Autonomous Car Acceptance: Safety vs. Personal Driving Enjoyment

Full Paper

Claus-Peter H. Ernst
Frankfurt University of Applied Sciences
cernst@fb3.fra-uas.de

Patrick Reinelt
Frankfurt University of Applied Sciences
preinelt@fb3.fra-uas.de

Abstract

Due to the passiveness of the passengers, autonomous cars promise benefits in terms of traffic safety, but also drawbacks in terms of the enjoyment people experience when driving a car themselves. We postulate that both Perceived Traffic Safety and Personal Driving Enjoyment play an important role in people's acceptance of autonomous cars. After collecting 100 questionnaires and applying a SEM approach, our findings indicate that Personal Driving Enjoyment has a negative influence on the Perceived Enjoyment of autonomous cars and that Perceived Traffic Safety has a positive influence on both their Perceived Usefulness and Perceived Enjoyment. Additionally, both Perceived Usefulness and Perceived Enjoyment were confirmed to positively influence autonomous car acceptance. These findings suggest that autonomous cars should optionally enable people to act as drivers, that manufacturers need to actively manage people's safety perceptions, and that they also need to emphasize the alternative hedonic benefits that the driverless experience offers.

Keywords

Autonomous Car, Perceived Traffic Safety, Personal Driving Enjoyment, Technology Acceptance.

Introduction

The idea of fully autonomous cars has recently gained momentum among various traditional car manufacturers such as Volkswagen, as well as various big players of consumer electronics such as Apple. This has led these companies to do research and development on autonomous cars. There are different levels of automation with regards to cars, ranging from traditional cars with no automation to fully autonomous cars (SAE International 2014). Fully autonomous cars "are those in which operation of the vehicle occurs without direct driver input to control the steering, acceleration, and braking and are designed so that the driver is not expected to constantly monitor the roadway while operating in self-driving mode" (National Highway Traffic Safety Administration 2013). Overall, fully autonomous cars are expected to fundamentally alter mobility by providing substantial social, environmental and economic benefits such as fewer accidents, less emissions, reduced fuel consumption, and productivity gains (cf. Fagnant and Kockelman 2015). However, despite these benefits, fully autonomous cars face substantial challenges with regards to mainstream acceptance.

In addition to the challenges of developing a market-ready product and the complex questions linked to autonomous cars in terms of law, privacy, licensing, security, and insurance regulation (Fagnant and Kockelman 2015), there is also the question of people's acceptance of this new kind of mobility. More specifically, although many people have gotten used to advanced driving assistance systems such as adaptive cruise control, blind spot monitors, and lane change assistance, many factors that might drive or hinder people's acceptance of autonomous cars have not yet been empirically examined. Indeed, while there is a wealth of studies that focus on the technological feasibility of autonomous cars as well as their necessary pre-conditions (e.g., laws), the knowledge of the factors that affect user's acceptance of this disruptive technology is rather vague and the corresponding research is rare.

Two opposing factors that might play a crucial role in people's acceptance of autonomous cars are personal driving enjoyment and traffic safety. More specifically, to differing degrees, people enjoy driving a car, i.e., they enjoy operating the car themselves, including managing the acceleration and steering of the vehicle (e.g., Hagman 2010). In the case of autonomous cars, this aspect is lost since drivers are now only passive passengers. However, despite this drawback of autonomous cars, drivers' passiveness simultaneously promises crucial benefits with regards to traffic safety. Indeed, a large share of vehicle crashes today can be attributed to human failures such as recognition and decision errors (National Highway Traffic Safety Administration 2008). Autonomous cars can potentially be more reliable than human perceptions and reactions and, as a result, can potentially decrease the number of car accidents (Ferreras 2014).

In this article, we take a look at the potential influence of these two factors, i.e., Personal Driving Enjoyment and Perceived Traffic Safety, on autonomous car acceptance. More specifically, it is generally accepted that the acceptance of a technology is determined by its Perceived Usefulness and Perceived Enjoyment, which are, in turn, influenced by additional antecedents (e.g., Davis et al. 1989; Davis et al. 1992; Van der Heijden 2004). In our context, we postulate that Personal Driving Enjoyment has a negative influence on the Perceived Enjoyment of autonomous cars and that Perceived Traffic Safety has a positive influence on both their Perceived Usefulness and Perceived Enjoyment. After collecting 100 complete online questionnaires and applying a structural equation modeling approach, our hypotheses were confirmed.

In the following sections, we will introduce Perceived Usefulness and Perceived Enjoyment as influence factors of technologies that provide utilitarian and hedonic benefits, and also provide theoretical background information on Personal Driving Enjoyment and Perceived Traffic Safety. Following this, we will present our research model and research design. We will then reveal and discuss our results before summarizing our findings, presenting their implications, and providing an outlook on further research.

Theoretical Background

The Role of Perceived Usefulness and Perceived Enjoyment on Car Acceptance

Generally, cars offer both utilitarian and hedonic benefits. Utilitarian benefits "provide instrumental value to the user" and hedonic benefits "provide self-fulfilling value to the user, ... [which] is a function of the degree to which the user experiences fun" (Van der Heijden 2004, p. 696). With regards to a car, the main instrumental value is individual mobility or, in other words, a person's freedom to get safely and independently to his/her desired destinations whenever he/she likes (e.g., Best 2006). Additionally, cars also offer hedonic benefits, since they can be used for fun and exciting activities such as cruising around or enjoying the thrill of speed (cf. Best 2006; Chen and Chen 2011; Hagman 2010; Hallo and Manning 2009; Jonah et al. 2001; Ulleberg and Rundmo 2003). Indeed, driving just for the sake of enjoyment has been described as popular recreational activity (e.g., Kent 1993).

Perceived Usefulness — i.e., "the degree to which a person believes that using a particular system would enhance his or her job [and task] performance" (Davis 1989, p. 320) — centers on the motivations and benefits that are external to the system-user interaction itself, also referred to as extrinsic motivations (Brief and Aldag 1977; Van der Heijden 2004). Perceived Enjoyment — i.e., "the extent to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use" (Venkatesh 2000, p. 351) — reflects a hedonic system's intrinsic motivations, such as fun, enjoyment, and other positive experiences, which stem directly from the system-user interaction (Brief and Aldag 1977; Van der Heijden 2004; Venkatesh et al. 2012).

Various studies in a variety of contexts have consistently confirmed that Perceived Usefulness and Perceived Enjoyment are central antecedents of the acceptance of utilitarian and hedonic technologies, respectively (Davis 1989; Davis et al. 1989; Davis et al. 1992; Van der Heijden 2004). By applying these findings to the context of cars, a person can be expected to use a car if he/she believes that it fulfills his/her expectations with regards to its instrumental benefits, that is, to its Perceived Usefulness, and with regards to its hedonic benefits, that is, to its Perceived Enjoyment.

Personal Driving Enjoyment

In addition to the overall enjoyment perceived with regards to cars, as explained above, one particular source of enjoyment is the pleasure a driver experiences when operating a car himself/herself. More specifically, to varying degrees, drivers are known to experience enjoyment when managing the acceleration and steering of a vehicle or, in other words, people like to drive a car themselves (e.g., Hagman 2010). We call this specific kind of enjoyment — which ultimately contributes to the overall enjoyment of a car (cf. Hagman 2010) — Personal Driving Enjoyment and define it as the degree to which a person experiences enjoyment from operating a car himself/herself.

Perceived Traffic Safety

Among the negative aspects of ubiquitous automobility are vehicle crashes. In 2015, 35,092 people died on US roadways, which was an increase of 7.2 percent compared to 2014 (National Highway Traffic Safety Administration 2016). Generally, a large portion of vehicle crashes can be attributed to human failures such as recognition and decision errors (National Highway Traffic Safety Administration 2008).

Autonomous cars may potentially be more reliable than human perceptions and reactions. Indeed, available advanced driving assistance systems are already able to capture information about the environment through several sensors, analyze the data and react to the information gathered. Thanks to this, they are more responsive, react faster and are more reliable than human perceptions and reactions (Ferreras 2014). As a result, fully autonomous cars could ultimately reduce the number of vehicle crashes.

However, security and safety are often subjective in nature (cf. Hyden 2016) and the usage of an autonomous car means the loss of overall control regarding a vehicle. As a result, and although objective data may suggest otherwise, autonomous cars might cause fears regarding traffic safety, ultimately leading potential users to have differing perceptions in terms of the traffic safety of autonomous cars. We call people's overall perception of autonomous cars' safety Perceived Traffic Safety and define it as the degree to which a person believes that an autonomous car is able to bring him/her safely to his/her destination, i.e., without any accidents.

Research Model

In the following section, we will outline our hypotheses and present our corresponding research model in Figure 1. As described above, autonomous cars provide instrumental benefits concerning mobility, making them partly utilitarian technologies. Perceived Usefulness is commonly accepted to be an important antecedent of utilitarian technologies' acceptance (e.g., Davis et al. 1989). Furthermore, autonomous cars can also be used for hedonic purposes, making them also partly hedonic technologies (Van der Heijden 2004). Perceived Enjoyment has been shown to be an important antecedent of hedonic technologies' acceptance (e.g., Van der Heijden 2004). We hypothesize that:

There is a positive influence of Perceived Usefulness on the Behavioral Intention to Use[1] *autonomous cars (**H1**).*

*There is a positive influence of Perceived Enjoyment on the Behavioral Intention to Use autonomous cars (**H2**).*

Reaching a destination safely is one of the most fundamental requirements of any kind of vehicle. As a result, any vehicle that a person believes to be unsafe might diminish its utilitarian value, i.e., a person's freedom to get safely to his/her desired destinations (e.g., Best 2006). In other words, people's perception regarding a vehicle's traffic safety positively influences their perception of its usefulness. Furthermore, similarly to the perception of risk, we believe that the feeling of safety is connected to individuals' feelings (cf. Yüksel and Yüksel 2007). More specifically, whereas risk perception is associated with negative consequences (Dowling and Staelin 1994; Featherman 2001), safety is associated with positive consequences and hence, can be expected to provide positive feelings such enjoyment, pleasure, and

[1] Since at the time of this study (July 2016), fully autonomous cars were not available to the general public, we only included Behavioral Intention to Use, and not Actual System Use, into our research model. Behavioral Intention to Use is a commonly accepted mediator between people's beliefs and their actual behavior. It "capture[s] the motivational factors that influence a [person's] behavior; they are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behavior" (Ajzen 1991, p. 181).

wellbeing. In other words, people's perception regarding a vehicle's traffic safety positively influences their enjoyment. We hypothesize that:

*There is a positive influence of Perceived Traffic Safety on the Perceived Usefulness of autonomous cars (**H3**).*

*There is a positive influence of Perceived Traffic Safety on the Perceived Enjoyment of autonomous cars (**H4**).*

Drivers can derive pleasure and enjoyment from operating a car themselves, which ultimately contributes to their overall perceived enjoyment of using a car (e.g., Hagman 2010). However, in the context of autonomous cars, this Personal Driving Enjoyment is lost, since drivers are now only passive passengers. As a result, this forced passiveness may hinder the acceptance of autonomous cars since it literally takes away some of the fun for people that enjoy operating a car themselves. We hypothesize that:

*There is a negative influence of Personal Driving Enjoyment on the Perceived Enjoyment of autonomous cars (**H5**).*

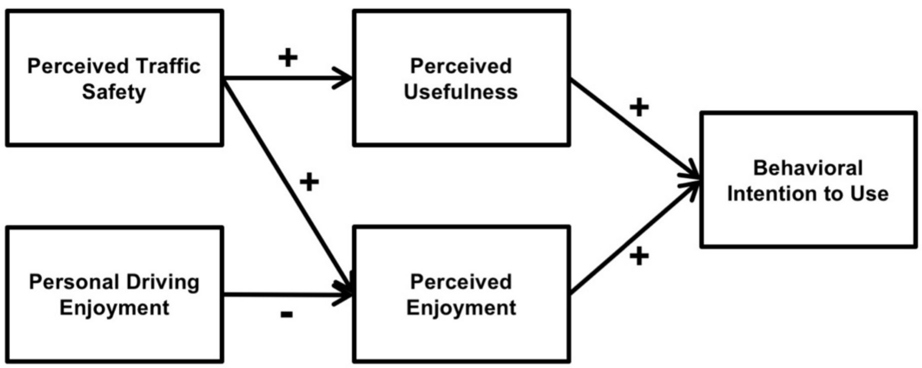

Figure 1. Research Model

Research Design

Data Collection

To empirically evaluate our research model, we posted calls on two German websites dedicated to automobiles and promised a raffle of two 20 € gift certificate from *Amazon* for the participants. At the beginning of the questionnaire, we provided the respondents with a short introduction that provided a definition of autonomous cars based on the definition provided above (cf. National Highway Traffic Safety Administration 2013), information on sensors that help autonomous cars to capture the environment as well as a list of potential activities that passengers can perform while driving in an autonomous car such as sleeping. In this manner, we obtained 100 complete German-language online questionnaires. 60 respondents were male (60 percent) and 40 were female (40 percent). The average age was 28.53 years (standard deviation: 7.54). 1 respondent was a pupil (1 percent) and another one was an apprentice (1 percent), 62 respondents were currently employed (62 percent), 33 were students (33 percent), and 3 selected "other" as a description of themselves (3 percent).

Measurement

We adapted existing scales to our context in order to measure Behavioral Intention to Use, Perceived Enjoyment, and Perceived Usefulness. For Personal Driving Enjoyment, we oriented ourselves on the Perceived Enjoyment scale of Davis et al. (1992) and reworded the items in order to measure people's general enjoyment of driving a car themselves. For Perceived Traffic Safety, we developed three of our own reflective items and consulted several researchers from our department throughout the development process. Table 1 presents the resulting items. All items were measured using a seven-point Likert-type scale ranging from "strongly disagree" to "strongly agree".

Construct	Items (Labels)	Adapted from
Behavioral Intention to Use	I intend to use an autonomous car in the future (BI1)	Hu et al. (2011) Venkatesh et al. (2003)
	I plan to use an autonomous car within the first 6 month after its market launch (BI2)	
Personal Driving Enjoyment	It is enjoyable to drive a car yourself (PDE1)	Davis et al. (1992)
	It is fun to drive a car yourself (PDE2)	
	It is exciting to drive a car yourself (PDE3)	
Perceived Enjoyment	Using an autonomous car is enjoyable (PE1)	Davis et al. (1992)
	Using an autonomous car is fun (PE2)	
	Using an autonomous car is exciting (PE3)	
Perceived Traffic Safety	I would feel safe traveling in an autonomous car (PTS1)	created by ourselves
	Driving with an autonomous car will be secure (PTS2)	
	The use of autonomous cars will lead to fewer automobile accidents (PTS3)	
Perceived Usefulness	Overall, autonomous cars are useful (PU1)	Alarcón-del-Amo et al. (2012) Ernst et al. (2013)
	I consider that autonomous cars are useful to me (PU2)	
	Autonomous cars benefit me (PU3)	

Table 1. Items of our Measurement Model

Results

We used the Partial-Least-Squares approach via SmartPLS 3.2.4 (Ringle et al. 2015). With 100 datasets, we met the suggested minimum sample size threshold of "ten times the largest number of structural paths directed at a particular latent construct in the structural model" (Hair et al. 2011, p. 144). To test for significance, we used the integrated Bootstrap routine with 5,000 samples (Hair et al. 2011).

In the following section, we will evaluate our measurement model. Indeed, we will examine the indicator reliability, the construct reliability, and the discriminant validity of our reflective constructs. Finally, we will present the results of our structural model.

Measurement Model

Tables 2 and 3 present the correlations between constructs as well as the *Average-Variance-Extracted* (AVE) and *Composite-Reliability* (CR), and our items' factor loadings, respectively: AVE and CR were higher than .68 and .83, respectively, meeting the suggested construct reliability thresholds of .50/.70 (Hair et al. 2009). All but one item (PE1: $\beta=.688$, $p<.001$) loaded high (more than .70) and significant ($p<.001$) on their parent factor and, hence, met the suggested threshold of indicator reliability of .70 (Hair et al. 2011). Nevertheless, we kept PE1 in our measurement model. Indeed, "indicators with loadings between 0.40 and 0.70 should only be considered for removal from the scale if deleting this indicator leads to an increase in composite reliability above the suggested threshold value" (Hair et al. 2011, p. 145). This was not the case in our analysis, since CR already met its suggested threshold as indicated above. We thus kept all indicators initially used. Finally, the loadings from our indicators were highest for each parent factor and the square root of the AVE of each construct was larger than the absolute value of the construct's correlations with its counterparts, thus indicating discriminant validity (Fornell and Larcker 1981; Hair et al. 2011).

Structural Model

Figure 2 presents the path coefficients of the previously hypothesized relationships as well as the R^2s of the endogenous variables (*** = $p<.001$, ** = $p<.01$, * = $p<.05$). Both Perceived Usefulness ($\beta=.263$, $p<.05$) and Perceived Enjoyment ($\beta=.486$, $p<.001$) were found to have a positive influence on Behavioral Intention to Use confirming hypotheses 1 and 2, respectively. Perceived Traffic Safety was found to have a positive influence on both Perceived Usefulness ($\beta=.586$, $p<.001$) and Perceived Enjoyment ($\beta=.315$, $p<.01$), confirming hypotheses 3 and 4, respectively. Finally, Personal Driving Enjoyment was found to have a negative influence on Perceived Enjoyment ($\beta=-.275$, $p<.001$), confirming hypothesis 5. Overall, our research model included two predecessors of Behavioral Intention to Use (Perceived Usefulness and

Perceived Enjoyment), two predecessors of Perceived Enjoyment (Personal Driving Enjoyment and Perceived Traffic Safety), and one predecessor of Perceived Usefulness (Perceived Traffic Safety). By taking this into account, the explanatory power of our structural model is good, since it explains 46.2 percent of the variances of Behavioral Intention to Use, 18.2 percent of the variances of Perceived Enjoyment, and 34.4 percent of the variances of Perceived Usefulness.

	BI	PDE	PE	PTS	PU
Behavioral Intention to Use (BI)	.71 (.83)				
Personal Driving Enjoyment (PDE)	-.344	.83 (.94)			
Perceived Enjoyment (PE)	.647	-.288	.72 (.88)		
Perceived Traffic Safety (PTS)	.523	-.044	.327	.68 (.86)	
Perceived Usefulness (PU)	.561	-.166	.613	.59	.77 (.91)

Table 2. Correlations between Constructs [AVE (CR) on the Diagonal]

	BI	PDE	PE	PTS	PU
BI1	.904 (40.00)	-.324	.614	.509	.587
BI2	.779 (13.04)	-.248	.461	.354	.319
PDE1	-.363	.949 (13.71)	-.302	-.082	-.137
PDE2	-.234	.865 (9.20)	-.188	.041	-.084
PDE3	-.321	.922 (13.62)	-.277	-.050	-.216
PE1	.284	-.040	.688 (6.05)	.061	.336
PE2	.578	-.220	.914 (37.34)	.361	.604
PE3	.659	-.357	.915 (62.55)	.300	.551
PTS1	.549	-.094	.392	.846 (23.66)	.504
PTS2	.293	-.009	.117	.827 (14.51)	.480
PTS3	.415	.009	.261	.798 (18.05)	.462
PU1	.442	-.139	.555	.507	.904 (32.99)
PU2	.483	-.164	.465	.553	.872 (36.35)
PU3	.547	-.134	.596	.482	.858 (22.68)

Table 3. Reflective Items' Loadings (T-Values)

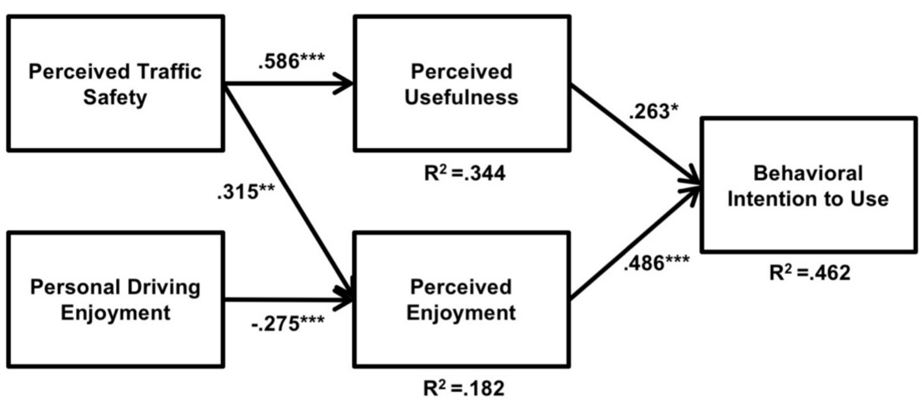

Figure 2. Findings

Limitations

Our study has some limitations. First, fully autonomous cars are not yet available to the general public. Hence, our respondents did not have any hands-on experience with them and could only state their guesses based on our description provided at the beginning of the questionnaire as well as on information they might have gathered on their own. Moreover, since we only surveyed German-speaking people, our results might not hold true for non-German speaking people. Also, our sample individuals were relatively young (mean: 28.53 years; standard deviation: 7.54). Hence, differences might be found for other age groups. Finally, our survey was only conducted online and our respondents were recruited on two websites dedicated to automobiles and, hence, excluded people that do not use the Internet or people that are not interested in cars.

Conclusions

In this article, we evaluated the role of Perceived Traffic Safety and Personal Driving Enjoyment on autonomous car acceptance. After collecting 100 complete online questionnaires and applying a structural equation modeling approach, our findings indicate that Personal Driving Enjoyment has a negative influence on the Perceived Enjoyment of autonomous cars and that Perceived Traffic Safety has a positive influence on both their Perceived Usefulness and Perceived Enjoyment. Additionally, both Perceived Usefulness and Perceived Enjoyment were confirmed to positively influence autonomous car acceptance.

In summary, our study contributes to autonomous car research by confirming that both utilitarian and hedonic benefits play a role in people's intention to use autonomous cars, and by confirming that both Perceived Traffic Safety and Personal Driving Enjoyment play an important role in people's perception of these two kinds of benefits. Moreover, our findings have important practical implications. Indeed, they suggest that autonomous cars should optionally enable people to act as drivers, if they wish to do so, since many enjoy driving a car themselves, and/or since they may have potential negative perceptions of driverless cars' safety. Additionally, they indicate that car manufacturers need to actively manage people's safety perceptions, in order to increase both their Perceived Usefulness and Perceived Enjoyment and, hence, also their acceptance of autonomous cars. Finally, our results imply that manufacturers need to emphasize the alternative hedonic benefits that the driverless experience offers such as time for enjoyable activities like reading books or watching movies.

As a next step, we plan to expand our research and address its limitations. More specifically, we want to roll out our survey to other countries around the world and in particular survey people that are older and younger than those in our sample. Furthermore, we plan to take a closer look at potential influence factors of Perceived Enjoyment that are specific to the driverless experience and may be able to make up for the loss of enjoyment due to the passiveness of the passengers.

References

Ajzen, I. 1991. "The Theory of Planned Behavior," *Organizational Behavior and Human Decision Processes* (50:2), pp. 179-211.

Alarcón-del-Amo, M.-D.-C., Lorenzo-Romero, C., and Gómez-Borja, M.-A. 2012. "Analysis of Acceptance of Social Networking Sites," *African Journal of Business Management* (6:29), pp. 8609-8619.

Best, A. L. 2006. *Fast Cars, Cool Rides: The Accelerating World of Youth and Their Cars*, New York, NY: NYU Press.

Brief, A. P., and Aldag, R. J. 1977. "The Intrinsic-Extrinsic Dichotomy: Toward Conceptual Clarity," *Academy of Management Review* (2:3), pp. 496-500.

Chen, C.-F., and Chen, C.-W. 2011. "Speeding for Fun? Exploring the Speeding Behavior of Riders of Heavy Motorcycles Using the Theory of Planned Behavior and Psychological Flow Theory," *Accident Analysis & Prevention* (43:3), pp. 983-990.

Davis, F. D. 1989. "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," *MIS Quarterly* (13:2), pp. 319-340.

Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. 1989. "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," *Management Science* (35:8), pp. 982-1003.

Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. 1992. "Extrinsic and Intrinsic Motivation to Use Computers in the Workplace," *Journal of Applied Social Psychology* (22:14), pp. 1111-1132.

Dowling, G. R., and Staelin, R. 1994. "A Model of Perceived Risk and Intended Risk-Handling Activity," *Journal of Consumer Research* (21:1), pp. 119-134.

Ernst, C.-P. H., Pfeiffer, J., and Rothlauf, F. 2013. "Hedonic and Utilitarian Motivations of Social Network Site Adoption." Johannes Gutenberg University Mainz: Working Papers in Information Systems and Business Administration.

Fagnant, D. J., and Kockelman, K. 2015. "Preparing a Nation for Autonomous Vehicles: Opportunities, Barriers and Policy Recommendations," *Transportation Research Part A: Policy and Practice* (77), pp. 167-181.

Featherman, M. 2001. "Extending the Technology Acceptance Model by Inclusion of Perceived Risk," *AMCIS 2001 Proceedings*, Paper 148.

Ferreras, L. E. 2014. "The Driverless City," *Civil Engineering* (84:3), pp. 52-55.

Fornell, C., and Larcker, D. F. 1981. "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of Marketing Research* (18:1), pp. 39-50.

Hagman, O. 2010. "Driving Pleasure: A Key Concept in Swedish Car Culture," *Mobilities* (5:1), pp. 25-39.

Hair, J. F., Black, W. C., Babin, B. J., and Anderson, R. E. 2009. *Multivariate Data Analysis*, 7th ed., Upper Saddle River, NJ: Prentice Hall.

Hair, J. F., Ringle, C. M., and Sarstedt, M. 2011. "PLS-SEM: Indeed a Silver Bullet," *Journal of Marketing Theory and Practice* (19:2), pp. 139-151.

Hallo, J. C., and Manning, R. E. 2009. "Transportation and Recreation: A Case Study of Visitors Driving for Pleasure at Acadia National Park," *Journal of Transport Geography* (17:6), pp. 491-499.

Hu, T., Poston, R. S., and Kettinger, W. J. 2011. "Nonadopters of Online Social Network Services: Is It Easy to Have Fun Yet?," *Communications of the Association for Information Systems* (29:1), pp. 441-458.

Hyden, C. 2016. "Urban Safety and Traffic Calming," in *Transport Planning and Traffic Safety: Making Cities, Roads, and Vehicles Safer,* G. Tiwari and D. Mohan (eds.), Boca Raton, FL: CRC Press, pp. 223-237.

Jonah, B. A., Thiessen, R., and Au-Yeung, E. 2001. "Sensation Seeking, Risky Driving and Behavioral Adaptation," *Accident Analysis & Prevention* (33:5), pp. 679-684.

Kent, R. 1993. "Attributes, Features and Reasons for Enjoyment of Scenic Routes: A Comparison of Experts, Residents, and Citizens," *Landscape Research* (18:2), pp. 92-102.

National Highway Traffic Safety Administration. 2008. "National Motor Vehicle Crash Causation Survey: Report to Congress."

National Highway Traffic Safety Administration. 2013. "U.S. Department of Transportation Releases Policy on Automated Vehicle Development." Retrieved 04-19, 2017, from http://www.transportation.gov/briefing-room/us-department-transportation-releases-policy-automated-vehicle-development.

National Highway Traffic Safety Administration. 2016. "2015 Motor Vehicle Crashes: Overview."

Ringle, C. M., Wende, S., and Becker, J.-M. 2015. "SmartPLS 3." http://www.smartpls.com.

SAE International. 2014. "Taxonomy and Definitions for Terms Related to on-Road Motor Vehicle Automated Driving Systems."

Ulleberg, P., and Rundmo, T. 2003. "Personality, Attitudes and Risk Perception as Predictors of Risky Driving Behaviour among Young Drivers," *Safety Science* (41:5), pp. 427-443.

Van der Heijden, H. 2004. "User Acceptance of Hedonic Information Systems," *MIS Quarterly* (28:4), pp. 695-704.

Venkatesh, V. 2000. "Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model," *Information Systems Research* (11:4), pp. 342-365.

Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D. 2003. "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly* (27:3), pp. 425-478.

Venkatesh, V., Thong, J. Y. L., and Xu, X. 2012. "Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology," *MIS Quarterly* (36:1), pp. 157-178.

Yüksel, A., and Yüksel, F. 2007. "Shopping Risk Perceptions: Effects on Tourists' Emotions, Satisfaction and Expressed Loyalty Intentions," *Tourism Management* (28:3), pp. 703-713.