THE DANGER OF REPLACING HUMAN INTERACTION IN IS-DRIVEN COLLABORATIVE CONSUMPTION SERVICES

Complete Research

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The increase usage of collaborative consumption services illustrates a significant shift in modern consumption behaviour. In order to simplify the process of collaborative consumption services, some providers are increasing the integration of IS and in some cases they are eliminating human interaction. We investigate how acceptance of collaborative consumption is affected by the elimination of human interaction. A research model in the context of P2P car-sharing is developed to explain service acceptance through the perspective of car owners. A mental experiment is used to understand the effects of IS integration on service acceptance. Two scenarios are introduced: one with "simple IS integration," in which human interaction allows trust building between lender and renter, and another with "advanced IS integration," in which users can open car doors using advanced IS. The analysis of 339 responses of potential adopters suggests that the effect of reduced human interaction through increased IS integration can negatively influence service acceptance. The study also looks at how the negative effect of reduced human interaction competes with the positive effect of increased service usefulness. We contribute to service design research with a model that evaluates benefits and threats of advanced IS integration in the area of collaborative consumption.

Keywords: Share economy, peer-to-peer car sharing, carpooling, service design

1 Introduction

The rise of collaborative consumption services (CCS) is probably one of the most significant shifts in consumption behavior in recent times. Botsman and Rogers (2010) even suggest that CCS could be as important as the industrial revolution in terms of how we think about owning and possessing products. CCS can be defined as services that support people in "coordinating the acquisition and distribution of a resource for a fee or other compensation" (Belk 2013). Some of the most popular CCS are *Airbnb*, a popular peer-to-peer (P2P) home-sharing service, and *Relayrides*, a widely used P2P car-sharing service. This new form of innovative, socioeconomic service design enjoys increasing popularity, with dozens of newly founded start-ups spanning a variety of goods and services. Information systems (IS) empower users to easily share information that enables them to distribute and use the excess capacity of individually owned goods and services (Sundararajan 2013). Thus, it acts as a key enabler and strong driver for these trending service designs and makes this a very promising research field. Surprisingly, research on CCS within the IS community is sparse (Andersson et al. 2013).

To unleash this vast potential, IS are used in CCS in all of its three main functions: automation, information, and transformation (Dehning et al. 2003). These functions are commonly applied in various service designs across a wide range of business areas to optimize service processes in terms of cost reductions or performance increases. By drawing on advanced IS solutions to achieve service process optimization, IS often replaces service design elements involving human interaction (Dehning et al. 2003). In this regard, there are two opposing perspectives considering the impact of IS on the success and consumer acceptance of CCS: On the one hand, the digitalization of collaborative consumption service processes allows for greater process efficiency through automatization and the reduction of physical interaction and should lead to a higher usability of the service, which in turn should result in increased service acceptance by end-users. On the other hand, personal relationships and trust lie in the nature of collaborative consumption (Belk 2014; Piscicelli et al. 2014). Therefore, if the digitalization of the service process leads to a reduction of human interaction, this can threaten the acceptance of the service. This particularly holds for CCS. CCS bear a high degree of uncertainty and risk; in collaborative consumption, the resource owner typically permits a consumer to make use of the resource (i.e., goods or services). While the owner retains ownership of the resource, he lacks control of it and is thus dependent on the consumer's behavior. Accordingly, in exchange for the compensation he receives – usually monetary – the resource owner must accept being vulnerable to the actions of the consumer. For instance, a car owner must accept that a consumer who pays to use the owner's vehicle might return the vehicle in a different condition than it was handed out. Therefore, in addition to an increase in service usability, the integration of IS can also result in increased risk for the owner of the good or service regarding the use of the CCS and thus a decrease of service acceptance by end-users.

Our research takes up both perspectives and aims to determine whether there is a danger for the CCS acceptance if human interaction is replaced by IS. For the following, we thus differentiate between two CCS designs in the context of P2P car sharing. One service design represents the classic P2P car-sharing service design as implemented by, e.g., the German company *Tamycy* ("Take my car"), and includes a process step in which the car owner personally hands over the vehicle keys to the renter. We call it the "simple IS case". The second service design includes all the same process steps as the simple IS case but replaces the human interaction of handing over the vehicle keys with an advanced IS solution that enables renters to access the vehicles using their smartphones by connecting to a pre-installed smart box in the vehicle. This smart box establishes an online connection to the service provider and checks whether the requesting user has actually booked the vehicle and, if so, unlocks the vehicle's doors; the keys are usually placed inside the vehicle's glove compartment. This is a service design that can be observed with *Relayrides*. In the following, we refer to this service design as the "advanced IS case".

From the perspective of a car lender, P2P car sharing with "advanced IS integration" differs from P2P CSS with "simple IS integration". First, the car lender does not meet the car renter before and after the car exchange in person. Accordingly, the loss of human interaction and corresponding trust-building processes (Gefen et al. 2003) implies an increase in the perceived risk of using the CCS. This leads to the first research question:

RQ1: Does an IS-induced loss of human interaction in P2P car-sharing services affect car owners' service acceptance?

Second, the integration of advanced IS solutions increases the usability of the CCS – in our case, easy access to the vehicles has a particularly strong effect. Therefore, one would expect the perceived usefulness of the CCS to be positively affected by the integration of high-level IS support. On the contrary, however, this integration and the resulting loss of human interaction lead to an increase in the perceived risk of the car owners regarding renting out their vehicles to people they neither know in advance nor get to know before or while the vehicle is used. In this regard, Pavlou and Gefen (2004) already show in their seminal work that the user's perceived risk concerning the use of such a service – e.g., risks that go along with renting out their vehicles over the CCS online platform – is of great importance for the acceptance of the service. Hence, the integration of advanced IS boosts positive as well as negative factors regarding the acceptance of the CCS. This leads to the second research question:

RQ2: In the case of advanced IS integration, can the greater perceived risk from the loss of human interaction be compensated for by an increase in the perceived usefulness?

We answer the research question by developing a causal model that explains P2P car-sharing service (CSS) acceptance through the perspective of a car owner who might be interested in providing his car to a P2P CSS. The effect of different degrees of IS integration in the service design is tested by developing a mental-based experiment. We establish two scenarios of P2P CSS: one with "simple IS integration," in which IS is only used in the booking process, and another with "advanced IS integration," in which users are able to open car doors using advanced technology and thus bypassing an encounter with the car's owner. The final group of 174 potential adopters are treated with the simple IS integration scenario of P2P CCS, while another group of 165 potential adopters face the advanced IS integration scenario. Structural equation modeling and multi-group comparison is used to separately test the role of perceived service usefulness and related risks for both groups on service acceptance.

In answering these research questions, we contribute to the emerging field of IS service design integration in P2P CSS in two ways. First, in contrast to prior literature, which often focuses solely on benefits of replacing human interaction with IS solutions (e.g., Geum et al. 2014; Lee et al. 2011; Lee et al. 2010), we explicitly integrate negative consequences of replacing human interaction with IS solutions. We can show that there is a tradeoff between the positive effects of IS integration in service design and the danger of supplanting human interaction. This enhances our understanding of how interactions are mediated by the use of IS. Second, by explicitly focusing on P2P car-sharing, we contribute to the upcoming stream in which particular attention was paid to P2P acceptance (e.g., Ballús-Armet et al. 2014), market potential (e.g., Shaheen et al. 2011), and development of business models (e.g., Hampshire and Gaites 2011).

The remainder is structured as follows. We first provide some background to the context of collaborative consumption, paying particular attention to P2P CSS and IS integration. Afterward, we present the research model together with our research hypotheses. In the fourth section, the research design and methodology is outlined, followed by a description of the results of the mental experiment. We finally discuss the results in relation to the initial two research questions and limitations that must be considered when interpreting these results.

2 Background

2.1 Collaborative Consumption

During recent years, there has been a fundamental paradigm shift in consumption behavior, as many consumers now prefer having temporary access to goods, paying for the experience of using something rather than owning it themselves (Marx 2011). Therefore, Chen (2009) concludes that ownership no longer seems to be the ultimate expression of consumer desire. Levine (2009) even expects the emergence of a whole new generation of consumers that use rather than own, declaring, "Sharing is to ownership what the iPod is to the eight track, what the solar panel is to the coal mine. Sharing is clean, crisp, urbane, postmodern; owning is dull, selfish, timid, backward." This phenomenon, known as collaborative consumption, was first defined by Felson and Speath (1978) as "those events in which one or more persons consume economic goods or services in the process of engaging in joint activities with one or more others." As this definition is mainly focused on coordinated consumption, it seems insufficient to fully explain changes in buying patterns. Belk proposes the following definition: "collaborative consumption is people coordinating the acquisition and distribution of a resource for a fee or other compensation" (Belk 2013). The definition includes bartering, trading, and swapping, with gift-giving and sharing activities excluded because there is no compensation involved. This is consistent with the definition provided in Botsman and Rogers (2010) or Bardhi and Eckhard (2012), who use the term "access-based consumption" rather than collaborative consumption.

A key role for the rise of the "sharing economy" is the development of advanced IS and the proliferation of Internet-based platforms that allow people to share resources in a convenient manner (Andersson et al. 2013). Accordingly, IS acts as a key enabler for collaborative consumption services, though some assume the origin of the expanding sharing economy lies in the digitalization of music and Web 2.0 and the resulting Napsterization that spread to all forms of media (Walsh 2011). Additional drivers of collaborative consumption include environmental benefits for society and economic motives for consumers. It can thus be shown that collaborative consumption can make a valuable contribution to reducing resource consumption by prolonging and optimizing the product utilization phase (Leismann et al. 2013). In addition, collaborative consumption represents a low-cost opportunity of having access to desired products instead of having ownership of them (Sacks 2011). Consumers may additionally benefit from a higher degree of flexibility as it releases them from the responsibility of asset ownership (Baines et al. 2007). Finally, collaborative consumption represents a way of interacting with other members of the community, thus providing emotional benefits (Campbell et al. 2012). In general, one can distinguish three different collaborative consumption systems (Leismann et al. 2013):

- Consumer-to-consumer (C2C): Private individuals can rent or rent out their assets to other private individuals (e.g., *Airbnb*).
- Business-to-consumer (B2C): A company acquires, maintains, and rents products (e.g., car-sharing).
- Business-to-business (B2B): A company mainly sells the functions performed by the products and functional units to other companies (e.g., chemical leasing).

C2C collaborative consumption, which is the focus of this paper, represents the newest approach of the sharing economy. In particular, peer-to-peer platforms and marketplaces, such as *eBay*, have become an essential part of collaborative consumption as they often eliminate the need for a traditional middleman and thus represent a viable alternate mechanism of exchange (Rodrigues and Druschel 2010). P2P collaborative systems models do not require any capital investments to acquire assets and are thus much more capital efficient than B2B systems. However, P2P collaborative systems are more complex and require coordination and regulation.

2.2 Peer-to-Peer Car-sharing

One of the most popular forms of collaborative consumption is car-sharing, which has grown to a worldwide industry over the past three decades. In traditional B2C car-sharing, members gain access to a vehicle owned or leased by a car-sharing operator for short-term daily use (Katzev 2003). A newer car-sharing model is "free floating," in which the users can drop off the cars at any spot within the organization's operating field instead of bringing the car back to a certain station (Shaheen et al. 2012). Another modern car-sharing concept is private P2P car-sharing. Lewis and Simmons (2012) define P2P car-sharing as "a process through which a person either rents a vehicle from someone else, or conversely, rents their own vehicle to someone else, usually by the hour or day, via a third-party operator that facilitates the exchange." The P2P car-sharing concept with advanced IS solutions has established itself successfully in the US market and is offered by various car-sharing operators (Ostrofsky 2013). The benefits of using advanced IS solutions include a higher degree of flexibility and additional new safety and information services, as a car kit enables the permanent localization of the car and offers anti-theft devices.

P2P CSS provider offer technical solutions and platforms (e.g., websites or mobile apps) that bring together owners and renters, manage the booking processes, and broker transactions among car users. These digital platforms differ greatly in their degree of digitalizing the car-sharing process. For this study, we differentiate between two typical possibilities: P2P car-sharing members can access vehicles through either a direct key transfer from the vehicle owner or "unattended access." In the latter case, users can open car doors using advanced technology (car kit) installed by an operator. The car kit also includes GPS, Wi-Fi and anti-theft devices. We classify the first concept as "P2P car-sharing with simple IS," in which IS is only used in the booking process (on an Internet platform or via apps), while the second is referred to as "P2P car-sharing with advanced IS" (see Figure 1).

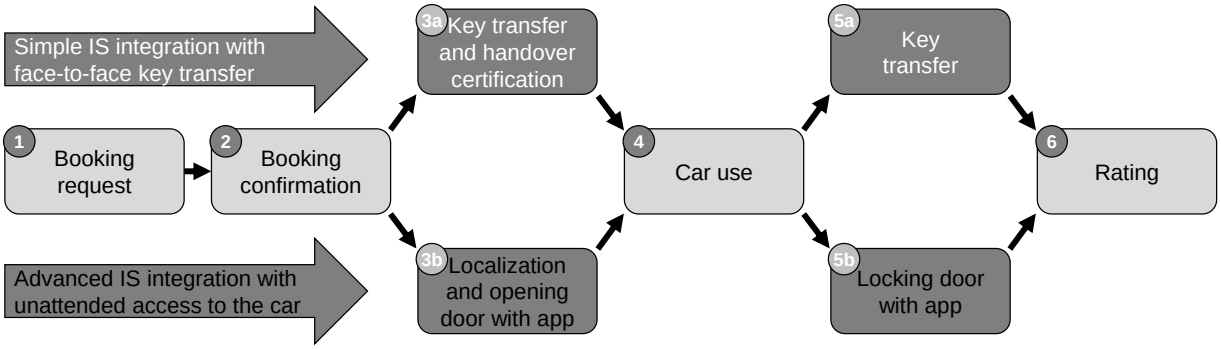


Figure 1. The P2P car-sharing process with simple and advanced integration of IS.

3 Research Model

Our research model aims to predict service acceptance dependent on the degree of IS support. Consistent with prior research on digital platforms (Malhotra and Alstyne 2014; Belk 2013; John 2012), we define IS support in the P2P car-sharing context as a digital platform that supports the service process. The research model is informed by Fishbein and Ajzen's (1975) theory of reasoned action (TRA) in two ways. First, we argue that service acceptance in terms of service usage behavior is highly related to behavioral intention, which is a typical assumption in service acceptance research (Ajzen and Fishbein 2005). Second, we follow TRA by arguing that two attitudinal beliefs, i.e., the perceived benefits of using the P2P car-sharing service and the perceived risks of offering a car as well as the subjective norm, i.e., the social influence regarding the use of the P2P car-sharing service, are important antecedents of behavioral intention. Our basic model is consistent with the stream on technology acceptance research (Davis 1989; Pavlou and Gefen 2004).

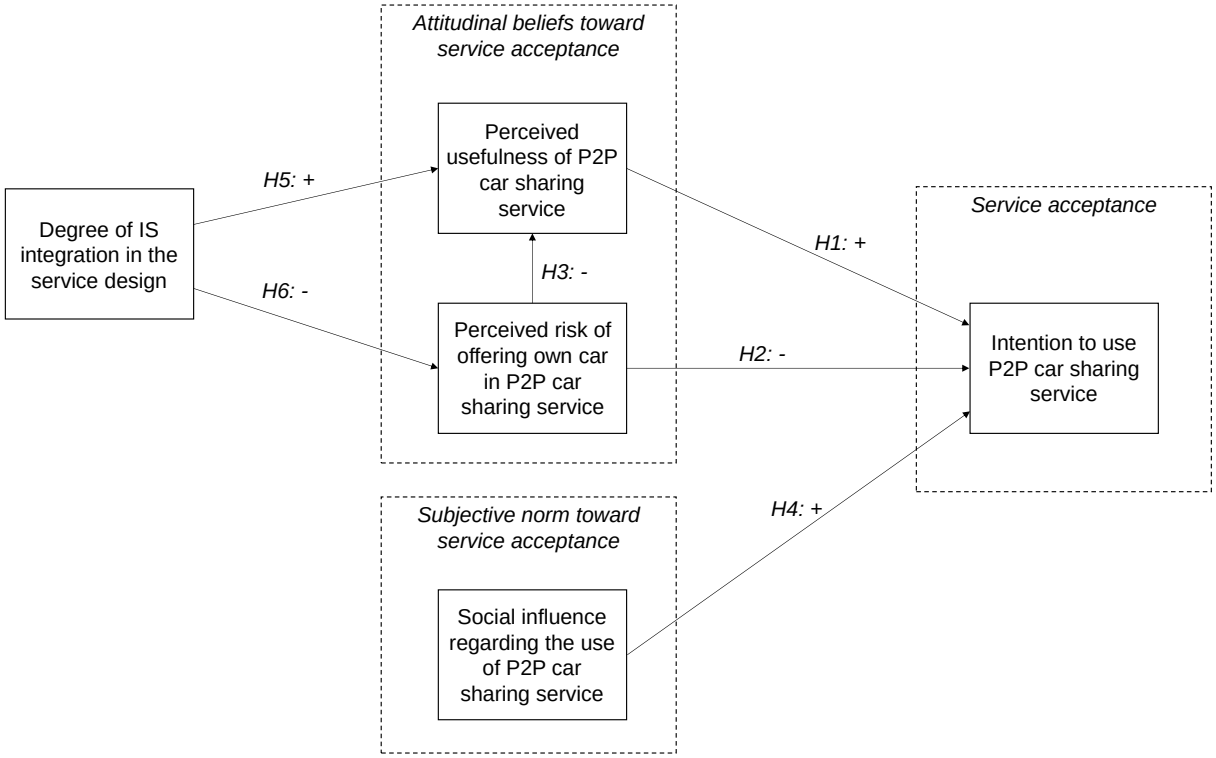


Figure 2. Research model.

3.1 The Influence of Perceived Usefulness, Perceived Risk, and Social Influence on Service Acceptance

We include the behavioral attitude of perceived usefulness of a P2P car-sharing service in our model. In this context, the perceived usefulness of the P2P car-sharing service can be defined as the degree to which an individual believes that the collaborative consumption service helps them rent out their privately owned vehicles (Davis 1989; Shaheen et al. 2012). This construct has successfully been proven to have a positive influence on behavioral intention in a wide range of research, e.g., Davis (1989), Gefen et al. (2003), or Venkatesh and Davis (2000). Therefore, we contend the following hypothesis:

H1: Perceived usefulness positively influences the intention to use a P2P car-sharing service.

In the context of P2P car-sharing, the perceived risk relates to the risks that go along with offering one's own car for the P2P car-sharing service, e.g., renters not returning the vehicle in the same condition as it was received (technical condition, cleanliness, etc.). As P2P car-sharing – like most other popular collaborative consumption services – is a form of digitalized services or product service systems (Geum and Park 2011; Mont 2002; Yoon et al. 2012) that strongly depends on IS support, e.g., the online platform to offer, book, and manage car rentals, they can be counted towards digital markets. In line with prior acceptance research (Jarvenpaa et al. 2000; and Pavlou and Gefen 2004), we thus contend a second hypothesis:

H2: The perceived risk of offering one's own car in P2P car-sharing services negatively influences the intention to use a P2P car-sharing service.

In addition, if the perceived risk of offering one's own car in P2P car-sharing services appears to be high, it directly affects the perceived usefulness because the perceived risk is negatively inclusive in the perception of the usefulness. Multiple studies have demonstrated a significant negative influence

of perceived risk on perceived usefulness (Im et al. 2008; Lu et al. 2005). Thus, we contend the subsequent hypothesis:

H3: The perceived risk of offering one's own car in P2P car-sharing services negatively influences the perceived usefulness of the collaborative consumption service.

As early as 1975, Fishbein and Ajzen (1975) made a connection between the subjective norm – social influence – and behavioral intention. If the context involves consumer-oriented IS that the consumer uses voluntarily, which is the case in the P2P car-sharing example, social influence has been shown to have a positive impact on behavioral intention. Hence, the consumer can be influenced by their peers, as they tend to rely on others' opinions regarding the service as a whole or other customers (Venkatesh and Davis 2000). Thus, we contend a fourth hypothesis:

H4: The social influence regarding P2P car-sharing positively influences the intention to use a P2P car-sharing service.

3.2 The Effects of Advanced IS Integration

To be able to answer the research questions– whether an IS-induced loss of human interaction affects the car owner's service acceptance – we analyze and compare the two different service designs of CSS with "simple IS integration" and "advanced IS integration". When integrating advanced IS-driven process steps into a collaborative consumption service design such as P2P car-sharing, the IS integration should increase the usability, thus enabling efficiency and effectiveness gains through its three functions of automation, information, and transformation (Dehning et al. 2003). These efficiency and effectiveness gains are caused by joint operation with other resources and have been proven to appear in a wide range of studies (Kohli and Grover 2008; Melville 2010; Wade and Hulland 2004). With regard to the first hypothesis concerning the influence of perceived usefulness on the intention to use a P2P car-sharing service, it can therefore be postulated that the perceived usefulness of the collaborative consumption service increases with the amount of (advanced) IS integration. Thus we contend a further hypothesis:

H5: The integration of advanced IS in P2P car-sharing services increases the perceived usefulness of the collaborative consumption service for the car lenders.

Personal contact is of utmost importance for establishing trust between two individuals (Burt and Knez 1996; Wichman 1970). However, when using a P2P car-sharing service, a privately owned car is usually rented out to a stranger. In the simple IS case, this stranger is met in person at least once before the most perilous action – the vehicle use – takes place. Thus, the human interaction of handing over the vehicle keys in person can be seen as the most important step in creating trust between the owner (lender) and the renter. As the integration of advanced IS (e.g., a mobile app to open the vehicle via smartphone) leads to omitting this important process step, the perceived risk of using this service should logically increase for the vehicle owner. Therefore, regarding the second hypothesis focusing on the influence of perceived risk on the intention to use a P2P car-sharing service, we contend additionally:

H6: The integration of advanced IS in P2P car-sharing services increases the perceived risk of the collaborative consumption service for the car lenders.

4 Methodological Approach

In order to test the theoretical model and compare the differences in adoption behavior between simple and advanced IS usage in P2P CSS, a mental experiment with two different treatments was designed (Zeimbekis 2011). We decided to use a mental-based experiment with hypothetical scenarios, because

it is efficient in the conduction and prior studies gave us sufficient indications for its applicability in context of CSS service acceptance (Castaño et al. 2008; Eisel et al. 2014; Taylor et al. 1998).

4.1 Data-Collection Procedure

At the beginning of the survey, the participants were randomly assigned to a group and received different messages regarding the process of P2P CSS. In order to put the participants in the mindset of a potential P2P car-sharing user, we described a fictive P2P car-sharing service provider called NeighbourCar. The descriptions entail a detailed comic explaining the P2P car-sharing process step by step, starting with user registration and ending with rating; the comics for the treatment groups were different when advanced IS use changes the provision process (see Appendix). Each participant was to imagine the respective situation, with the goal of arousing a cognitive evaluation process (Zeimbekis 2011). After this treatment, all participants were asked to report their perceptions of the process from the perspective of a potential car lender and received a standardized questionnaire. The questionnaire ended with items of participant characteristics and was pre-tested by a focus group. In order to assure the effect of our treatment and the cleanliness of the questionnaire, we conducted a pretest. The subsequent interviews led to minor changes in the wording and length of the two treatments and the scales.

Our target subjects were potential adopters of P2P car-sharing services which might be willing to contribute to the P2P car-sharing community. The target group of P2P car-sharing services is people between 25 and 34 years old with higher educational qualifications (Hampshire and Gaites 2011). Accordingly, we decided to gather data in the context of a German university. After excluding data sets due to quality criteria such as missing data, we finally ended up with 339 answers, which include 174 data sets with a "simple IS NeighbourCar" treatment and 165 with an "advanced IS NeighbourCar" treatment. The sample consists of respondents with an average age of 26.89 years. Of these respondents, 29% state that their highest level of education completed is an A level, 66% have a college degree, and 3% received a Ph.D. Finally, 55% of the sample is female, and 45% is male.

As we decided for a between subject experimental design, we also checked whether there are differences between personal characteristics of the participants. However, a t-test revealed no significant differences for age and gender between both groups. We thus argue, that our randomization procedure worked properly and that personal differences between the groups had no confounding effect.

4.2 Measurement of Constructs

The theoretical constructs of the research model have been operationalized using established scales from prior research and were adapted to the context of this work. The items were then translated into German and crosschecked by the authors. All measures were worded as statements. Seven-point Likert scales ranging from 1 = strongly disagree to 7 = strongly agree were used to measure most items. All constructs were of reflective nature. We measured the car owner's intention to use P2P car-sharing with a 3-item scale, perceived usefulness with a 4-item scale and social influence with a 4-item scale based on Venkatesh et al. (2003). We used a 4-item scale adapted from van der Heijden et al. (2003) and Pavlou and Gefen (2004) to measure car owners' perceived risks of lending their cars.

5 Results

Before beginning the model analysis, survey data was checked for the thread of common method bias using SPSS Statistics 21. The research model was then tested using structural equation modeling with PLS. We maintain this decision for a variance-based model estimation instead of covariance-based because PLS has fewer demands for sample size and excels at prediction (Ringle et al. 2012). As we split our sample into two distinct groups with 174 and 165 observations, PLS is particularly suitable for this study. The analysis is primarily supported using the software SmartPLS 2.0.M3 (Ringle et al. 2005). First, we assessed the measurement model for validity and reliability criteria. We then evaluated the structural model. Finally, additional computation for a model comparison was done.

5.1 Common Method Bias and Measurement Model

Our study design adopts a single-informant approach. Accordingly, there is a threat of common method bias, as the same participant answers both exogenous and endogenous variables. In order to examine this effect, we used Harman's single factor test and ran an exploratory factor analysis (Podsakoff and MacKenzie 2003). The results indicate that not a single factor emerges from the data, and a general factor does not capture a high share of the variance. Therefore, we argue that common method bias should also not be of concern throughout the analysis.

Table 1. Correlations and measurement information

Variable	# items	FL	CA	CR	AVE	1	2	3	4
Simple IS integration									
1 Intention to Use	3	.925–.948	.954	.927	.873	**.934**			
2 Perceived Usefulness	4	.810–.915	.931	.901	.771	.593	**.878**		
3 Perceived Risk	4	.744–.916	.889	.847	.668	-.502	-.311	**.817**	
4 Social Influence	3	.952–.973	.973	.959	.923	.371	.224	-.338	**.961**
Advanced IS integration									
1 Intention to Use	3	.940–.956	.964	.944	.899	**.948**			
2 Perceived Usefulness	4	.813–.921	.931	.901	.771	.508	**.878**		
3 Perceived Risk	4	.751–.865	.880	.819	.648	-.588	-.405	**.805**	
4 Social Influence	3	.968–.980	.982	.972	.948	.387	.174	-.247	**.973**

FL: factor loadings; CA: Cronbach's alpha; CR: composite reliability; AVE: average variance extracted; bold numbers: square root of AVE

In order to examine how well the empirical data fits the structural models, we considered content, convergence, and discriminant validity for both the simple IS integration model and advanced IS integration model (see Table 1). As the fundamental theoretical model is based on an established theory, the extensions follow a well-grounded reasoning, and all of our scales use established measures, we argue that content validity is given. We examined convergence validity by checking for individual item reliability, composite construct reliability (CR), and average variance extracted (AVE). All factor loadings exceeded the threshold of .70, indicating good reliability (Gefen and Straub 2005). The models also passed the test for internal consistency, with a CR above .70 (Hulland 1999). In addition, all AVEs exceeded the lower bound of .50 (Bhattacherjee and Premkumar 2004). Finally, we checked for discriminant validity. Checking for cross-loadings, it holds for both models that all items have the highest loading on their own factor. Moreover, following the suggestions of Fornell and Larker (1981), we computed the square root of the AVEs. For each construct, this value exceeds the correlations shared with all other constructs, indicating discriminant validity. Consequently, we argue that both measurement models are sufficient to derive conclusions from further structural analyses.

5.2 Structural Models and Hypothesis Testing

For assessing significance levels of the structural model, we used the bootstrapping re-sampling method and created 1000 samples. PLS regression analysis indicates support for the general model of P2P car-sharing adoption. The model explains 48.7 % of the variance in usage intention with simple IS usage and 48.4 % with advanced IS usage. Results indicate a significant influence of all three predictors of usage intention – perceived usefulness, social influence, and perceived risk – for both samples, indicating support for Hypotheses 1, 2, and 4. Also the negative influence of perceived risk on perceived usefulness was revealed to be significant in both samples, providing support for Hypothesis 3.

Table 2. Results of model estimations and model comparisons

Path	Sample		Hypothesis supported	Sample comparison		
	Path coeff. Simple IS	Path coeff. Advanced IS		t-value	df	p-value (2-side)
H1: Perceived Usefulness → Intention to Use	.462 ***	.303 ***	Yes	1.973	326	.057
H2: Perceived Risk → Intention to Use	-.302 ***	-.408 ***	Yes	1.324	323	.166
H3: Perceived Risk → Perceived Usefulness	-.311 ***	-.405 ***	Yes	1.013	309	.239
H4: Social Influence → Intention to Use	.166 ***	.233 ***	Yes	-0.740	328	.303
Perceived Risk → Intention to Use (total effect)	-.446 ***	-.530 ***	N.A.	1.094	298	.219

*Significance levels: ***p < .01, **p < .05, *p < .10; Simple IS: n = 174, Advanced IS: n = 165*

Based on the latent variable scores we retrieved from the PLS analysis, we also computed mean values for all model variables (see Table 3). Mean comparisons using a 2-sided t-test was conducted. We found no significant differences between intention to use and social influence; only perceived usefulness and perceived risk were revealed to be significantly different, providing support for Hypotheses 5 and 6.

Table 3. Results of variable means and mean comparisons

Construct	Range	Simple IS		Advanced IS		Mean comparison			Hypothesis supported
		Mean	Std. dev.	Mean	Std. dev.	t-value	df	p-value (2-sided)	
H5: Perceived Usefulness	1–7	3.705	1.485	4.234	1.486	3.272	336	.001	Yes
H6: Perceived Risk	1–7	4.143	1.212	4.535	1.154	3.042	337	.003	Yes
Intention to Use	1–7	2.593	1.466	2.449	1.346	0.946	337	.345	N.A.
Social Influence	1–7	2.027	1.312	1.945	1.369	0.563	334	.574	N.A.

Simple IS: n = 174, Advanced IS: n = 165

5.3 Model Comparison

As we find differences in the model estimations (see Table 2), we conducted an additional post hoc analysis. The aim of the further analysis was to better understand whether the treatment has also significantly influenced the strength of the independent variables in predicting the dependent variables, i.e., to find differences in path estimates between simple and advanced IS usage in P2P car-sharing services. Based on path coefficients from the PLS estimates and standard deviations retrieved from the bootstrapping procedure, we calculated t-statistics for each relationship (Chin 2000). We assumed non-equal variances (Chin and Dibbern 2010; Sarstedt et al. 2011). The results of the multigroup analysis are depicted in the sample comparison column of Table 2. The data indicates that car owners' perceived usefulness is a significantly weaker determinate for the usage intention when advanced IS is used (b = .462, b = .303, p < .10). While we found a notable difference (>.10) in the path estimation of perceived risk on usage intention, our data could not show this effect to be significant.

6 Discussion and Conclusion

This study set out to examine effects of different levels of IS integration in the CSS design. We used the scenario of a P2P CSS in order to explain differences in car owners' acceptance. We therefore developed a research model and conducted a mental experiment with two groups: one was treated with the simple IS NeighbourCar scenario and the other with advanced IS NeighbourCar scenario. Overall, our research model was able to account for an ample amount of the variance in the intention of car

owners to use a P2P CSS, which gives general support for the structure of our service acceptance model. Moreover, the results indicate support for the method of a mental experiment as we find significant differences in path estimations and mean values of the latent variable scores of both groups.

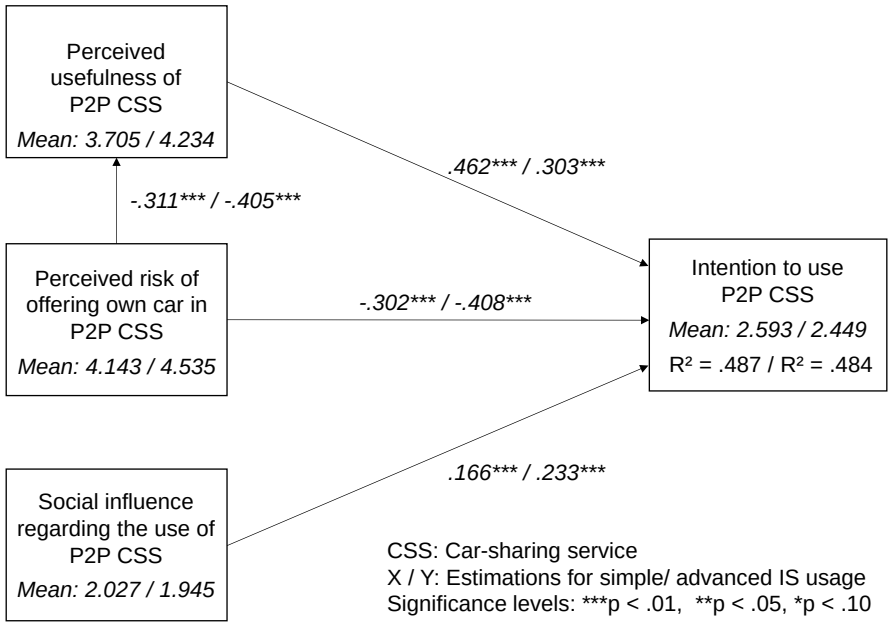


Figure 3. Results from PLS path estimation for both simple IS and advanced IS integration.

The results generally show low to average acceptance values of the service design (with a mean value of 2.593 respective 2.449 for intention to use) with average variation (a variance of 1.466 respective 1.346). The research model performs well in predicting the variation (R^2 = .487 respective R^2 = .484). Our data provide answers regarding RQ1. We can trace the negative effect of increased IS integration in the P2P CSS. In our example, the loss of human interaction in the case of the advanced IS NeighbourCar scenario indeed seems to increase related risk perceptions by an average of 4.143 to 4.535. Although below typical significance levels, we also find an increase with b > .10 (p > .10) in the relative importance of perceived risk in predicting P2P CSS usage intention.

RQ2 asked for the strength of the two competing effects of greater IS integration in P2P CSS, i.e., the increased value and the increased risk. Our first interesting finding is that our data show little and non-significant differences in service acceptance (with an average of 2.593 for simple and 2.449 for advanced IS integration with p > .10). At first glance, the degree of IS integration seems to have no effect on service acceptance; however, looking deeper we see notable changes in both the perception of service usefulness and risks as well as the path coefficients in the model; these changes actually equalized the effect.

First, the integration of advanced IS in P2P CSS increased the perceived usefulness – a mean of 3.7 in the simple IS sample increased to 4.23 in the advanced IS sample (p < .01). At the same time, the perceived risk increased from a mean of 4.11 in the simple IS sample to 4.52 in the advanced IS sample (p < .01). Accordingly, our data reveals an indication for the competing effects of increasing the degree of IS integration and replacing human interaction. Furthermore, we observed an opposite effect regarding the path coefficients of perceived risk and perceived usefulness on intention. Whereas the mean of the perceived usefulness increased when using advanced IS in the collaborative consumption service, the relative importance, i.e., the path coefficient, significantly decreased from b = .462 to b = .303 (p < .10). In addition, the increase of the perceived risk's mean comes along with an increase in the value of its importance for the usage intention, as the path coefficient increased from b = -.311 to b = -.403. Although we could not prove the latter effect to be significantly higher, the competing effect

could be found in the path coefficients. While in the case of simple IS integration the car owner's intention to use the P2P car-sharing service depends most on the perceived usefulness with risk perceptions only in second place, the relative importance is reversed in the case of advanced IS integration. If the P2P car-sharing process becomes more digitalized and IS reduces human interaction and trust building between the collaborators, the perceived risk has a stronger influence on usage intention than gains in perceived usefulness. Finally, looking at the relation between perceived risk and perceived usefulness, the data also shows that the influence increases with advanced IS integration ($b = .311$, $b = .405$); however, we did not find this shift to be significantly different ($p > .10$).

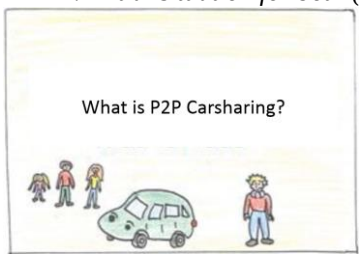
Thus, the combination of both observed effects – the change of the constructs' means as well as the change of the constructs' relative importance regarding the intention to use the P2P car-sharing service – reflects the danger of replacing human interaction in IS-driven collaborative consumption services. In our case, these divergent effects offset each other, but it cannot be assumed that this is the case with other CSS. At this point, the question emerges of whether the more advanced degree of IS-service design integration pays off in the end. Future studies on CSS acceptance (e.g., Ballús-Armet et al. 2014) as well as research on CSS-related business model (e.g., Hampshire and Gaites 2011) should consider the optimal degree of IS integration when designing services. This study contributes to IS research in two major ways: First, our results indicate that in collaborative consumption services both the perceived risk as well as the perceived usefulness regarding the service can play an important role in influencing service acceptance. Therefore, researchers should consider this when analyzing and developing collaborative consumption service designs. Second, we found evidence that the increasing digitalization of ordinary services, which we refer to as advanced IS, leads to a possible loss of human interaction service design elements, in turn bearing the risk of decreasing the end-user's collaborative consumption service acceptance.

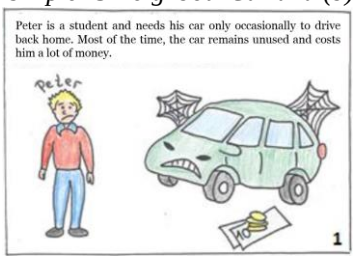
However, the following limitations should be considered when interpreting the results. We conducted our survey in a German sample only. Therefore, our sample is biased towards the German car owners' perspective. Furthermore, we analyzed only a single collaborative consumption service, P2P car-sharing, which was necessary in order to explore the interplay between perceived usefulness and perceived risk in detail. In addition, the study's sample is younger and more educated than the general population. Hence, as in most non-randomized surveys, there are issues concerning the generalizability to the entire population of the results. However, as the typical early adopter of CCS tends to be young and educated (Hampshire and Gaites 2011), the results are reliable for this important market segment. Finally, an experiment in a real life context is usually preferable to a mental treatment. This might have had an effect on cognitive, affective, and behavioral arousals through the treatment and strength of the resulting perceptions in both groups. Indeed, the mean differences between both groups, i.e. .529 for perceived usefulness and .392 for perceived risk on a 7-point Likert scale, are not large. However, as we find some support for the method of mental experiments in prior studies (Castaño et al. 2008; Eisel et al. 2014; Taylor et al. 1998) and we observe highly significant differences, we argue that the treatment has, at least, worked in the right direction. Of course, further research in different contexts and with different methods is necessary to support our results.

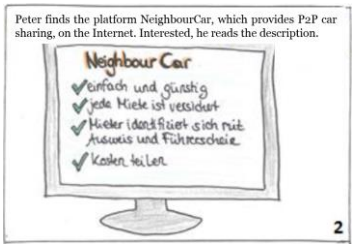
To the best of our knowledge, we are amongst the first to elaborate on the importance of human interaction in IS-driven collaborative consumption service design, as we extend the young IS research stream regarding the trending area of CCS (Andersson et al. 2013) by adding insights about individual acceptance behavior and the danger that accompanies an extensive integration of advanced IS solutions into the service design of CCS. Our results should be understood as a warning that when integrating advanced IS into new or existing CCS designs, special attention should be paid to process steps in which the advanced IS can replace human interaction. In doing so, the potential danger of decreased end-user acceptance might be avoided.

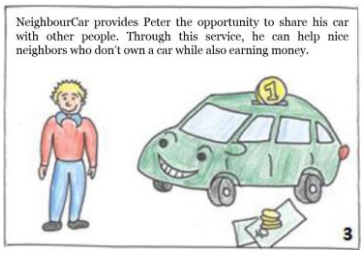
Appendix – Treatments for the experiment

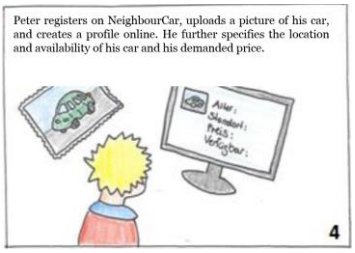
1. Initial situation for both (a) simple IS NeighbourCar and (b) advanced IS NeighbourCar

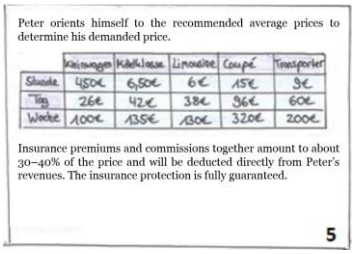




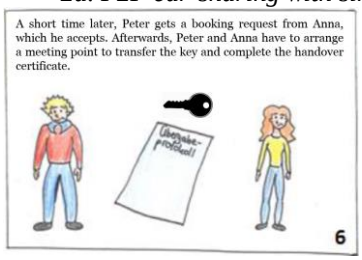


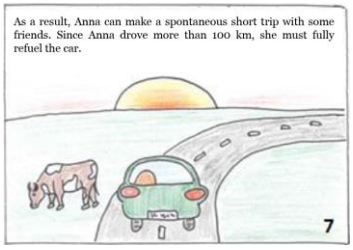


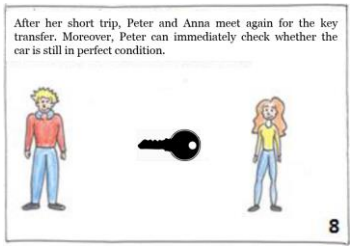


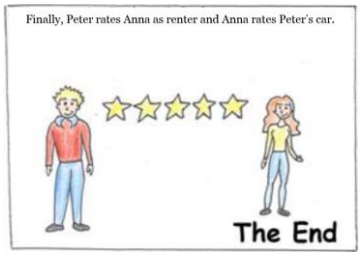


2a. P2P car-sharing with simple IS integration treatment









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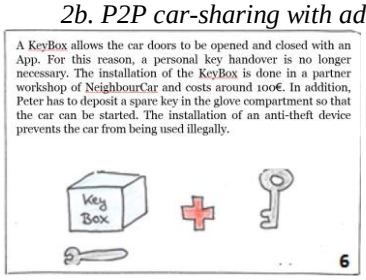

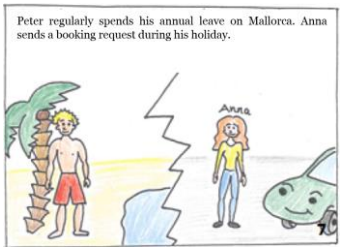

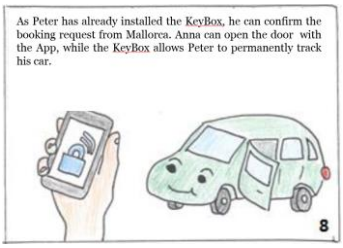

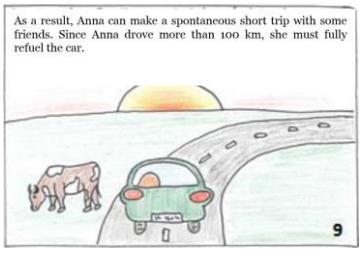

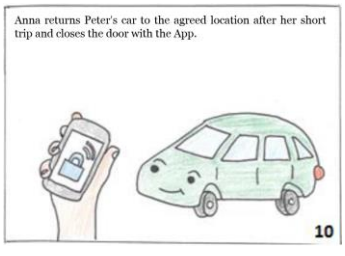

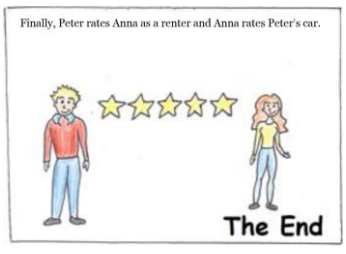

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