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"I like it, but I don't use it": Impact of carsharing business models on usage intentions in the sharing economy

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Abstract

Carsharing is often promoted as a potentially environmental-friendly alternative to individual car ownership. However, various carsharing programs have displayed limited success in the past. An initial field study of a new carsharing service is such a story of failure: The introduction of this new service at a medium-sized German university generated unexpectedly low adoption rates so that the service was eventually scaled down and then suspended. Quantitative field study results as well as additional qualitative focus groups reveal that missing compatibility is a key barrier to adoption. Drawing on extant conceptual frameworks of user participation in sharing business models, a factorial survey identifies the importance of different dimensions of carsharing business models for their acceptance. The results reveal that a set of convenience and lifestyle dimensions influences usage intentions, including mode of drive, pickup and drop-off mode, service level, price model, availability, and type of market mediation. In contrast, vehicle fleet does not appear to influence carsharing models' acceptance. These findings contribute to research on business model configuration as well as the attitude–behavior gap in the sharing economy by determining relevant dimensions of a carsharing business model that can bridge the gap between basically positive attitudes and usage resistance. Thereby, they also serve for concrete managerial recommendations.

KEYWORDS

access-based services, business model, carsharing, factorial survey, sharing economy, usage intentions

1 | INTRODUCTION: THE RELEVANCE OF BUSINESS MODEL CHARACTERISTICS FOR THE ADOPTION OF CARSHARING SERVICES

> "[Carsharing] is a good concept … [but] I wouldn't use it except for very rare cases." (Interview quote of focus group participant).

Carsharing is often described as ecological alternative to car ownership, and these environmental effects of carsharing have received significant scholarly attention (e.g., Baptista, Melo, & Rolim, 2014; Firnkorn & Müller, 2012; Peterson & Simkins, 2019; Rabbitt & Ghosh, 2016). However, carsharing services differ in their environmental impacts partly due to their different business model design, for example, free-floating and station-based systems (Münzel, Boon, Frenken, & Vaskelainen, 2017). Furthermore, it is not quite clear which kind of carsharing business models users prefer so that any research results about sustainability impacts of carsharing services in general are largely hypothetical.

Predictions of the growth of carsharing (e.g., Monitor Deloitte, 2017) have prompted many car manufacturers and service providers to develop access-based service offerings to exploit this market. However, numerous carsharing programs seem to have disappointed, which has led service providers such as Citroën MultiCity (www.multicity-carsharing.de), Cité Lib (an initiative by Toyota, Place Gre'net, 2017), and car2go in UK (BBC News, 2014) to exit their respective markets. The reasons for these failures are unclear though, especially with regard to consumers' (non)adoption behavior (Monitor Deloitte, 2017; Perboli, Ferrero, Musso, & Vesco, 2018).

Until today, carsharing programs lack a dominant design. Regarding the "best" business model, one simulation predicts that a station-based model with fixed drop-off and pickup locations, competitive pricing, and an e-car fleet would be most successful (Perboli et al., 2018). Other studies, however, emphasize that free-floating models, which operate with varying drop-off and pickup locations, are bigger, growing faster, and more convenient (Firnkorn & Müller, 2015; Heilig, Mallig, Schröder, Kagerbauer, & Vortisch, 2018; Schaefers, 2013), as well as more likely to be adopted in large cities with high demand density (Münzel et al., 2017). These divergent findings suggest the need for a closer consideration of underlying consumers' perceptions of the alternatives, consumer behaviors, and contextual factors. Consequently, previous research calls for considering these alternatives as potential drivers of or barriers to the adoption of sharing programs (Davidson, Habibi, & Laroche, 2018).

Given the above, there is a gap in research understanding what factors shape consumer usage intentions toward carsharing services. Determining these factors might (a) indicate which business model is optimal (Münzel et al., 2017; Perboli et al., 2018) and thus contribute to the ongoing debate on what influences the attitude–behavior gap in sustainability-related consumption (e.g., Shim, Shin, & Kwak, 2018; Tilley, 1999), (b) provide insights for scholars and consultants who seek to predict the market potential of carsharing, and (c) help managers launch and maintain suitable carsharing services.

Therefore, we seek to shed light on the influence of various business model characteristics in carsharing programs. In an initial field study of a new carsharing service at a German university and through follow-up focus group interviews, we were struck by the fact that this program was poorly adapted and finally failed. Finding that a lack of compatibility drives nonadoption, we also specify which dimensions (or more precisely, which configurations of dimensions) in carsharing business models evoke perceptions of compatibility among consumers. The dimensions align with carsharing and sharing economy literature (Bardhi & Eckhardt, 2012; Lamberton & Rose, 2012; Münzel et al., 2017; Perboli et al., 2018) and triggered our main study in which data were collected via a factorial survey and tested with different multilevel models. Results of our main study show that mode of drive, pickup and drop-off mode, service level, price model, availability, and type of market mediation all influence the usage intentions of carsharing services.

To illustrate the relevance of a well-orchestrated business model as prerequisite for a successful service, we begin this paper by setting the scene in Section 2 through reporting on the failed business model in our initial field study an example of a misarranged composition. Following this preface, the remainder of the paper then follows a classical structure beginning with a literature review on environmental aspects of carsharing as well as on determinants influencing the adoption of different carsharing offers in Section 3, followed by the development of hypotheses in the same section. The main study was designed as a factorial survey, and we illustrate the method of this quasi-experimental approach in Section 4. We present our results in Section 5 and discuss our research contributions, managerial implications, and limitations of our approach in Section 6 before concluding in Section 7.

2 | PREFACE: A STORY OF FAILURE

Before conceiving the main study presented in this paper, we conducted a field study in which potential users of a newly established carsharing program learned about it, developed attitudes, registered, and used the program. The initial aim of this study was to understand consumers' adoption of a carsharing program. Quantitatively, our analysis, however, was limited due to low adoption, which in turn prompted us to collect qualitative data in focus groups to dig deeper into the actual reasons for nonadoption.

2.1 | Setting of initial field study

The field study involved the introduction of a carsharing service at a German university by one of the world's top 10 car manufacturers (OICA, 2016). It started with three station-based cars, of varying sizes and prices. The car manufacturer and university promoted the program with mailings, newsletters, advertising material, and sales

TABLE 1 Regression results (initial field study)

	Linear regression			Logistic regression				
Dependent variable	Carsharing attitude			Carsharing registration				
	β	SE	Sig.	β	SE	Wald	Sig.	Exp(β)
Independent variables								
Relative advantage	.654	.051	.000	−.083	.233	.128	.721	.920
Compatibility	.154	.043	.020	.617	.201	9.421	.002	1.854
Complexity	.073	.042	.198	−.062	.195	.101	.751	.940
Control variables								
Gender	−.045	.107	.331	.612	.409	2.240	.134	1.844
Age	.103	.004	.028	.007	.016	.223	.637	1.008
Brand attitude	.012	.050	.803	.086	.209	.168	.682	1.089

Note. Linear regression for attitude: Adjusted R^2 = .62; $F(6,185)$ = 53.293, p < .000. Logistic regression for complete registration: 2 log likelihood = 161.267; χ^2 (df) = 21.075 (5), p = .002; Hosmer–Lemeshow test: 7.344, p = .500; Nagelkerke R^2 = .17; classification percentage = 83.3.

promotions. The target customers, and thus the study sample, were students and employees of the university (approximately 15,000 people in total) who were invited to fill out an online survey, which we used to gather insights on potential drivers of adoption (relative advantage, compatibility, and complexity) and attitudes toward the offer as well as to match the survey data with registrations and actual usage behavior. To encourage participation, everyone fully registered for the new program received a € 10 starting credit. The registration included filling out an online form and providing a face-to-face proof of identity and a valid driver's license. In total, 192 university members (62% women, 57% students) completed the survey (1.28% response rate; approximately 15,000 students and employees). Following the survey, only 35 (60% students) of these 192 persons registered whereas 157 remained unregistered for subsequent 7 months. Of the 35 registered users, only eight people used the carsharing program, whereas 27 did not. Since we received the registration data from the carsharing provider in the entire local operating area, it turned out that we captured almost all potential carsharing users within our research project. The total number of registrations in the operating area was 37.

These numbers tell a story of a failed carsharing program. Despite the low numbers of participation (and thus responses to our questionnaire), some elements of the questionnaire did allow us to shed light on indicators explaining this failure. To achieve this, we compared those 35 respondents of our survey, who fully registered for the service with the 157 respondends who only completed the online survey but did not register for the program. This analysis provides first insights on why many people, who seemed to be initially interested in the service (as they completed the survey), did then not register. These exploratory results presented in the following then paved the way for our main study.

2.2 | Exploratory results

The key finding was that the lack of compatibility of the carsharing offer with customers' needs limited their adoption. Specifically, we used established 7-point Likert scales to measure the perceived relative advantage, compatibility, and complexity of the carsharing business model as discussed by Meuter, Bitner, Ostrom, and Brown (2005). All variables exhibited high reliability. Carsharing attitude, one of the dependent variables, was captured by the survey using a 7-point sematic differential scale (Dabholkar & Bagozzi, 2002; Reinders, Dabholkar, & Frambach, 2008; see Appendix A). The second dependent variable, usage intention, was measured by participants' actual behavior as they completed carsharing registration. To determine the values for the latent, multi-item variables, we calculated mean values. Age, gender, and brand attitude were included as control variables.

As we detail in Table 1, the linear regression Model 1 indicates a good fit (adjusted R^2 = .62) and a significant regression equation, $F(6,185)$ = 52.293, p < .000. Relative advantage and compatibility exert significant impacts on attitude (β = .65, p < .000; β = .15, p < .020), whereas complexity has no effect (β = .07, p < .198). The logistic regression Model 2 also shows good model fit with a highly significant χ^2 (21.075, df = 5; p < .002).[1] Here, only perceived compatibility offers a strong predictor of usage intentions (registration; p = .002; Exp(β) = 1.854). None of the control variables, gender, age, or brand attitude, affect registration decisions, and only age has a marginally significant positive effect on attitude. In sum, specifically the lack of compatibility of the carsharing offer with customers' needs seemed to have limited their adoption.

2.3 | Further insights from focus groups

To gain deeper insights into the low adoption rate, we conducted three focus groups (e.g., Baxter, 2015; Williamson, 2018) following recommendations from prior literature (Krueger & Casey, 2015; Wilson, 2014) with 16 participants who participated in the online survey and either registered (one group) or not registered (two groups) for

[1] The nonsignificance of the Hosmer–Lemeshow test (χ^2 = 7.34; df = 8; p = .500) also indicates good fit with the data. Furthermore, the model accurately predicts user registration, with a classification accuracy of 83.3%.

the carsharing program in our field study. The focus group interviews were recorded and transcribed; combined, they took up 3 hr and 23 min, with 29,509 words. To avoid a confirmation bias toward existing theoretical frameworks (Bryman, Becker, & Sempik, 2008), an independent researcher, unfamiliar with the frameworks or concrete research questions, analyzed the data.

Without exception, all participants expressed positive to very positive attitudes toward carsharing in general so that attitude does not seem to determine the usage intention of the carsharing model. When the interviewees addressed barriers to or disadvantages of the program, they consistently related to rather concrete aspects of the business model and its lack of fit with the participants' lifestyles (compatibility). Negative comments cited the effort of having to return the station-based cars: "The big pain for me is having to return it to here [the university]" (Participant M). This complaint aligned with the participants' sense that regular uses of the carsharing offer were not compatible with the business model, in their specific consumption situation: "I think this is an atypical situation, a person who drives away from work or from his place of study and then comes back afterwards, this is really a special case" (Participant F). Participant H elaborates, she would use it at a "maximum if I'd have to run an errand in my lunch break."

In sum, when people praised carsharing, the comments were general and at the societal level. When they criticized it, they cited the lack of compatibility with their own concrete consumption situation. Compatibility with consumers' lives thus emerges as a key determinant of (non)adoption that we scrutinized in our main study. The following literature review and hypotheses deduction builds upon these insights and serves to conceptualize the different dimensions of carsharing business models.

3 | LITERATURE REVIEW AND HYPOTHESES

3.1 | Effects and dimensions of carsharing business models

The environmental effects of carsharing have received significant scholarly attention, and in general, carsharing and access-based services are often perceived as "eco-efficient services" because they make use of underutilized assets (Botsman & Rogers, 2010; Lamberton, 2016; Meijkamp, 1998). Further, a plethora of studies indicate that carsharing reduces car ownership (e.g., Baptista et al., 2014; Clewlow, 2016; Engel-Yan & Passmore, 2013; Firnkorn & Müller, 2011; Firnkorn & Müller, 2012; Le Vine & Polak, 2019; Martin, Shaheen, & Lidicker, 2010; Nijland & van Meerkerk, 2017; Stasko, Buck, & Oliver Gao, 2013) as well as private vehicle kilometers traveled (Clark, Gifford, Anable, & Le Vine, 2015; Firnkorn & Müller, 2011; Kopp, Gerike, & Axhausen, 2015; Nijland & van Meerkerk, 2017; Sioui, Morency, & Trépanier, 2013; Steininger, Vogl, & Zettl, 1996). Rabbitt and Ghosh (2016) estimate, in sum, that carsharing could lead to significant cost and CO_2 savings (similar to Baptista et al., 2014).

This all said the specific type of carsharing service (e.g., free-floating vs. station-based systems), likely also influences environmental impact. Namazu and Dowlatabadi (2018), for example, show that only station-based systems indeed substitute private car ownership, whereas free-floating systems are an additional mobility option for users, and Baptista et al. (2014) posit that reduced CO_2 emissions are likely to materialize only if a shift to hybrid or electric vehicles is promoted. Moreover, sharing and access-based services, however, constitute a service innovation (Baumeister, Scherer, & Wangenheim, 2015) with highly insecure adoption results. Thus, research results about sustainability impacts of carsharing services in general are largely hypothetical as long as we do not know if and potentially what type of carsharing business model consumers prefer. For any positive ecological effects to materialize, the respective carsharing programs need to be compatible enough for potential users to elicit usage.

Several studies illustrate that demographic factors, for example, age, influence the utilization of carsharing services (e.g., de Luca & Di Pace, 2015; Jian, Rashidi, & Dixit, 2017; Prieto, Baltas, & Stan, 2017). Furthermore, consumer psychographic variables and motivations have been identified as important factors for the use of access-based and sharing programs in general (e.g., Benoit, Baker, Bolton, Gruber, & Kandampully, 2017; Lamberton, 2016; Moeller & Wittkowski, 2010; Roos & Hahn, 2017) as well as carsharing in particular (Peterson & Simkins, 2019; Schaefers, 2013).

Apart from individual user aspects, program characteristics of carsharing business models also influence adoption. In this regard, costs are an obvious factor to the decision to own or share a car (Schuster, Byrne, Corbett, & Schreuder, 2005; also de Luca & Di Pace, 2015) and has shown to be crucial for the success or failure (Perboli et al. (2018)). With regard to the overarching setup of different carsharing options, Münzel et al. (2017) posit that no specific provider model (cooperative, business-to-consumer, and peer-to-peer) will dominate in the foreseeable future and Cohen and Kietzmann (2014) add, with a focus on the provider of carsharing services, that both private and public models are fraught with principal–agent conflicts. Finally, the issue of free-floating versus station-based systems is also one of interest when looking at usage patterns and customer choices. Study comparing free-floating with station-based services shows differences in customers' demographics, in that younger customers and customers with short trips prefer free-floating systems (Heilig et al., 2018; Rotaris, Danielis, & Maltese, 2019). Ciari, Bock, and Balmer (2014) posit that both systems complement each other in a generally high potential to extend carsharing services. On an overarching level, nonusers seem to be more willing to switch to carsharing if the accessibility of the service is improved (Namazu, MacKenzie, Zerriffi, & Dowlatabadi, 2018).

In sum, although above studies pave the way for identifying crucial aspects of carsharing business model adoption, they examine business model dimensions (e.g., pricing) of carsharing services in isolation. Hence, to prevent failure and better understand adoption as well as nonadoption of such business models, we still lack a comprehensive approach that takes different business model dimensions and their configurations into account.

3.2 | Hypotheses on effects of carsharing business model dimensions on usage intention

To investigate different carsharing business models, we focus on criteria unique to the decision-making realm of the carsharing provider, building on work by Bardhi and Eckhardt (2012) and Lamberton and Rose (2012). Bardhi and Eckhardt (2012) propose six benefit dimensions of access-based consumption, with an explicit reference to carsharing: market mediation (for profit vs. nonprofit), service levels that require different levels of consumer activity (self-service to full service), type of accessed object (experiential or functional), political consumerism (mode of consumption as strategy to promote ideological interests), anonymity (context of use is private or public), and temporality (duration of access and usage).

We adopted this framework in our research with the exception of excluding temporality and anonymity and adapting political consumerism for our model. First, usage duration is particular to a time and place of a consumption; it cannot be addressed on a general level and is not directly influenced by the service provider (Belk, 1974). Second, we omitted anonymity, which is defined as having either private and exclusive access to a good (e.g., carsharing; Bardhi & Eckhardt, 2012) or social, nonexclusive access (e.g., library), because the carsharing context already determines this aspect, so it is not a differentiating factor of various carsharing models. Furthermore, we acknowledge that political consumerism might be considered a consumer-related variable (Bardhi & Eckhardt, 2012) and is as such not in the decision-making realm of the carsharing provider, but providers' reactions to political consumerism are. Therefore, we interpret the choice of electric versus gasoline engines as a dimension of the business model, chosen in reaction to consumers' preferences to facilitate a non-fossil fuel-based economy.

To capture the costs side of the business model, we refer to Lamberton and Rose (2012) who introduce three costs of sharing systems in their typology of shared goods: price of sharing (e.g., one-time system membership fee or periodic access fees), technical costs (nonmonetary costs associated with service usage), and search costs (monetary or nonmonetary costs related to finding an optimal provider or product). We included all three dimensions in our study.

Thus, we investigate seven dimensions of carsharing business models: type of market mediation, price model, fleet variety, mode of drive, pickup and drop-off mode, availability, and service level. Each dimension can span multiple specifications, but for the purposes of our study, we distinguish two specifications per dimension, as detailed subsequently. For example, the pickup and drop-off mode, which is a key indicator of technical costs, might be either free-floating or station-based, which represent two common carsharing models in practice. Search costs are predominantly associated with the cars' availability or how long it takes carsharing customers to access a vehicle and the likelihood that they can find it. Table 2 provides an overview of these seven conceptual dimensions, derived from the literature along with their respective parameters. Each dimension affects either the cost or the benefit side of the offer (Bardhi & Eckhardt, 2012; Lamberton & Rose, 2012), so we predict that each carsharing business model dimension determines the usage intention of potential customers.

H1. *Carsharing program usage intentions are determined by the (a) type of market mediation, (b) price model, (c) fleet variety, (d) mode of*

TABLE 2 Carsharing dimensions and hypotheses (factorial survey)

Hypothesis	Conceptual dimension	Empirical dimension	Parameters
Business model dimensions determine the usage intention (H1) of a carsharing model			
H1a	Market mediation (Bardhi & Eckhardt, 2012)	Type of market mediation	0: We are a commercial subsidiary of the Automotive Inc. 1: We are a publicly owned municipal enterprise.
H1b	Price of sharing (Lamberton & Rose, 2012)	Price model	0: Monthly fee of € 10 plus € 0.2/km 1: Usage-dependent fee of € 0.3/min and € 0.2/km
H1c	Type of accessed object (Bardhi & Eckhardt, 2012)	Fleet variety	0: Agile compact cars 1: Agile compact cars and spacious station wagons
H1d	Political consumerism (Bardhi & Eckhardt, 2012)	Mode of drive	0: Fuel drive 1: Electric drive
H1e	Technical costs (Lamberton & Rose, 2012)	Pickup and drop-off mode	0: Station-based system, that is, stationary locations for vehicles pickup and drop-off 1: Free-floating system, that is, vehicle pickup and drop-off anywhere in the business area
H1f	Search costs (Lamberton & Rose, 2012)	Availability	0: In the past, all customers found a vehicle within 10 min. 1: In the past, half of the customers found a vehicle within 2 min.
H1g	Consumer involvement (in the process; Bardhi & Eckhardt, 2012)	Service level	0: Active collaboration of users, for example, fueling or washing the car via (prepaid) fuel card 1: Full-service model

drive, (e) pickup and drop-off mode, (f) availability, and (g) service level.

In addition, based on the insights from our initial story of failure, we anticipate that a lack of compatibility stems from individual mobility preferences or else a generally unfavorable structure of the various carsharing business model dimensions. That is, in addition to an optimal configuration of carsharing business model dimensions as hypothesized above, we consider consumers' general carsharing compatibility as an independent variable for our main study. Compatibility reflects the degree to which an innovation fits with the potential adopter's existing values, previous practices, and current needs (Arts, Frambach, & Bijmolt, 2011). Consumers whose needs and lifestyles fit with the idea of carsharing should be more likely to participate in them. Formally,

H2. *Consumers' perceived compatibility with carsharing increases the usage intentions toward the carsharing program.*

4 | METHOD: FACTORIAL SURVEY

4.1 | General approach and suitability of a factorial survey

To test these hypotheses, we used a factorial survey (sometimes referred to as vignette experiments or as paper people studies; see Aguinis & Bradley, 2014), as a quasi-experimental approach. It combines elements of survey research with the controlled setting of an experimental design (Aguinis & Bradley, 2014; Oll, Hahn, Reimsbach, & Kotzian, 2018; Wallander, 2009). The vignettes in the survey are "constructed and realistic scenarios to assess … intentions, attitudes, and behaviors" (Aguinis & Bradley, 2014, p. 351). For our study, each participant received 10 vignettes. Each vignette features the seven dimensions of carsharing business models with a random set of one of the two value parameters per dimension, for example, station based versus free floating (see Table 2; Appendix B contains an example vignette). A factorial survey is valuable when little is known about the underlying factors of the individual decision-making process (Oll et al., 2018), so we deem it suitable for uncovering the relevance of the various dimensions of carsharing business models.

As illustrated in the following sections, we followed the methodological recommendations provided by Aguinis and Bradley (2014) and Oll et al. (2018) in choosing the (1) vignette dimensions, (2) variables for rating the vignettes, (3) sample population, (4) number of vignettes per respondent, and (5) overall sample size.

4.2 | Vignette design and rating

The initial step in any factorial survey is to construct the vignette dimensions (e.g., service level) and their factor values (e.g., high/low), which define the vignette universe (Atzmüller & Steiner, 2010). The seven dimensions were derived from the frameworks proposed by Bardhi and Eckhardt (2012) and Lamberton and Rose (2012). Two value parameters were chosen for each dimension to prevent uneven variations influencing participants' reactions (Oll et al., 2018). Thus, our total vignette universe comprises 128 ($=2^7$) different vignettes.

Noting the importance of the compatibility of a carsharing program for adoption, we decided to scrutinize the pre-usage phase and utilized participants' usage intentions as dependent variable. Usage intention was captured on the vignette level with one item from Dodds, Monroe, and Grewal (1991; "The likelihood of using this carsharing offer is very low–very high") and measured with an 11-point semantic differential scale. For the independent variable carsharing compatibility, which was measured on a general so not vignette-based level, we again draw on previous work by Meuter et al. (2005) who provide a base for a general carsharing compatibility scale. For this variable, we employed a 7-point multi-item scale (see Appendix C).

4.3 | Sampling and participants

With regard to the sampling (Step 3), students frequently serve as respondents in factorial surveys (Wallander, 2009), though Oll et al. (2018) express some validity concerns. In our case, however, we explicitly aimed to identify students' intentions, to largely match the target population (and help explain the results) of the field study. We thus distributed the study online to students all over Germany and excluded any respondents who participated in the field study.

In Step 4, we chose the number of vignettes rated by each respondent. We decided to use 10 vignettes per person avoiding boredom effects, information overload, or inconsistent ratings (Sauer, Auspurg, Hinz, & Liebig, 2011). This number is conservative with the maximum recommended number of 20 vignettes (Lauder, 2002) and this even though the higher educational level of our sample is favorable toward evaluation consistency (Sauer et al., 2011). Thus, each participant rated a random sample of 10 out of 128 vignettes appearing in random order (Dülmer, 2007; Oll et al., 2018).

Finally, in Step 5, we determined the necessary sample size and derived from it the number of observations (sample size × 10 ratings). Aguinis and Bradley (2014) suggest that each scenario should be rated at least four times. For the 128 vignettes, a minimum of 512 vignette ratings (128 × 4) would be needed, which in turn requires a sample of at least 52 participants. Beyond this minimum requirement, there is little methodological guidance on adequate numbers of observations (Lauder, 2002). We therefore decided to take a very conservative approach and acquired 282 usable participants,[2] who provided 2,820 ratings, resulting in more than 20 ratings per scenarios (2,820 vignette views/128 vignettes). The respondents (44.3% women) had a mean age of 22.8 years (standard deviation = 4.24 years), lived mostly in cities with more than 100,000 inhabitants (56%), and earned an average

[2] Initially, 425 people started the survey; 120 of them did not finish the questionnaire, 11 were excluded due to socially desired response behavior, and 12 did not belong to the target group of students.

monthly income of less than € 1,000 (92.2%). Thus, the sample is an adequate match to the sample we gathered in the field study.

5 | ANALYSES AND RESULTS

5.1 | Analytical approach

To test the hypotheses, we conducted hierarchical linear modeling (Raudenbush & Bryk, 2002), which requires the evaluation of a series of models. We first ran a null, unconstrained model (baseline model) for our dependent variable usage intention, which does not contain any independent variables relating to the vignette (Level 1) or the participant (Level 2) yet. The findings indicate significant between-subject variance in the intention to use the respective carsharing models (i.e., differences in vignette evaluations across participants; usage intentions $\tau_{Subject}$ = 4.575, Δdf = 1, $\Delta\chi^2$ = 1343.901, p < .001). The intraclass correlation coefficient is 51.4% for usage intentions, which means further cross-level analysis for the difference in rating is justified (Heck, Thomas, & Tabata, 2014). To do so, in the next steps, both the business model configuration (vignette level) and differences in individual characteristics (participant level) are added to the model.

In multilevel models, we include Level 1 predictors (vignette dimensions) and Level 2 predictors (individual compatibility with carsharing) simultaneously to test the hypotheses. To investigate which vignette dimensions determine the usage intention of carsharing models, we follow general recommendations for mixed models (e.g., Field, 2009; Rabe-Hesketh & Skrondal, 2008). We start by grouping each respondent's mean-centered usage intentions, to adjust for differences in intention ranges among participants. Thus, we could evaluate each vignette dimension's contribution to the different levels of usage intentions for each participant. Next, we applied grand mean centering for the independent variable (i.e., compatibility) and metric control variables, to enable comparisons at an aggregate level.

5.2 | Hypotheses testing

The results in Table 3 indicate that type of market mediation, price model, mode of drive, pickup and drop-off mode, availability, and service level all influence consumers' usage intentions, in support of H1a, H1b, and H1d–g. Specifically, consumers prefer a public provider (β = .161, p < .05; H1a), to pay a fixed monthly amount rather than a usage-dependent fee (β = −.428, p < .001; H1b), an electric engine over fuel-based cars (β = .681, p < .001; H1d), and a free-floating system over a station-based model (β = .498, p < .001; H1e). They also cite preferences for quick but insecure availability (β = .327, p < .001; H1f) and a full-service model (β = .480, p < .001; H1g). A diversified vehicle fleet (H1c), however, does not appear to influence consumers' usage intentions of a carsharing model.

To determine if carsharing compatibility influences the consumers' usage intentions, we ran a random intercept-and-slope models. Such a model can reproduce the "most realistic situation" (Field, 2009, p. 734), compared with more simplistic, multilevel models (such as, for instance, solely random intercept models). Models 2a–c (as shown in Tables 3 and 4) summarize the results for usage intentions.

Carsharing compatibility significantly enhances usage intentions (β = .588, p < .001; Model 2a), as we predicted in H2. Assuming that intentions are the single best predictors of actual behavior (Ajzen, 1991), our findings indicate that, in addition to the carsharing model configurations, customers' tendency to use a carsharing offer depends strongly on its compatibility.

This effect holds, even when we control for demographics and individual determinants such as price consciousness, carsharing experience, perceived opportunity to try new products through carsharing (trialability), and car ownership (see Model 2b). Among interpersonal differences, only the opportunity to try a new car through carsharing positively influences a consumer's intention to test a carsharing offer. Although not hypothesized, we considered possible interactions between individual determinants and vignette domains (see Model 2c). They reveal that a pricing model with a monthly basic fee and less usage-dependent costs (which are rather difficult to predict) is especially preferred by price-conscious consumers.

6 | DISCUSSION

6.1 | Research contribution

This research contributes to the domain of the sharing economy (Botsman & Rogers, 2010) by considering how carsharing program dimensions determine usage intentions, in response to calls for research on this topic (Davidson et al., 2018). Our initial field study of a carsharing business model failure and the follow-up focus groups indicated that a positive attitude toward carsharing is not a good predictor of usage, although we show that compatibility of specific dimension of the carsharing system with consumers living situation is essential for acceptance and usage intention. This also underlines the existence of an attitude–behavior gap (e.g., Shim et al., 2018; Tilley, 1999) in the sharing economy as a generally positive stance toward carsharing (as indicated in our focus groups) did not translate to a meaningful behavior (in our case: use of the service) in the field study.

Our factorial survey makes the next step and determines potential triggers of an attitude–behavior gap as it identifies those dimensions of carsharing business models that have a significant influence on usage intentions beyond a generally positive attitude toward the idea in general. Earlier explorative research indicated that convenience and lifestyle are dominant motives in determining carsharing usage (Schaefers, 2013). Furthermore, Shim et al. (2018) recently illustrated that successive stages in the consumer decision-making process, for example, the relationship between preference and usage intention, need to be considered to explain and overcome the attitude–behavior gap. We provide insights on these aspects for the case of carsharing, as we identified (a) a free-floating fleet with fast availability and a full-service level as a specific dimension of

TABLE 3 Random intercept regression and multilevel regression for usage intention (factorial survey)

	Model 1 (Level 1 only)			Model 2a (Level 1 and independent)		
Dependent variable (grand mean centered)	Usage intention			Usage intention		
	Coefficient	*SE*	*t*	Coefficient	*SE*	*t*
Vignette domains (Level 1)						
Type of market mediation (0 = commercial; 1 = public)	.161*	(.08)	2.03	.157*	(.08)	2.00
Price model (0 = monthly fee; 1 = usage-dependent)	−.428***	(.08)	−5.42	−.427***	(.08)	−5.42
Fleet variety (0 = compact cars only; 1 = different choices)	.089	(.08)	1.12	.092	(.08)	1.17
Mode of drive (0 = fuel; 1 = electric)	.681***	(.08)	8.61	.683***	(.08)	8.65
Pickup and drop-off mode (0 = station-based; 1 = free-floating)	.498***	(.08)	6.28	.497***	(.08)	6.28
Availability (0 = secure and slow; 1 = insecure and quick)	.327***	(.08)	4.14	.325***	(.08)	4.12
Service level (0 = active collaboration; 1 = full service)	.480***	(.08)	6.03	.477***	(.08)	6.01
Independent variable (Level 2)						
General carsharing compatibility				.588***	(.08)	7.78
Intercept	−.905***	(.17)	−5.31	−.885***	(.16)	−5.54
−2LL	12629.546			12568.671		
df	10					
$\Delta\chi^2/\Delta df$ (reference: Baseline model)	27.81**					
R^2 (Level 1; reference: Baseline model); microlevel perspective				.075		
R^2 (Level 2; reference: Model 1); macrolevel perspective				.309		
Covariance structure	VC			UN		

Note. Estimation method: maximum likelihood; covariance structure: VC = variance components, UN = unconstrained; R^2 of the macrolevel perspective based on significant single-sided covariance measures only.
*$p < .05$.; **$p < .01$.; ***$p < .001$.

convenience, (b) a pricing model with monthly basic fees (that constitutes a base rate model) instead of solely usage-dependent fees and public service providers as dimension of safety needs, and (c) electric vehicles as an important lifestyle dimension. These three underlying dimensions, convenience, safety needs, and lifestyle, can bridge the attitude–behavior gap, if configured appropriately.

These insights are also relevant beyond the specific case of carsharing, as they illustrate elements that can hinder (or foster) the transition of environmentally friendly attitudes to behavior (or behavioral intentions). We also merge the two existing frameworks (Bardhi & Eckhardt, 2012; Lamberton & Rose, 2012), with their various dimensions of sharing offers, into a set of the most relevant dimensions, with the most common and relevant factor values, namely, (a) type of market mediation (commercial/public institution), (b) price model (mixed/purely usage dependent), (c) fleet variety (low/high), (d) drive mode (fuel/electric), (e) pickup and drop-off mode (station-based, free-floating), (f) availability (secure-lower/insecure-higher), and (g) service level (part/full service). We test this merged framework and demonstrate which carsharing business model is most compatible with consumer preferences, suggesting its greater adoption likelihood. This finding contributes to carsharing research, in that we derive a framework of the most important dimensions of a carsharing business model (Bardhi & Eckhardt, 2012; Lamberton & Rose, 2012). This allows researchers to start from a set of relevant dimensions which is fine-grained enough to adequately capture realistic scenarios and business models while, at the same time, focusing only on empirically relevant dimensions, which reduces complexity in empirical studies.

Recently, Namazu et al. (2018) posited that carsharing usage could be increased by improving accessibility, and Peterson and Simkins (2019, p. 463–463) illustrate that "consumers' awareness of car sharing as a flexible, convenient, and cost-efficient mode of travel matters much in the cognitive processing of car-sharing adoption." We move a step further and illustrate that not only the availability and convenience but most importantly also the mode of drive (specifically e-mobility as a lifestyle dimension) as well as other factors (foreseeable price model as a safety need dimension) influence the usage intention of carsharing business models. Furthermore, Schaefers (2013) argued in his exploratory study that although

TABLE 4 Multilevel regression results with and without interactions

	Model 2b (full model)			Model 2c (full model with interactions)		
Dependent variable (grand mean centered)	Usage intention			Usage intention		
	Coefficient	*SE*	*t*	Coefficient	*SE*	*t*
Control variables (Level 2)						
Age	−.017	(.03)	−.53	−.017	(.03)	−.53
Sex (1 = male)	−.237	(.24)	−.98	−.235	(.24)	−.97
Income in Euro (reference category: >2,000)						
≤450	−.131	(1.50)	−.09	−.140	(1.50)	−.09
451 to ≤1,000	−.342	(1.48)	−.23	−.349	(1.48)	−.24
1001 to ≤2,000	.056	(1.50)	.04	.056	(1.51)	.04
City size (reference category: >500,000)						
<5,000	−.173	(.53)	−.33	−.179	(.53)	−.34
5,000 to <20,000	.498	(.42)	1.20	.498	(.42)	1.19
20,000 to <100,000	−.377	(.34)	−1.10	−.379	(.34)	−1.10
100,000 to <500,000	−.294	(.33)	−.90	−.297	(.33)	−.90
Trialability	.172*	(.07)	2.59	.174*	(.07)	2.37
Price consciousness	.083	(.11)	.79	.159	(.12)	1.37
Car ownership (reference category: own car)						
No driver's license	−.850	(.52)	−1.62	−.864	(.52)	−1.65
No regular car access	−.262	(.38)	−.70	−.266	(.38)	−.71
Now and then car access	−.063	(.35)	−.18	−.065	(.35)	−.18
Regular car access	−.294	(.33)	−.89	−.299	(.33)	−.90
Carsharing experience	−.169	(.13)	−1.28	−.171	(.13)	−1.29
Vignette domains (Level 1)						
Type of market mediation	.160*	(.08)	2.02	.152†	(.08)	1.92
Price model	−.429***	(.08)	−5.43	.140	(.31)	.45
Fleet variety	.090	(.08)	1.14	.091	(.08)	1.15
Mode of drive	.687***	(.08)	8.69	.691***	(.08)	8.74
Pickup and drop-off mode	.499***	(.08)	6.30	.498***	(.08)	6.29
Availability	.328***	(.08)	4.16	.330***	(.08)	4.18
Service level	.475***	(.08)	5.98	.591†	(.31)	1.89
Independent variable (Level 2)						
General carsharing compatibility	.588***	(.08)	7.18	.299***	(.07)	4.41
Interactions (Level 2 and Level 1)						
Trialability × fleet variety				−.003	(.04)	−.08
Trialability × mode of drive				−.000	(.04)	−.02
Price consciousness × price model				−.124†	(.07)	−1.90
Price consciousness × service level				−.027	(.07)	−.40
Intercept	−.001	(1.58)	−.00	.013	*(1.58)*	.01
−2LL	12538.835			12544.467		
R^2 (Level 2; reference: Model 1); macrolevel perspective	.356			.356		
R^2 (Level 2 + interactions; reference: Model 1); macrolevel perspective				.356		
Covariance structure	UN			UN		

Note. Estimation method: maximum likelihood; covariance structure: UN = unconstrained; R^2 of the macrolevel perspective based on significant single-sided covariance measures only.

†$p < .1$.

*$p < .05$.; **$p < .01$.; ***$p < .001$.

environmental motives are present when deciding to use carsharing, they seem to be merely a side effect. In this regard, the strong influence of an electric mode of drive in our factorial survey is striking. We argue that the relevance of e-mobility in our study might be on the one hand influenced by potential changes in consumer preferences in the last years (e.g., Rezvani, Jansson, & Bengtsson, 2018). On the other hand, the preference for electric vehicles might not necessarily or exclusively be an indication for increased environmental awareness but could also positively relate to lifestyle motives when e-mobility is perceived as an attractive (e.g., sporty, sharp accelerating, and silent) option. On the level of personal motives, future studies could scrutinize our results with an in-depth look on individual decision-making.

In sum, our factorial experiment, complemented by exploratory insights from a field study and subsequent focus group interviews, showed that (lack of) compatibility is important not only for adoption, as previously shown by Claudy, Garcia, and O'Driscoll's (2015) web-based survey, but also for nonadoption of carsharing services, whereas literature is clear that reasons for and reasons against have to be differentiated (Westaby, 2005). We find that considerations to adopt or nonadopt carsharing services depend on business model characteristics, not just on consumers' characteristics and motives.

6.2 | Managerial implications

The findings also provide useful implications for managers who intend to design and establish a successful carsharing program. The failure of the carsharing program in the initial field study clearly demonstrates that basically liking the concept of carsharing is a misleading predictor of adoption. What is more meaningful is the program's compatibility with consumers' needs and actual living situations.

The results of our main study reveal relevant characteristics that can increase consumers' acceptance of carsharing offers. That is, providers should develop carsharing business models that feature an electric, free-floating fleet with fast availability that operates with a full-service level and low required customer participation, along with a pricing model that combines usage-based and monthly fees, at least if they intend to target a young and highly educated clientele. This “ideal model” reflects a combination of customers' desire for flexibility, convenience, predictability, and a good conscience. Apart from being an offer from a commercial provider, the business model in the field study did not include three of these important dimensions: It offered combustion engine cars, station-based pickup/drop-off, and a price model that is entirely usage dependent. These discrepancies might explain its poor adoption rates. However, we also acknowledge that an ideal model might generate high costs, with implications for the price and user base, so providers also should identify different models according to their economic feasibility. For example, they should determine how high a monthly fee must be to ensure a free-floating, full-service model based on electric vehicles. Such a monthly fee might alienate the “emergency customers” from even considering this particular carsharing program as a mode of transportation.

Finally, business executives and public administrations both are under pressure to pursue environmentally friendly consumption modes, and this work provides further insights along these lines. Electric cars are a key request from consumers, so we recommend that carsharing concepts should include and strongly highlight their electric vehicles. Firnkorn and Müller (2015) show that especially users of electric carsharing programs were willing to forgo a private car purchase, whereas Clewlow (2016) found that carsharing users are generally more likely to own a vehicle with a smaller environmental footprint. In this regard, carsharing offers an easy way for consumers to try out e-mobility as a potentially more environment-friendly mode of private transport. Wesseling, Niesten, Faber, and Hekkert (2015) illustrate how especially manufacturers with strong incentives and opportunities to innovate were initially successful in selling electric vehicles. Carsharing services can offer a viable means for manufacturers to innovate and introduce e-mobility to larger groups of customers. Managers and public administrators can thus leverage an affinity for e-mobility in sharing concepts to foster changes in individual mobility, including triggering enthusiasm for e-mobility in ownership settings. This is especially relevant when conceding that carsharing offers the most distinct environmental benefits if it goes along with a shift to electric vehicles (Baptista et al., 2014). A first step might include cooperation between municipalities and service providers to improve the charging infrastructure for electric cars.

6.3 | Limitations and further research

Several limitations of this study suggest opportunities for further research. First, our field study, with actual registration and usage data, provides strong external validity, but it only builds upon rather marginal data as the carsharing offer that we analyzed in this study by and large failed. Therefore, it mainly serves to set the scene for the main study in this paper. Although our qualitative inquiries as well as our main study shed light on reasons for the low adoption rate in the field study, continued research into other programs that did not succeed would enhance our understanding of the (non)adoption process further.

Second, the research setting for our main study provides higher internal validity, yet its results are limited to intentions, not actual behavior. Investigations of real usage contexts might address this limitation, perhaps by conducting studies with consumers who embrace different sharing concepts, which could provide further understanding of their perceptions of different business model characteristics.

Third, the main study, in examining only preferences, produces an ideal (or even idealistic) model that does not account for the corresponding costs. Continued research could investigate cost–value ratios for the characteristics of the offer and thereby identify which characteristics consumers actually are willing to pay for.

Fourth, although our models are already quite extensive, we cannot rule out the possibility of having overlooked inadvertently

further independent variables that might help to increase the explanatory power of our models. For example, with respect to vignette dimensions (Level 1 variables), future research could include dimensions such as "ease of registration and handling," if the carsharing provider offers a (web) application for its services, or "brand of the car manufacturer." Both dimensions were neither applicable to the setting of our initial field study nor have they been mentioned by the works of Bardhi and Eckhardt (2012) and Lamberton and Rose (2012), which constituted the theoretical framework for our factorial survey. On the individual's level (Level 2 variables), future research might consider consumers' "resistance to change," "level of inertia," and different "value orientations," which could provide additional insights when used in interaction with vignette variables such as mode of drive and pickup and drop-off mode.

Fifth, to match the target populations of the actual carsharing program of the initial field study, we deliberately used predominantly a German student sample. This reliance on a specific population limits the generalizability of the results, even though the segment of highly educated, young, urban residents constitutes a significant target group for carsharing services (Becker, Ciari, & Axhausen, 2017; Kopp et al., 2015). Still, further research might explore the effects with a broader, cross-national study.

Sixth, considering the meaningful preferences for electric vehicles revealed by our study, further research should investigate potential trial effects of carsharing. New technologies such as electric vehicles could be promoted by access or sharing offers, an avenue for research that has been mentioned previously (Lawson, Gleim, Perren, & Hwang, 2016).

7 | CONCLUSION

Carsharing is a well-known example of an access-based service in the sharing economy with numerous carsharing programs operating around the world. Despite this popularity, many aspects of its adoption have remained unclear. Our results reveal that positive attitudes do not predict adoption; rather, the key is the compatibility of the offer with consumers' lifestyles and needs. Furthermore, (non)adoption should be seen as a gradual rather than dichotomous variable because many customers see carsharing as a contextually appropriate mobility solution leading to infrequent and rather complementary usage. Finally, this article identifies specific dimensions of carsharing models that potential consumers prefer most, for example, free-floating systems and electric vehicles. As such, it has important implications for marketers and society at large, in that it provides insights for ways to encourage carsharing, which in turn may benefit sustainability initiatives (e.g., more carsharing and less ownership consumption and e-mobility).

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APPENDIX A: | Measurement scales (initial field study)

Construct	Scale item	α	*M*	*SD*
Relative advantage (adapted from Meuter et al., 2005)	Using the "Campus Carsharing" improves the mobility opportunities at the university.	0.852	5.17	1.37
	Overall, I believe using the "Campus Carsharing" is advantageous.			
	I believe the "Campus Carsharing" in general is a superior mobility solution.			
Compatibility (adapted from Meuter et al., 2005)	Using "Campus Carsharing" is compatible with all aspects of my life.	0.909	3.96	1.71
	I think that using "Campus Carsharing" fits well with my needs.			
	Using the "Campus Carsharing" fits into my life style.			
Complexity (adapted from Meuter et al., 2005)	Using the "Campus Carsharing" would be easy for me.	0.893	5.10	1.52
	Using the "Campus Carsharing" will not be a problem for me.			
	Using the "Campus Carsharing" will not become a challenge for me.			
Carsharing attitude (adapted from Reinders et al., 2008; Dabholkar & Bagozzi, 2002)	Bad/good	0.892	5.60	1.14
	Unpleasant/pleasant.			
	Harmful/beneficial			
	Unfavorable/favorable			
	Negative/positive			
Carsharing registration	Yes = 1, No = 0 (dichotomous variable)	-	0.18	0.387
Brand attitude (control) (adapted from Bergkvist & Rossiter, 2007)	Bad/good	0.943	4.55	1.05
	Unsympathetic/sympathetic			
	Unreliable/reliable			
	Negative/positive			
	Unpleasant/pleasant			
	Poor performance/good performance			

APPENDIX B: | Exemplary vignette from vignette universe (factorial survey)

Carsharing Model #1/10											
Our carsharing model is characterized by the following features:											
Type of market mediation:	We are a commercial subsidiary of the Automotive Inc.										
Price model:	For the use of our carsharing, you pay a usage-dependent fee of € 0.3/min and € 0.2/km. This covers all cost.										
Fleet variety:	We offer a fleet of agile compact cars.										
Mode of drive:	Our entire fleet consists of electricity-driven cars.										
Pickup and drop-off mode:	Our service is based on a free-floating system, that is, you can pick up and drop off the vehicle anywhere in the business area.										
Availability:	In the past, all customers found a vehicle within 10 min.										
Service level:	We build upon the active collaboration of our users, for example, you can fuel or wash the car with a (prepaid) fuel card.										
Please rate this carsharing model											
	Very low										Very high
The likelihood that I would use this carsharing program is	O	O	O	O	O	O	O	O	O	O	O

APPENDIX C: | Measurement scales (factorial survey)

Construct	Scale item	α	*M*	*SD*
Unit of analysis: vignette (Level 1 variable)				
Attractiveness (single-item, adapted from Reinders et al., 2008)	My feeling concerning this carsharing program is: very bad–very good	-	7.00	2.63
Unit of analysis: carsharing in general (Level 2 variable)				
Carsharing compatibility (adapted from Meuter et al., 2005)	Carsharing is compatible with all aspects of my life. Carsharing fits well with my needs. Carsharing fits into my life style.	0.939	3.76	1.68
Carsharing experience (control variable) (single-item, own development)	How many times have you used carsharing offers in the past?	-	1.54	1.04
Price consciousness (control variable) (adapted from Gabler, Myles Landers, & Reynolds, 2017)	The money saved by finding low prices is usually worth the time and effort. I am willing to go to extra effort to find lower prices. The time it takes to find low prices is usually worth the effort. I would shop at more than one store to find a low price.	.804	4.58	1.21
Trialability (control variable) (single-item, adapted from Meuter et al., 2005)	I have the opportunity to try out a new car via carsharing.	-	4.80	1.85