into profiles. Invitations to the survey were published in issue-specific online forums, interest groups in social media and among students in IS.

Data Analysis and Results

We had certain requirements on the characteristics of our population of interest for the study (among others familiarity with main features and capabilities of state-of-the-art connected cars). We assured that all analyzed responses met these requirements with respective meta-questions and were filled out with appropriate respondent effort resulting in 84 participants in total. We further carried out reliability tests at the level of input judgments of the respondents (Green and Srinivasan 1978): attention check, self-evaluation of understanding of the components, and self-evaluation of the abovementioned familiarity. Due to practical restrictions such as the survey length, we decided to abstain from a second set of stimulus (test-retest-reliability). We removed 14 datasets due to low reliability.

Choosing the parameter estimation method in CA depends on the dependent variable's scale. We estimated the obtained rank-order preference measures with MANOVA using the CA module of XLSTAT. MANOVA is among the most popular and best known methods in the class of algorithms designed for an ordinal-scaled dependent variable (Hair et al. 2010, p. 294; Green and Srinivasan 1978, p. 112f.).

Besides reliability, we tested the validity with adjusted R^2 value. It is interpreted as the proportion of the variability of the dependent variable explained by the model. The adjusted R^2 is a correction to the R^2 since it compensates lower degrees of freedom (Hair et al. 2010, p. 298; Green and Srinivasan 1978, p. 114ff.) that are given in our case. We did not have to remove any datasets due to low validity.

We also reviewed all part-worth patterns and identified any that may reflect reversals (Hair et al. 2010, p. 300). Reversals create a preference structure that cannot be supported theoretically, i.e. reversals represent illogical or inconsistent patterns in the overall preference structure as measured by the part-worths. We consider significantly negative part-worths either for Customization (component A) and Situational services (component B) illogical (reversals), whereas according to our assumptions, part-worths of Data co-creation (component C) can be either negative or positive. We identified 7 reversals and removed these datasets. At the end, our adjusted sample contains 63 datasets. This sample was object to our analysis on an aggregated level. A conjoint analysis can be estimated even with one respondent. However, when calculating and interpreting on aggregated levels like in our case, the sample size is not irrelevant (Hair et al. 2010, p. 292). In this regard, we rate our final sample size as sufficient.

Table 2 shows the aggregated results of our survey for the relative importances of the components.

CA	Component	Min./Max.	Mean	Std. dev.	Chart
Smart navigation (exemplary connected car service), N=63	A: Customization (high direct value-in-context)	0,0 / 99,9	35,0	25,2	
	B: Situational services (high option value-in-context)	0,0 / 99,8	31,5	19,9	
	C: Data co-creation (high indirect value-in-context)	0,0 / 99,5	33,4	25,5	

Table 2. Overall value-in-context using the example of “smart navigation”

In the upper part of figure 1, we compare the relative importance of Customization (high direct value-in-context) to Data co-creation (high indirect value-in-context), and to Situational services (high option value-in-context). We do that to avoid arguing with a “pseudo-high” relative importance of the both newly introduced components, i.e. a high relative importance of Situational services (high option value-in-context) exclusively at the expense of Data co-creation’s relative importance (high indirect value-in-context) and vice versa. The lower part of figure 1 shows if the respective component is associated with a positive value (has a benefit), negative value (has no benefit), or is indifferent for the participants. For example, of those 56% of participants who consider Data co-creation (high indirect value-in-context) as equal or even more important than Customization (high direct value-in-context), 88% perceive the value of Data co-creation as positive, i.e. they prefer a service with Data co-creation while 9 % perceive the value of Data co-creation as negative. In this case, indirect value-in-context is negative in the additive model and decreases the overall value-in-context of “Smart navigation”.

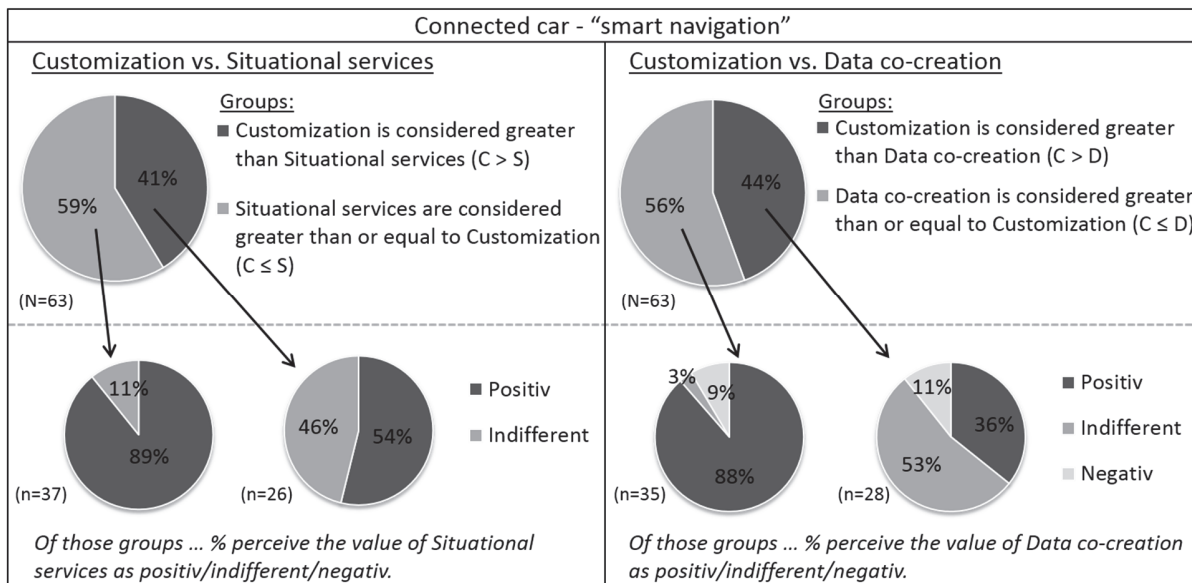


Figure 1. Data co-creation and Situational services compared to Customization

Discussion and Conclusion

The failure to clarify the value proposition, based upon a profound misunderstanding of the different values that consumers attribute to connected car services, is the root cause of failed business models (GSMA, 2012, p. 2, 9). Beyond practice, value propositions play a central role in research on business models (Zott et al. 2011, p. 1040; Ehret et al. 2013, p. 649; Dijkman et al. 2015, p. 677). Posing the question „How do consumers evaluate value propositions of connected car services?”, we address the research gap on value propositions in business models for the Connected Car. Informed by S-D logic, we conceptualize the perceived value on the consequence level and show empirically that consumers evaluate value propositions of connected car services not only in terms of their direct, but also in terms of their indirect and option value-in-context. Thus, the latter both, so far disregarded, components of value-in-context are decisive factors in consumers’

choice processes for connected car services. Both factors substantially contribute to the service experience in platform mediated value co-creation that applies to the field of connected cars. As to value propositions with high indirect value-in-context, we explicitly show that customers perceive their role as data co-creators in a positive way, despite of potential data privacy concerns.

Value proposition design is one type of business model innovation (Maglio and Spohrer 2013, p. 655). Practitioners can use our results to innovate their business models, focusing on the design of novel value propositions with high indirect and option values-in-context. Market studies on the Connected Car point out that both, value propositions with a superior value for the customer, and business cases that would immediately boost the popularity of connected cars, are missing (Heßeler and Hofmann 2015, p.3; Morris and Savill 2013, p. 9). We attribute this situation to the circumstance that companies seem to focus on value propositions with high direct value-in-context, neglecting the (relative) importance of value propositions with high option and indirect values-in-context.

The high relative importance of value propositions with high indirect value-in-context (that most often have been evaluated positive) leads us to encourage the practice to abandon the idea of a passive consumer. It is crucial to appreciate the consumer's role as a data co-creator, i.e. as the integrator of probably the most important operant resource in platform mediated value co-creation. In line with our results, a study claims that more than 80% of car owners are willing to share personal and vehicle information, when they see (direct) benefits to them (Gill and Winkler 2014, p. 36f.). Thus, we believe that companies need to provide a clear value proposition to customers to encourage data sharing, and suggest doing so by maximizing indirect values-in-context of the value propositions.

We further encourage the practice to develop value propositions with a high option value-in-context that should be offered complementary and accordingly to the customer's context. Beside in-car services, consumers increasingly expect service experiences that go beyond the vehicle (Deloitte 2014, p. 3). This should be reflected by business models and their value propositions. Yet, a context-independent display of services has only little usefulness to the customer. We believe that value propositions with high option value-in-context are an effective mean in this regard. In our opinion, such value propositions require open and platform based business models. Our work contributes to the innovation stream of business model research (Zott et al. 2011), focusing on the IoT subdomain of the Connected Car. Schneider and Spieth (2013, p. 22f.) call attention to process and elements of business model innovation as one important future research field in their tripartite research agenda on business model innovation. We integrate S-D logic's thinking and the business model concept, focusing on the value proposition as object of business model innovation. Clauß et al. (2014) discuss possibilities how to adapt business models to S-D logic's thinking, and develop a set of propositions that describe the influence of a company's service-dominant business logic on the basic elements of a business model. We draw implications for research making reference to some of their propositions.

With regards to the design of business models, option value-in-context means that value propositions need to address the contextual requirements of customers. As these vary among different interactions even with the same customer, value propositions need to be more flexible and wide-ranging. Companies will be required to find new ways to align customizable offerings with efficient internal value creation (proposition 1a (Clauß et al. 2014, p. 275)). We propose to implement this service dominated thinking by platform mediated value co-creation and orchestration of connected car service components with a particularly high option value-in-context. We further believe that this requires open and platform based business models, such as the ones in line with Gawer's (2014) industry platform conceptualization in which interface specifications are shared with complementors. An interesting characteristic of industry platforms is that the platform leader is not required to know *ex ante* who or where innovators might be. Potential innovators of complementary products—here complementary services with high option value in context (e.g. situational services)—identify themselves to the platform ecosystem. This nature of relationship between the platform leader and (potential) complementors creates unprecedented scope for innovation on value propositions (Gawer 2014; Gawer and Cusumano 2014), and corresponds well to S-D logic's service ecosystem conceptualization. We see research opportunities in this area, e.g. in terms of a closer conceptual integration of S-D logic's thinking and platform research. Finally, further studies could address the question through which channels service components with high option value-in-context (e.g. situational services) can be transmitted, and how these channels can be effectively interlinked. Mikusz (2015a) introduce six interlinked interaction channels in a related research context: "Intelligent sensors", "Intelligent actuators", "Software interface", "Goods as a vehicle", "User interface", and "Person-to-person".

Implementing S-D logic causes a need to redefine the basic understanding of transactions, i.e. to focus more on the exchange and integration of operant resources and less on the exchange of services as units of output against money. Thus, in order to be able to co-create value-in-context, business models should facilitate the application and exchange of operant resources (proposition 1b (Clauß et al. 2014, p. 276)). Our insights into value propositions with high indirect value-in-context, and the customer's role as data co-creator, contribute to this issue. Further research in this regard could address the question of which specific collaborative competences for the successful exchange of operant resources companies should develop (similar to proposition 1d (Clauß et al. 2014, p. 277)). These competencies should allow the transformation of customers' sensor data into knowledge about their future needs, e.g. for complementary value propositions, and allow learning from user decisions and behavior. One could ask in simple words—how to turn the customer's role as data co-creator into knowledge co-creator and how to increase the customer's willingness to engage in co-creation (e.g. considering motivational factors).

Our work is not without limitations. The subjectivity of the researcher is intimately involved in conceptual research that lays the groundwork for our conjoint analysis. This first part of our work is based on—by nature subjective—plausibility considerations. The second, empirical part is to some extent limited by the chosen research method and operationalization. Despite the following drawbacks, we have considered the conjoint analysis as the most appropriate approach for our purposes.

Limitations can result from the low number of factors and factor levels of our conjoint task. However, we note that a (too) complex conjoint task would limit the results as well. The complexity of our conjoint task was limited by drawbacks of an online-based conjoint study: It may be difficult for survey participants to evaluate non-tangible, context sensitive services via an online-based conjoint study. We resolved this by the provision of a plausible scenario, introduction, visual and textual descriptions, and, as abovementioned, with a relatively simple conjoint task with a low number of factors and factor levels. Our operationalization—the hypothetical connected car service “smart navigation”—may limit the level of generalization of our results. On the one hand, we have had to minimize the individual scope for the participants in interpretation of the components' contents. On the other hand, we have had to ensure the generalizability of our results to value propositions of connected car services in general, i.e. beyond navigation (sub) services. We resolve this immanent trade-off between operationalization and generalization firstly by providing a general description of the components and secondly by listing two concrete examples (table 1). Finally, we thoroughly pretested the study, and checked for reliability and validity of our results.

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