Analysing Consumer Attitudes Towards Digital Innovations in Automotive Retail: Insights from an Online Survey

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ABSTRACT

Purpose: This study investigates how digital innovations reshape consumer behaviour and decision-making in German automotive retail. It highlights the impact of online shopping platforms, virtual showrooms, and AI-driven personalisation on customer engagement and purchase decisions.

Methodology/Approach: The study employs a systematic literature review and an empirical investigation via a standardised online survey and evaluates attitudes towards digital innovations in automotive retail. Statistical techniques were used for data interpretation, including linear regressions and correlation analysis.

Findings: The findings reveal significant impacts of digital innovations on consumer purchasing decisions. Key results show a strong preference for online vehicle purchasing and virtual showrooms, which are closely tied to general online shopping behaviours. Personalised recommendations and advanced digital services are identified as critical drivers for enhanced customer experience.

Research Limitation/Implication: This work provides actionable recommendations for integrating digital tools to meet evolving customer expectations. However, the findings are limited to the German market, suggesting a need for validation in Europe.

Originality/Value of paper: This study fills an important research gap by providing empirical evidence for the intersection of digital transformation and automotive retail in Germany and is one of the first studies to comprehensively uncover customer expectations of digital and hybrid retail solutions.

Category: Research paper

Keywords: automotive retail; retail; digital transformation; survey; consumer expectations

Research Areas: Management of Technology and Innovation; Strategic Quality Management

1 INTRODUCTION

German automotive retail must adapt more and more in the context of digital transformation in order to continue to successfully position itself in the market in the future (Lempp, Siegfried, 2023). German automotive distribution is indirect for almost all manufacturers, which is why independent retailers ensure vehicle distribution and service (Roßmann, 2019; Roßmann, 2023; Vogel et al., 2018; Krause et al., 2023), although manufacturers are increasingly pushing into direct distribution (Reindl, 2023; Reindl, Sosto Archimio, 2022; Rock, 2018). In Germany, automotive retailers with contractual partnerships with car manufacturers have a workforce of around 50 to 2000 employees (Schmacke et al., 2021). This gives the retailers a high economic significance (Reindl, 2023). In addition, in Germany and many other European countries, private car ownership remains one of the main modes of transport (Lempp, Siegfried, 2023), but cars are increasingly being leased and financed, which has also increased the potential shift towards online purchasing, while offline purchasing remains a security issue for many customers (Dudenhöffer, Paul, 2022). Due to their rather medium-sized company size, automotive retailers often have little to no capacity for the change towards digital transformation and are in a dependent relationship with the manufacturers (Lempp, Siegfried, 2023). In principle, the new electric car suppliers on the market, such as Tesla, BYD, and others, have taken advantage of this dilemma in the distribution of roles between retailers and manufacturers (Schirmer, 2024). Electromobility means that a complex and expensive network of workshops and retail is no longer necessary (Wisbert, Knappe, 2021). The new providers have therefore set up their own smaller service stations and showrooms and, above all, have direct access to customer data and highly digitised vehicles (Bellotti et al., 2016). At the same time, ride-hailing providers such as Uber are entering the market and posing a new challenge (Bruhn, Hadwich, 2016). For existing automotive retailers and manufacturers, this raises the question of what customers actually expect from car retailers in terms of digital innovations, urbanisation and the sharing economy (Gröschel et al., 2021) (Flügge, 2017). Urbanisation is displacing cars and, with them, the business model of automotive retail (Hachette et al., 2024).

This research not only advances the theoretical framework of digital transformation in automotive retail but also provides practical guidance for industry professionals to align their strategies with evolving consumer expectations. By integrating insights on digital technologies such as virtual showrooms and AI-driven personalisation, this study addresses a critical gap in understanding the intersection of digital tools and customer behaviour in the automotive sector.

The use of innovations in automotive retail has been shown to have a positive effect on competitiveness (Bellini et al., 2016). A significant shift is emerging in automotive retail in particular, as digital technologies such as online shopping platforms (Winkelhake, 2021), virtual showrooms, and artificial intelligence (AI) (Schmacke et al., 2021; Reindl, 2023; Liebehenschel et al., 2021) are increasingly finding their way into the industry (Reindl, 2023, Lempp, Siegfried, 2022). Against

this backdrop, the present work aims to analyse the effects of digital innovations on customer behaviour and purchasing decisions in the German automotive retail industry and to understand what specific adjustments automotive retailers need to make in order to respond effectively to these digital trends.

In order to address the objectives of this work precisely, the following research questions have been formulated:

1. How do digital innovations influence purchasing decisions and customer behaviour in German automotive retail?
2. What specific measures can automotive retailers take to effectively respond to their customers' digital needs and expectations?

These questions are of central importance for understanding the practical implications of digital technologies and for developing appropriate strategies for the automotive retail that both meet customer requirements and strengthen retailers' competitiveness.

Chapter 2 deals with the systematic literature review. It has become clear that there is little research in this area overall and that previous research is often very regionally limited. Therefore, Chapter 2 also explains how the research gap for this work has arisen and is presented. Chapter 3 then looks at the methodology, with the results then being discussed in Chapter 4. Chapter 5 then presents the conclusions, and Chapter 6 mentions the limitations of the work and the future need for research.

2 LITERATURE REVIEW

As part of this work, a systematic literature review of the current state of research in the field of automotive retail in relation to digital innovation was carried out at the beginning. The aim of the systematic literature analysis is, above all, to uncover specific research gaps and to consider any further approaches and topics that must then be taken into account in the empirical research. This transparent approach also allows other researchers to repeat this literature review. The systematic literature analysis went through the following phases: selection of the literature database and the search terms, consolidation of the results from several databases, including the inclusion and exclusion of hits, review and synthesis of the results.

2.1 Databases and search terms

The Web of Science, Scopus and Link Springer databases were searched to cover a complete search. Thus, the results are composed of peer-reviewed journal articles and scientific books. The topic of the work was divided into blocks of terms of equal rank according to the procedure of Guba (2008), whereby these are the term blocks 'automotive' and 'retail'. Due to the small number of hits anyway, further term blocks were not used. The term blocks' automotive' and 'digital*' and 'automotive' and 'innovation' each produce a high four-digit number of hits, with almost all of them relating to various automotive topics, particularly in the area of

manufacturers and production. The search was carried out in the areas of title, abstract and keywords.

The following search string illustrates the search process and the search results obtained (Figure 1). Searches for the individual terms 'automotive' or 'retail' are not shown here, as these each led to search results of several thousand hits. The search was carried out in English and in Link Springer, also in German. The search was also carried out in Scopus and Web of Science in German, but did not yield any results.

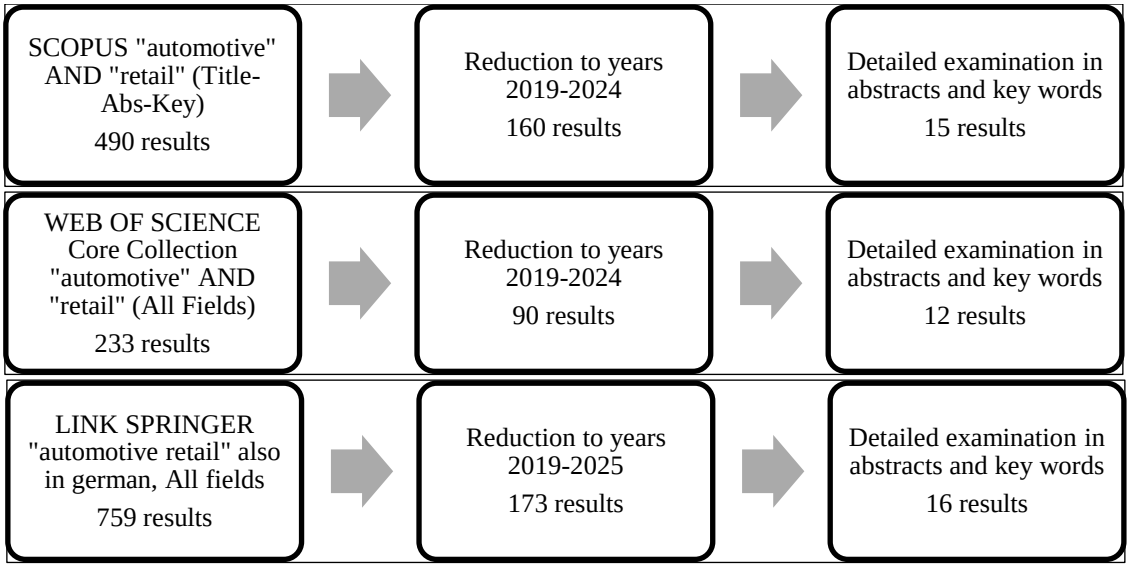

Figure 1 – Search string for "automotive "AND "retail" and number of results in the databases

2.2 Screening

A total of 1,482 hits were found after the search. The current five years were then considered based on the timeliness of the topic, which is the years 2019 to 2024. This reduced the number of results to be examined to 423 hits.

The inclusion and exclusion criteria used to review the titles and abstracts of the individual papers are presented in Table 1. In this phase, the number of results retained was reduced from 423 to a total of 43. To ensure reliability, this process was carried out independently by both authors.

Table 1 – Inclusion and Exclusion criteria

Criterion	**Inclusion**	**Exclusion**
Language	English	
Authors	All	
Subject Area	Must be focused on automotive retail	Physics or Chemistry
Study type	Empirical and theoretical studies	

2.3 Extraction and synthetic summary

The most important results of the systematic literature research are summarised in Table 2. As mentioned earlier, a total of 43 relevant articles were identified after a detailed examination of the results based on the inclusion and exclusion criteria. These 43 results were then synthesised using the methodology of Fink (2014).

Table 2 – Authors, Main Results and Research Question (Appendix A1)

Author(s)	Year	Main results	Linked to the research question
Li, Zhang, Liu	2024	Omnichannel sales is an important sales channel, but it always needs the right structure so as not to offer too many options.	2
Wen, Decosta	2024	Online vehicle sales have increased sharply due to Covid. Now retailers are struggling to maintain existing sales channels and are now figuring out what the best sales channel is.	2
Buzzavo	2023	Manufacturers are showing an increasing focus on professionalising and standardising retailer networks to improve market coverage and customer satisfaction. It is also clear that despite this development, there are significant challenges in the introduction and implementation of digital technologies and e-commerce solutions.	1
Kim, Connerton, Park	2022	With regard to the willingness to use "Buy Online & Pick up in Store" in the automotive retail sector, it can be seen that the fit between task and technology (task-technology fit) is mediated and influences the intention to use it. Personal willingness to innovate is another strong predictor.	2
Kim, Connerton, Park	2021	The study concludes that Connected, Autonomous, Shared, Electrified (CASE) has a significant impact on the automotive retailers business model.	1
Gunawan	2020	Retailers need an efficient system for fast and agile pricing.	2
Proff, Szybisty, Fojcik	2019	Automotive retailers will continue to lose profit margins due to electromobility. The integration of additional services is therefore important in order to open up new sales channels (e-fleet management, service innovations, energy-efficient products).	1
Koroth, Mazurek, Pater	2019	The number of car subscriptions will continue to increase, so retailers should focus on car subscriptions as an offer as this is a type of car rental business.	1
Mahmood, Al-Shattarat, Hamed, Al-Shattarat, Benameur, Hassanein, Tahat	2023	Environmental awareness and online vehicle purchasing will continue to increase. Urbanisation reduces the attractiveness of the car.	2
Jain, Kulkarni	2022	Automotive retailers should use augmented reality and virtual reality to have a competitive advantage in	1

Author(s)	Year	Main results	Linked to the research question
		vehicle presentation. Artificial intelligence can help with personalised offers.	
Rossmann, Schade, Burmann	2023	Automotive retailers should continue to build and emphasise their own image and brand across multiple brands in order to break away from the manufacturer's image and have a better market position in times of digital transformation.	2
Roßmann	2019	Customer brand loyalty to retailers is declining. Retailers must invest in their own image and modern sales channels.	2
Lempp, Siegfried	2023	The car is still the number 1 means of transport in Germany, but it definitely requires a more digital purchasing process.	1
Teichert, Knöchel, Lüken	2020	Retailers should increasingly rely on car subscriptions as an additional offer, as this is easy to implement due to the proximity to the car rental business.	2

Several research gaps emerge from the systematic literature analysis. In the work of Li et al. (2024), it remains unclear which specific digital offerings and channels (such as virtual showrooms or online configurators) are most effective in the automotive retail for influencing willingness to use and ultimately purchasing decisions (Sedil, 2018). Wen and Decosta (2024) conclude that different customer segments (Schmitz et al., 2018) are more likely to return to traditional purchasing behaviour in automotive sales after the COVID-19 pandemic, while empirical data, however, tends to show a growth in online sales channels. It therefore remains unclear which channel is more relevant for the future. Gröschel et al. (2021) show various development scenarios in which customers either remain traditional buyers, use car sharing or autonomous driving, or use fully flexible mobility (Kauschke, 2023; Wisbert, 2023).

Buzzavo (2023) continues to see major challenges in the implementation of digital technologies and e-commerce solutions and should therefore, according to Budde et al. (2020), also rely on new partnerships (Ternés et al., 2015). The study by Kim et al. (2022) sees the right customer approach above all as the right technology for the right vehicle purchase, but does not provide any specific information. The work of Giannelli and Hilke (2021) comes to the conclusion that car buyers are not sufficiently informed, especially when it comes to the topic of electric mobility. The second study by Kim et al. from 2021 revisited the topic of CASE (Connected, Autonomous, Shared, Electrification) and found that this is associated with a rethink for the retail, but does not mention any specific solutions. In his work published in 2020, Gunawan used the example of a large automotive retailers group to show that large retail groups in particular need to react even faster to price and demand shifts in the market in order to counteract the loss of customers. Proff et al. (2019) have shown in their work that service innovations and new business models in the context of electric mobility counteract the loss of profitability.

However, it also remains unclear which specific innovations and implementations customers expect and which are relevant for a successful implementation. The work of Koroth et al. from 2019 comes to a similar conclusion, but sees a need for further research at the national and local level. Mahmood et al. (2023) show that a strike is rather negative for the automotive retail, as customers consider whether or not they actually need a car. There is certainly scope for further research here to find out how such customers can be persuaded to buy a car with new innovations. Jain and Kulkarni (2022) see augmented reality and virtual reality as important options for the automotive industry, but it remains unclear how these technologies can specifically impact customer loyalty and behaviour. Rossmann et al. (2022, 2019) explain that multi-brand retailers need to emphasise their own image more strongly, but do not explain how this can be done. This is particularly important in times of electric mobility (Dijk et al., 2016). Lempp and Siegfried (2023) and Teichert et al. (2020) confirm that customers still primarily use cars as a means of transport, although Teichert et al. see a very good opportunity for retailers in the area of car subscriptions to expand their business model (Dudenhöffer, Paul, 2022). The research gaps mentioned underline the need for more detailed research into how digital technologies influence consumer behaviour, specifically in the automotive sector. In particular, it was shown that there is insufficient understanding of the direct influences of digital services on the purchasing decisions and the resulting behaviours of car buyers. These findings lead to the formulation of the main objective of this work: the detailed investigation of customer attitudes towards digital innovations in the automotive retail, based on an online survey.

The study is guided by two central research questions, which were developed according to the CIMO scheme by Briner and Denyer (2012):

1. How do digital innovations influence purchasing decisions and customer behaviour in the automotive retail?
2. What specific actions can automotive retailers take to effectively address the digital needs and expectations of their customers?

Seven hypotheses were developed to support these questions, covering various aspects of the influence of digital technologies on car purchases, from the importance of online shopping to the preference for advanced, AI-driven personalised services.

3 METHODOLOGY

This study focuses on the investigation of which customer expectations have to be met in the digital age in the German automotive retail. In view of the research objective of this study, empirical research was also used.

3.1 Sample and data collection

This study uses an online survey to determine the attitudes, expectations and preferences of both existing and potential automotive customers in Germany with regard to digital innovations in the automotive retail. Data was collected using a structured questionnaire that was specifically designed for a broad target group of automotive customers.

Participants for the survey were recruited through various digital channels, including social media, automotive forums, websites and email distribution lists. Care was taken to ensure a representative sample by selecting the channels carefully. The questionnaire covered both demographic (age, gender, place of residence) and financial characteristics (income bracket, purchasing power) of the participants. In addition, questions were asked about attitudes towards digital innovations in the automotive retail, which were to be answered on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). The respondents completed the questionnaire on the website www.empirio.de.

The data was analysed using the R statistical programme. Simple linear regressions and a correlation matrix were used to test the hypotheses of the study. This made it possible to examine the influences of different characteristics on each other.

The main purpose of the methodology was to evaluate which innovations are most desired by customers. The online survey, conducted between March and April 2024, aimed to capture the attitudes and expectations of 340 selected individuals in Germany regarding digital innovations in the automotive retail. This specific focus on the German and European markets made it possible to interpret the results in a targeted manner and formulate recommendations for these markets. The selection of a predominantly younger target group, with an average age of 28, reflects the intention to gain insights into the preferences and expectations of future automotive customers. This demographic focus was strategically chosen to reflect long-term trends in the automotive industry, as younger consumers are considered the main drivers of future market developments.

The gender distribution of the participants was 56.14% male and 43.86% female. The average net income of the respondents was around €2,456 per month, which provides a realistic basis for evaluating the purchasing power and financial possibilities of the target group.

The study was conducted in accordance with high ethical standards, ensuring the anonymity and privacy of the participants.

3.2 Measures

When designing the questionnaire for this study, various topics related to digital innovations in the automotive retail were carefully conceptualised. The measurement was carried out using a five-point Likert scale (1 = 'strongly disagree', 5 = 'strongly agree') and categorical questions. The contents of the questionnaire are based on previous studies and relevant literature to ensure

content validity. In addition, the questions and topics were adapted based on existing research and concepts, and validly set up according to the approach of Faulbaum (2019). The questionnaire used in this study was standardised to ensure consistency in data collection. All questions were structured and used a Likert scale to uniformly capture participants' attitudes and preferences. This enabled a systematic analysis of the data and contributed to the reliability and validity of the results by ensuring a consistent interpretation of the answers.

To further validate the content and wording of the questions, the questionnaire was subjected to an expert review. Both academic experts and industry experts from the automotive sector validated the questionnaire. This validation process included a panel of academic experts (n = 3) and industry experts (n = 2) who assessed the suitability of the questions for the intended research objectives. A pre-test was conducted in parallel, but no abnormalities were found. The questionnaire questions can be found in the appendix (A1).

This careful development and multi-stage validation ensured a high quality of the questions and the data based on them, which contributes significantly to the accuracy and reliability of the research results.

3.3 Research design and hypotheses

The questionnaire for the online survey was developed on the basis of the findings to date and the identification of research gaps.

Figure 2 – Research design

On the basis of the research design shown in Figure 2, as well as the research questions and the research gaps, the following seven hypotheses were developed:

Hypothesis 1: The more important basic online shopping is to respondents, the more important the option of buying a vehicle online is to them.

Hypothesis 2: The higher the respondents' interest in digital technologies, the higher their preference for virtual showrooms when buying a car.

Hypothesis 3: The greater the importance of personalised recommendations for respondents, the more positively they rate the use of artificial intelligence (AI) for personalised vehicle recommendations in automotive retail.

Hypothesis 4: The higher the income of respondents, the more likely they are to consider digital financing options when purchasing a vehicle.

Hypothesis 5: The more pronounced the respondents' experience with connected car services, the higher their interest in further digital services after the vehicle purchase.

Hypothesis 6: The need for mobile app use to manage vehicle functions is higher among respondents who have already had a positive experience with digital services.

Hypothesis 7: The more respondents generally use online channels and online shopping, the more important a high level of price transparency is to respondents.

Authors and their relation to the research questions and hypotheses are summarised in Table 3. The hypotheses are tested and evaluated in Chapter 4.

Table 3 – Authors, Research Question (Appendix A1) and Related Hypotheses

Author(s)	**Year**	**Linked to the research question**	**Linked to hypotheses**
Li, Zhang, Liu	2024	2	4
Wen, Decosta	2024	2	2
Buzzavo	2023	1	3
Kim, Connerton, Park	2022	2	5
Kim, Connerton, Park	2021	1	6
Gunawan	2020	2	4
Proff, Szybisty, Fojcik	2019	1	7
Koroth, Mazurek, Pater	2019	1	7
Mahmood, Al-Shattarat, Hamed, Al-Shattarat, Benameur, Hassanein, Tahat	2023	2	7
Jain, Kulkarni	2022	1	3
Rossmann, Schade, Burmann	2023	2	2
Roßmann	2019	2	4
Lempp, Siegfried	2023	1	1
Teichert, Knöchel, Lüken	2020	2	6

4 RESULTS

In the following, the hypotheses are tested, and results (Table 4 – Table 10) are discussed in a targeted manner.

Hypothesis 1

Table 4 – Testing of Hypothesis 1 in R

Coefficients:	Estimate	Std. Error	t-value	Pr(>I t I)	
(Intercept)	1.99734	0.22640	8.822	<2e-16	***
Preferonlinebuyinggeneralinsteadoffline1no5yes	0.20983	0.06219	3.374	0.000826	***

Signif. Codes: 0 `***' 0.001 `**` 0.01'*' 0.05 '.'	0.1' '1				
Residual standard error: 1.221 on 340 degrees of	freedom				
Multiple R-squared: 0.0324, Adjusted R-squared:	0.02956				
F-statistic: 11.39 on 1 and 340 DF, p-value:	0.0008258				

The p-value of the F-statistic is below 0.05, which is why the null hypothesis can be rejected. This means that H1 can be confirmed. The model makes an explanatory contribution. The result is also highly significant. It is also important to consider the multiple R-squared. In this case, the value is 0.0324. This means that the model explains around 3.24% of the variance of the dependent variable. This is a relatively small value, which is why other parameters also have a considerable influence on the dependent variable. According to the findings from hypothesis 1, it can be expected that an increase in general online purchasing behaviour will also lead to an increase in the online purchase of vehicles.

Hypothesis 2

Table 5 – Testing of Hypothesis 2 in R

Coefficients:	Estimate	Std. Error	t-value	Pr(>I t I)	
(Intercept)	1.42565	0.37456	3.806	0.000167	***
iaminterestedinnewtechnologies1no5yes	0.41357	0.08565	4.828	2.08e-06	***

Signif. Codes: 0 `***' 0.001 `**` 0.01'*' 0.05 '.'	0.1' '1				
Residual standard error: 1.116 on 340 degrees of	freedom				
Multiple R-squared: 0.06417, Adjusted R-squared:	0.06142				
F-statistic: 23.31 on 1 and 340 DF, p-value:	2.084e-06				

The p-value of the F-statistic is below 0.05. This means that H2 can also be confirmed. The multiple R-squared here is around 6.42%. Hypothesis 2 concludes that increasing interest in new technologies will also increase customer interest in virtual showrooms. Retailers should, therefore, increasingly integrate these. Almost 93% of respondents in the survey also stated that they are open to and interested in new technologies. This is presumably also due to the younger target group.

Hypothesis 3

Table 6 – Testing of Hypothesis 3 in R

Coefficients:	Estimate	Std. Error	t-value	Pr(>I t I)	
(Intercept)	2.66458	0.19957	13.352	<2e-16	***
personalrecommdbyaihaveposiimpacarsal1no5yes	0.22805	0.05881	3.878	.0.000126	***

Signif. Codes: 0 `***' 0.001 `**` 0.01'*' 0.05 '.'	0.1' '1				
Residual standard error: 1.224 on 340 degrees of	freedom				
Multiple R-squared: 0.04236, Adjusted R-squared:	0.03954				
F-statistic: 15.04 on 1 and 340 DF, p-value:	0.0001264				

Hypothesis 3 can also be confirmed. The model makes an explanatory contribution. The result is also highly significant. According to hypothesis 3, artificial intelligence is particularly interesting for personalised vehicle recommendations.

Hypothesis 4

Table 7 – Testing of Hypothesis 4 in R

Coefficients:	Estimate	Std. Error	t-value	Pr(>I t I)	
(Intercept)	3.309e+0	9.237e-02	35.827	<2,43e-11	***
netincomepermonth	-1.53e-05	2.823e-05	-0.541	0.589	

Signif. Codes: 0 `***' 0.001 `**` 0.01'*' 0.05 '.'	0.1' '1				
Residual standard error: 1.129 on 340 degrees of	freedom				
Multiple R-squared: 0.00086, Adjusted R-squared:	-0.002079				
F-statistic: 0.2925 on 1 and 340 DF, p-value:	0.589				

Hypothesis 4 was rejected. This leads to the conclusion that modern, digital financing solutions are not only of interest to people with high incomes.

Hypothesis 5

Table 8 – Testing of Hypothesis 5 in R

Coefficients	Estimate	Std. Error	t-value	Pr(>I t I)	
(Intercept)	1.45956	0.19137	7.627	<2,43e-11	***
connectedcarsincreasevalueforme1no5yes	0.51644	0.05213	9.906	<2e-16	***

Signif. Codes: 0 `***' 0.001 `**` 0.01'*' 0.05 '.'	0.1' '1				
Residual standard error: 0.9826 on 340 degrees of	freedom				

Coefficients	Estimate	Std. Error	t-value	Pr(>I t I)	
Multiple R-squared: 0.224, Adjusted R-squared:	0.2217				
F-statistic: 98.13 on 1 and 340 DF, p-value:	<2.2e-16				

Hypothesis 5 is accepted and confirmed. The result is highly significant, and R squared also amounts to a value of 22.40%. Hypothesis 5 also confirmed that, in addition to connected car services, respondents also want other digital offers after the purchase.

Hypothesis 6

Table 9 – Testing of Hypothesis 6 in R

Coefficients	Estimate	Std. Error	t-value	Pr(>I t I)	
(Intercept)	1.93897	0.16478	11.77	<2e-16	***
positiveonlinegeneralwanttobuycarsonline1no5yes	0.44336	0.05137	8.63	2.3e-16	***

Signif. Codes: 0 `***' 0.001 `**` 0.01'*' 0.05 '.'	0.1' '1				
Residual standard error: 1.01 on 340 degrees of	freedom				
Multiple R-squared: 0.1797, Adjusted R-squared:	0.1773				
F-statistic: 74.48 on 1 and 340 DF, p-value:	2.39e-16				

Hypothesis 6 is accepted and confirmed. The result is also highly significant. R squared is 17.97%.

Hypothesis 7

Table 10 – Testing of Hypothesis 7 in R

Coefficients:	Estimate	Std. Error	t-value	Pr(>I t I)	
(Intercept)	4.23919	0.13371	31.705	<2e-16	***
preferonlinebuyinggeneralinsteadoffline1no5yes	0.02451	0.3673	0.667	0.505	

Signif. Codes: 0 `***' 0.001 `**` 0.01'*´ 0.05 ´.´	0.1 ´ ´1				
Residual standard error: 0.721 on 340 degrees of	freedom				
Multiple R-squared: 0.001309, Adjusted R-squared:	-0.001629				
F-statistic: 0.04455 on 1 and 340 DF, p-value:	0.5049				

Hypothesis 7 is rejected as the p-value of the F-statistic is significantly higher than 0.05. However, the result is very interesting in this respect and contradicts a previous trend in the digital age. The desire for high price transparency and the general use of online stores do not go hand in hand in a linear fashion. This means that the automotive retail definitely has the opportunity to achieve good returns in online retail.

Essentially, the results show that almost all of the previously formed hypotheses can actually be confirmed and that the respondents are generally very interested in the topic of digitalisation and modern vehicle purchasing. On the one hand, this is a very interesting result for the study, but on the other hand, it contradicts the aim of this study to look at more specific measures. For this reason, the results of the question as to whether respondents would generally buy a car online were used as the dependent variable. A Pearson correlation matrix was then developed on this basis, as the variables are metric and the requirements of bivariate normal distribution are met. This allows the respective trends to be prioritised again according to importance, whereby it was possible to list the respective measures precisely according to the priority of customer wishes within the scope of this work. Specifically, according to the above analysis, retailers should focus on the following points. The following parameters were therefore tested for correlation in relation to the basic online purchase of a car: virtual showrooms, personalised vehicle recommendations through AI, digital financing options, digital contract signatures, chatbots and digital customer support, transparent customer reviews, connected car services, mobile apps for vehicle management, AR for vehicle customisation during configuration and high price transparency when purchasing a vehicle. Table 11 shows one column of the correlation matrix.

Table 11 – Correlation matrix from R

	iwouldbuycaronlineifpossible1no5yes
iwouldbuycaronlineifpossible1no5yes	1
preferonlinebuyinggeneralinsteadoffline1no5yes	0.180003281
virtualshowroomsaregoodalternative1no5yes	0.379020860
Personalrecommendationsbyaihavepositiveimpact1no5yes	0.159084871
digitalfinancingoptionsimportantforcarbuying1no5yes	0.279672793
digitaldocumentsigningattractive1no5yes	0.300071546
ilikechatbotsanddigitalcustomersupport1no5yes	0.001346471
transparentcustomerfeedbackisimportantformydecision1no5yes	0.152084423
connectedcarsincreasevalueforme1no5yes	0.322128825
appforcarconfigurationsattractive1no5yes	0.399630011
ARforcarconfigurationsattractive1no5yes	0.222883817
highonlinepricetransparencyimportantforcarbuying1no5yes	0.197689030

The table shows that, in the survey, customers primarily stated that the more willing they are to buy a vehicle online, the more important an app for managing and using a car is to them. This is followed by virtual showrooms being very important to customers. This is followed by customer expectations that customers see added value through connected car functions.

As part of the survey, respondents were also asked whether they are generally interested in buying a car online. The Figure 3 shows the response in the form of agreement with this statement.

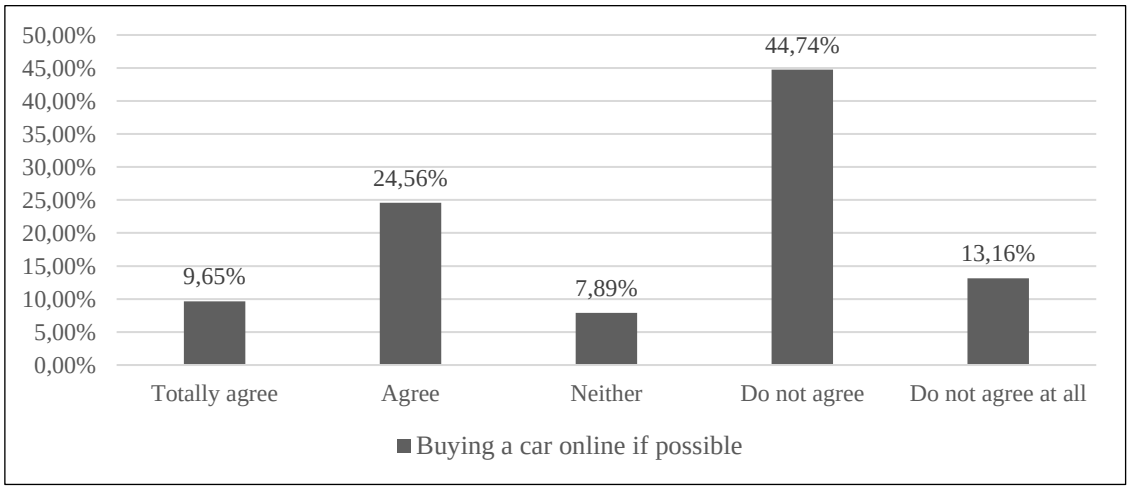

Figure 3 – Results from the survey to the question: Buying a car online if possible

In view of the younger age of the respondents, it is important to emphasise that only around a third of respondents would buy their car online. However, it should also be noted at this point that similar studies on general online purchasing behaviour were conducted a few years ago. Even then, many customers could not imagine buying a general retail product online. Today, almost all customers buy products online, which is why online retail has developed into a constant and unstoppable sales channel. A similar development can also be expected for the online sale of vehicles. The market entry of new manufacturers and providers is likely to lead to a shift in purchasing behaviour. This raises the question of whether customers could migrate away from the established manufacturers and opt for new, more digital and cheaper manufacturers and vehicles. Especially in the early days of online retail, it was able to attract and win customers with low prices. Something similar could now happen in automotive retail if manufacturers do not properly recognise this danger. A realisation along the lines that it is a good thing that so many customers still want to buy their vehicle offline would therefore be a bad realisation. More than a third of those surveyed would already buy their vehicle online, which is also a high proportion. These customers in particular are therefore easier for new vehicles and manufacturers to appeal to, as new manufacturers often only offer an online purchasing process. Established manufacturers and retailers must therefore already offer suitable channels for these online-savvy customers and also provide suitable models and services for those who are still hesitant in order to convince them to buy online. At the same time, however, the existing, traditional structures should also be retained for these customers in order to avoid creating mistrust and disappointment among customers. As mentioned at the beginning, it is therefore important to take the right measures for the right customer groups. The right measures have already been mentioned for online-affine customers. For customers who are currently still offline-affine, the existing

channels should not be deteriorated or neglected. To convince these customers to buy online, manufacturers and retailers should also consider the following aspects:

Facilitated conversion offers and hybrid experiences: Online purchase process with test drives and/or on-site consultation

Click and collect: A mixture of online purchases with the option to collect the vehicle in person and final acceptance at a retailer. This gives customers peace of mind that they are not solely reliant on digital interactions and can complete the purchase in a familiar environment.

Comprehensive warranties and return policies: Extended warranties and customer-friendly return policies, including satisfaction guarantees

Personal advice and customer support: Video consultations and live demos with trained sales advisors. These measures aim to increase confidence in the online purchasing process by combining the benefits of the online experience with the security and familiarity of traditional purchasing processes. Sceptics can be addressed with such hybrid offers, and strong guarantees and barriers can be broken down to increase the acceptance of online vehicle purchasing.

5 CONCLUDING SUMMARY

This study comprehensively explored the transformative impact of digital innovations on customer behaviour and purchasing decisions in German automotive retail. The findings highlight the pivotal role of digital technologies in shaping modern sales strategies. Notably, a strong correlation was identified between a general preference for online shopping and a higher willingness to purchase vehicles online, emphasising the need for automotive retailers to integrate digital sales platforms as core components of their business models.

5.1 Theoretical Benefits

This research significantly advances the theoretical understanding of the relationship between digital transformation and consumer behaviour in automotive retail. This study enriches existing literature on digital transformation in the automotive sector by empirically demonstrating how technologies such as virtual showrooms and AI-driven personalisation influence purchasing decisions. It provides a robust framework for analysing customer preferences and digital engagement, offering a theoretical basis for further research on omnichannel strategies and the integration of online and offline customer experiences. Additionally, this study highlights the importance of understanding the demographic nuances, particularly the growing preference for digital tools among younger, tech-savvy consumers, thus contributing to theories of consumer behaviour in digitally dominated markets.

5.2 Practical Benefits

The study offers actionable insights for practitioners in the automotive retail industry, presenting a clear roadmap for adapting to the digital needs of modern consumers. Key practical benefits include:

1. Customer-Centric Solutions: Identifying tools such as transparent reviews, digital consultations, and mobile apps for vehicle management as critical to enhancing customer satisfaction and trust in online purchasing.
2. Enhanced Sales Strategies: Emphasising the value of virtual showrooms and AI-driven personalisation to improve customer engagement and streamline the decision-making process.
3. Omnichannel Integration: Providing a blueprint for integrating digital and physical sales channels to create seamless customer experiences, aligning with changing consumer preferences.

By addressing these practical considerations, automotive retailers can better meet customer expectations, foster loyalty, and strengthen their competitive position in an increasingly digital market.

5.3 Research Questions

Research Question 1: How do digital innovations influence purchasing decisions and customer behaviour in automotive retail?

This study confirmed the direct impact of digital tools on customer purchasing behaviour, particularly the alignment between online shopping preferences and vehicle purchases. It underscores the need for retailers to invest in technologies that enhance customer engagement, offering empirical evidence to guide future business strategies.

Research Question 2: What specific measures can automotive retailers take to effectively address the digital needs and expectations of their customers?

Key measures include transparent reviews, hybrid sales approaches, and the use of advanced digital tools. These strategies increase trust and satisfaction, offering practical guidelines for automotive retailers to navigate digital transformation successfully.

Conclusion

This study contributes significantly to the academic and practical discourse by identifying digital features that influence customer satisfaction and loyalty, filling a crucial gap in the literature. It underscores the importance of an omnichannel strategy and highlights the potential for digital innovations to enhance competitiveness in the automotive retail sector. The results emphasise that automotive retailers must transition from reactive to proactive digital strategies, leveraging customer-centric digital tools to deliver a comprehensive and satisfying purchasing experience.

In summary, the integration of digital innovations into automotive retail requires a nuanced understanding of customer behaviour and technological possibilities. This study bridges the gap between theory and practice by providing a detailed analysis of the role of digital technologies in shaping customer experiences and offers a foundation for future research and practical applications in this evolving field.

6 LIMITATIONS AND FUTURE RESEARCH FIELDS

The results and implications of this work contribute to the field of digital automotive retailing, with a specific focus on customisation and the use of digital sales platforms. However, the present study has certain limitations that offer suggestions for future research. The sample of respondents is limited to the German market. In the future, it would be useful to test the validity of the proposed framework in automotive retailers operating in different European countries. By using multinational data, comparisons could be made to identify possible patterns, similarities and differences.

Furthermore, other research areas could be developed. It would be interesting to examine the main drivers and enablers of digital innovation in automotive retail in more depth. In this context, a case study approach could be helpful as it would provide qualitative data and insights that could support the results of this study.

Finally, digitalisation perspectives in automotive retailing can be further developed to foster even more customer- and sustainability-centric solutions, especially in the context of a paradigm shift towards a more comprehensive digital customer experience. These aspects offer a wide range of opportunities for future research aimed at optimising the adoption and implementation of digital technologies in the automotive industry.

APPENDIX

A1 – Questions from the online survey

No	Question
1	I generally prefer shopping online to shopping in physical stores. (agreement)
2	I am open to and interested in new digital technologies. (agreement)
3	I would buy a vehicle online if I had the option. (agreement)
4	Virtual showrooms are an attractive alternative for exploring cars without having to be physically present. (agreement)
5	Personalised vehicle recommendations by AI would positively influence my car purchase. (agreement)
6	Digital financing options are important to me when buying a car. (agreement)
7	The option to sign documents and contracts digitally is attractive to me. (agreement)
	I appreciate the availability of chatbots and digital customer support. (agreement)
8	Transparent customer ratings and feedback are important to me when making decisions. (agreement)
9	Connected car services increase the value of a vehicle for me. (agreement)
10	Using a mobile app to manage my vehicle is important to me. (agreement)
11	I am interested in digital innovations that contribute to environmentally friendly mobility. (agreement)

No	Question
12	The ability to visualise vehicle customisations and features through AR makes a car more attractive to me. (agreement)
13	My willingness to complete future vehicle purchases entirely online increases with my experience of online services. (agreement)
14	Digital workshop services and online appointment booking would increase my satisfaction with after-sales service. (agreement)
15	I would use apps to optimise vehicle use or reduce CO2 emissions. (agreement)
16	High price transparency is very important to me when buying a vehicle online. (agreement)
17	I am willing to pay more for sustainably produced vehicles if they are digitally supported (e.g. by apps to optimise consumption). (agreement)
18	I am willing to pay more for digital services in a car (agreement)
19	I am willing to pay more for sustainable vehicles (agreement)
20	I am satisfied with the after-sales service of my automotive retailer (agreement)
21	Transparent customer reviews on the retailer´s website increase my trust in the retailer (agreement)
22	My previous experiences with digital services (e.g. online banking, online shopping) are mostly positive. (agreement)
23	It is important to me that my vehicle is made more environmentally friendly by digital technologies. (agreement)
24	The possibility of customising and visualising my vehicle using augmented reality (AR) is attractive to me. (agreement)
25	My positive experiences with online services increase my willingness to complete future car purchases entirely online. (agreement)
26	I would prefer digital workshop services and online appointment bookings for maintenance and repair work, based on my positive experiences with digital services in other industries. (agreement)
27	How old are you?
28	What is your gender?
29	What is your net income per month?
30	What is your current employment status?
31	What is your highest educational qualification?
32	What is your marital status?

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CONFLICTS OF INTEREST

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