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ANALYSIS OF FACTORS INFLUENCING CAR PURCHASES ON THE INTERNET BY AUTOMOTIVE CUSTOMERS IN GERMANY[*]

Robert von Böhlen ¹*, Iveta Šimberová ²

1,2 Brno University of Technology, Kolejní 2906/4 612 00 Brno, Czech Republic

*E-mails: *¹ 232577@vutbr.cz; ² simberova@fbm.vutbr.cz*

Abstract. This research aims to investigate various factors influencing the decision of automotive customers in Germany to buy a car on the Internet. The empirical study conducted mainly examines the influence of multiple factors such as employment status, gender, desire for advice when buying a car, price sensitivity, previous online vehicle purchasing experience, familiarity with online vehicle platforms, the intensity of general online shopping and age of the respondents on the degree of online vehicle purchasing behaviour. The scientific literature has produced only a few concrete studies in this regard. It is still being determined which factors are decisive for customers to buy their car online. Online vehicle purchasing behaviour was approximated using a Likert scale. Over 250 participants were surveyed in this process. The results were analysed by contrasting each influencing factor with online vehicle buying behaviour as part of a simple linear regression model. The T-test was then used to test each hypothesis for significance. A multivariate linear regression model was then constructed and retested with the significant influencing factors obtained. This showed that employment status, desire for advice when buying a car, having already made an online vehicle purchase, knowledge of online vehicle platforms, and general online shopping are (highly) significant and, therefore, strongly influence the online purchase decision of automotive customers in Germany. Future research should focus on comparing the results of this study for Germany and other more digital countries.

Keywords: automotive industry; automotive retail; digital transformation; customer behavior

1. Introduction

The topic of online vehicle purchasing has become increasingly important in recent years. Yet the automotive industry is still considered a rather traditional sector and has always relied on an indirect sales channel via economically independent dealers. German automotive brands such as Audi, BMW, Mercedes-Benz and

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Volkswagen, in particular, are known for relying on an established dealer network. However, since the increase in digitalisation in all areas of life, it has become increasingly apparent that the automotive industry's business model needs some innovations anyway (Winkelhake, 2021). Above all, digitisation and connectivity must be incorporated into the car. Autonomous driving, shared mobility, and electromobility will continue to change the business model significantly anyway (Budde et al., 2020; Koroth et al., 2019). In the meantime, manufacturers have considerably expanded their digital offerings in cars.

Nevertheless, sales remain very traditional and are almost wholly separated between analogue and digital at initiating and concluding a purchase. Information and purchase initiation are now almost wholly online. On the other hand, the investment is almost entirely analogue when the purchase contract is signed at the retailer's premises. Customers buying behaviour, in particular, has changed fundamentally in recent years so that customers now expect a digital buying experience and the conclusion of the contract online (Bruhn & Hadwich, 2022a; Budde et al., 2020).

2. Theoretical background

The sale of vehicles is part of the automotive value chain and, in this context, is to be regarded as the part that ultimately covers the entire first areas of value creation since sales generate revenues. This insight already indicates the priority that is given to sales. Manufacturers and dealers have worked to sell as many vehicles as possible for years. In the context of the Corona pandemic and the worldwide shortage of microchips, this changed for the first time, focusing no longer on the pure number of vehicles sold and sales but profit margins. In the process, the pandemic also once again increased the utility value of the car. Overall, this shows that the car as a means of transport is still significant in practice, despite challenging political debates regarding new mobility concepts and the issue of sustainability (Bruhn & Hadwich, 2022a; Dispan, 2021).

In Winkelhake's opinion, the automotive industry is relatively slow and sluggish. The development cycles of new vehicle models are around 4-6 years. The car is becoming increasingly unimportant as a status symbol for young customers. In parallel, the increase in Internet use, particularly in online vehicle configurators and information procurement, is increasing among young customers (Dispan, 2021). Only now, the barriers to market entry have been very high for new competitors due to the high development costs of new vehicle models, complicated technology and costly maintenance. The homogenisation of vehicles and their technology, particularly in electromobility, reduces the complexity of the product and the after-sales challenges. At the same time, this simplification makes it easier for new competitors to enter the market. New competitors have the primary advantage of independent of established manufacturers' existing sales networks and channels. According to Dudenhöffer, indirect sales are one of the most expensive sales channels and account for around 10% of the price of new cars. According to Stenner's analysis, the costs of online vehicle sales are only around 3-4% of the purchase price (Stenner, 2015). The advantages of indirect sales are manageable and lie primarily in reducing purchase risks for the customer, handling the purchase and sale of vehicles, and handling warranties and workshop visits. Stirzel and di Nisio also confirm the customers' desire for risk minimisation in their work (Stirzel & Di Nisio, 2021). The first new sales models and usage models, such as car subscriptions or Tesla's direct sales, clearly show that a complex and expensive indirect sales network is no longer necessary and that vehicles can also be purchased digitally (Jannsen et al., 2019; Kim et al., 2021; Winkelhake, 2021). Incumbent manufacturers have switched to an agency model, especially for electric car sales, to reduce challenges for retailers (Dispan, 2021). If electromobility continues to grow, direct sales via manufacturers will also increase and become more critical. According to Winkelhake, it can also be assumed that new technologies will account for around 30% of total sales by 2030 (Winkelhake, 2021). According to Bartczak's study, any digital change in existing business models increases companies' competitiveness (Bartczak, 2022).

In their theses, Becker and Völsgen also address that all-around carefree packages are gaining importance, which is why actual vehicle ownership is also becoming increasingly unimportant. Ceranic et al. and Dudenhöffer and Paul also confirm this in their studies (Ceranic et al., 2018; Dudenhöfer & Paul, 2022). The declining desire for vehicle ownership is at odds with the advantages mentioned above of purchasing a vehicle through a car dealer, which reduces them and makes the role of the dealer less important (Binckebanck, 2011). Dudenhöffer and Paul, Winkelhake, Birk et al., Dudenhöffer, Birk et al., and Inampudi et al. all independently confirm that the number of dealers will continue to decline (Birk et al., 2020; Dudenhöfer & Paul, 2022; Inampudi et al., 2019; Jannsen et al., 2019; Winkelhake, 2021). According to the analysis by Dudenhöffer and Paul from 2022, it also shows that car subscriptions, in particular, can be a perfect transition solution from previous offline sales to digital online sales (Dudenhöfer & Paul, 2022). According to Reindl, these subscriptions also clarify that new car customers must be mobile and flexible (Reindl, 2017). Winkelhake and Dispan also confirm this growing trend toward flexibility in vehicle purchasing and see those cars must fit more with people's life needs (Dispan, 2021; Winkelhake, 2021).

Large Internet portals have so far conducted vehicle sales online as a referral to the dealer. However, the actual conclusion of the sales contract still takes place offline. In the last two years or so, and the wake of the Corona pandemic, manufacturers have established their own initial online sales channels through which customers can now purchase their vehicles almost entirely online. Dispan adds to this the aspect that manufacturers should also demonstrate system leadership (Dispan, 2021). In parallel, the pandemic has once again highlighted the utility of the car as an individual means of transport (Dudenhöfer & Paul, 2022). This contrasts with Reindl's 2016 findings that the vehicle will increasingly become part of multimodal mobility, or intermodal mobility, according to Ceranic et al., as a result of which customers will tend to become mobility customers, and the automobile will become part of this mobility mix (Ceranic et al., 2018; Reindl, 2017).

Concerning actual online vehicle purchases, Budde, Schmacke and Terstiege (2020) addressed the fact that digital purchasing is particularly relevant for younger customers and that they are the leading target group for this. Today's younger customers are the future car customers and therefore have a changed expectation of the vehicle purchasing process at its core. In this context, Bacher explains that the vehicle purchase should be as simple as buying a book (Bacher, 2020; Budde et al., 2020). According to Reindl, past studies have shown that the number of digital options, vehicle equipment and information available on the Internet has often overwhelmed customers, resulting in many inquiries. It is, therefore, necessary to also narrow down the model variety and quantity of equipment, as online advice is significantly less than in stationary car dealerships. This is independent of deciding on a vehicle purchase, leasing or a car subscription (Reindl, 2017). According to the study by Fau Dudenhöffer, however, it is also apparent that as customers' desire for advice increases, the discount on the Internet must increase to decide to buy a vehicle over the Internet. Enterprises encounter challenges related to new and modern consultation (Chen et al., 2022). Ms. Dudenhöffer's 2012 study analysed that a discount level of 8% is sufficient for customers switching to the Internet (Dudenhöffer, 2012). Dispan ads in his analysis that Internet platforms, in particular, also significantly increase transparency in vehicle purchasing. Bacher adds that pricing should be uniform across all channels (Bacher, 2020). According to Dispan, manufacturers' share of direct sales has intensified significantly in the past two years, with omnichannel sales also being essential (Dispan, 2021). In Becker's view, the growing importance of customer data should also be addressed in this context, with future revenues dependent on customer data (Becker, 2021). According to Bacher, customer data should first be obtained and used in the first place (Bacher, 2020).

Concerning the actual online purchasing behaviour of customers, there are already some studies on the basic assessment of customers wanting to buy their car online. The first studies and surveys on this are from 2012 to 2014. A study from 2014/2015 by the management consultancy Capgemini clarified that around 44% of customers are prepared to buy their car online in principle. The results were compared with a previous study from 2008/2009, where the proportion was just as high (Parment, 2016). Birk et al. also assume that the proportion of customers who want to buy their vehicles online will continue to rise in the coming years (Birk et al., 2020). The

current literature and science reflect that the willingness of customers to buy their cars online is there. However, there is still a predominant need for possible online purchasing options. Traditional stationary sales predominate, and manufacturers see dealers as an essential sales channel, especially concerning the high sales targets in pure unit numbers. As a result of the Corona pandemic and the shift, as mentioned above by manufacturers from sales targets to strongly profit-oriented corporate management, Internet sales are becoming much more of a focus, as the manufacturers themselves can then obtain customer data in particular, sales costs can be significantly reduced, and the manufacturers themselves can completely control pricing for vehicle sales (Berger & Rechenbach, 2015; Börjesson, 2021; Dudenhöfer & Paul, 2022; Inampudi et al., 2019). Therefore, the main objective of this research is to determine which factors are decisive for customers to buy their cars online.

Key factors for online car buying

According to scientific studies, customers' decision to buy their car online correlates with several factors. However, only one concrete study has analysed which factors are decisive for online vehicle purchases. This is the study by the author Dudenhöffer from 2010, which analysed which factors are decisive for the Internet purchase of a car. She published the results of the survey in both 2012 and 2014. The factors that emerged from this study and also from further findings in the course of the literature research for this thesis are those listed below, which will be further updated in the course of this research work (Dudenhöffer & Dudenhöffer, 2014; Dudenhöffer, 2012):

(1) Employment status: According to the findings, employment status is a decisive factor in whether customers would buy their car online or not. It can generally be assumed that people who decide to buy a car also usually work and have a corresponding income or otherwise have savings they can live off of (Dudenhöffer, 2012).

(2) Gender: According to the findings, men, in particular, are still intensely interested in an emotional vehicle buy. The factors of engine performance and image continue to play an important role. This study showed that women take a much more rational view of cars than men. More than half of men are therefore prepared to spend more money on a vehicle with an extremely high image, whereas this figure is only around 40% for women. This shows that gender does make a difference when it comes to buying a car. (Bratzel, 2014). Nevertheless, Dudenhöffer's study concludes that men are more likely to migrate to the Internet than women, as women generally want more advice (Dudenhöffer, 2012).

(3) Desire for advice when buying a car: According to Reindl from 2017 and Diez from 2015, the high level of recommendation required for automobiles as a product must be considered in the context of sales. As a rule, a vehicle purchase is often associated with a vehicle sale as a trade-in. Therefore, the mobility solution for the customers by the car dealerships is currently almost a continuing intensive consulting process. In this context, it is crucial to note how essential customers consider the aspect of advice to assess whether direct purchase via the Internet is possible and reasonable for customers (Reindl, 2017). Another study showed that to improve digitisation within the company, greater emphasis must be placed on novel digital technologies (Sliwa et al., 2021).

(4) Favorable price or good offer: The basic approach of customers is always to pursue a favourable purchase price. In doing so, homo economicus always strives for an optimal relationship between price and performance. As previously mentioned, the Internet has significantly increased transparency in vehicle purchasing. As a result, the digital comparison of offers has become very important for many customers, leading them to compare offers and prices much more effectively. This makes it increasingly difficult for dealers to enforce their high prices, which they need to cover their costs. Given the above aspects, the question arises about how customers' price sensitivity and online buying correlate (Reindl, 2017). According to Dudenhöffer and Dispan, the major purchasing platforms are taking advantage of the new purchasing options such as leasing, financing or car

subscriptions in terms of lower purchase prices and better cost planning (Dispan, 2021; Dudenhöfer & Paul, 2022).

(5) Online vehicle purchases already made: The proportion of customers who bought their last vehicle online and thus gained substantial purchasing experience remains low but is growing steadily. The study, as mentioned above by Dudenhöffer concluded in 2010 that 7.7% of respondents had already bought a car over the Internet. The decisive factor here was that a first-time online vehicle purchase also leads to further online purchases (Dudenhöffer, 2012).

(6) Knowledge of online vehicle purchasing platforms: In her study, Dudenhöffer assumes that the influence of online vehicle brokerage platforms has an impact on whether customers decide to buy a vehicle online or not. In this context, the platforms pursue the goal of either carrying out sales for the dealer so that the dealer only has to carry out the physical handover of the car. Alternatively, the purpose of the platforms is to establish contact between the dealers and the customers. In the long term, however, the platforms will change their business model to become even more customer-focused and tap into a more extensive process of value creation in sales. According to Kollmann, the marketplaces skim off the generated added value via various sources of revenue (Dudenhöffer, 2012; Kollmann, 2022). Kim et al. confirmed in their Automotive Retail Study in 2022 that today's omnichannel distribution, in particular, affects customers who are already using convenient solutions to continue to be willing to use suitable solutions for shopping and purchasing, thus maximising their convenience and benefit (Kim et al., 2022). In their analysis, Mosler et al. point out that the automotive industry has followed the same business model for years, which now requires a radical rethink (Meinhardt & Pflaum, 2019).

(7) Intensity of general online shopping: In her study, Dudenhöffer also concluded that purchasing a car via the Internet depends at a 95% level on whether the customer also generally uses online shopping a lot. This means that available online shopping also influences the willingness to buy a car over the Internet (K. Dudenhöffer, 2012). According to the study by Kim et al. from 2021, the changes in digitisation and the upcoming disruptions in online sales will not stop in the automotive industry. Therefore, the new options and possibilities will also affect the automotive retail sector. Kim et al. also conclude that a systematic business foresight process should be developed to improve the survival of organisations in a rapidly adapting environment (Kim et al., 2021). Deges describes in his analysis that the blending of online and offline activities of retailers and manufacturers has also been increasing for years, with online retailers entering the offline business and offline sales shifting heavily to digital anyway. In parallel, online shopping and transparent digital price comparison have become ubiquitous and almost cross-sectoral (Deges, 2020).

Particularly concerning the study by author Dudenhöffer from 2010, this article will again go into detail and compare it (Dudenhöffer, 2012).

The decision to car buying online or offline

Whether to buy a vehicle online or via a conventional dealer depends at least on the factors mentioned above. At the same time, there is no standardised measurement methodology or standardised catalogue of questions to evaluate what the purchase decision for or against an online purchase depends on. It is, therefore, also difficult to draw comparisons with other studies, although it should be noted that this research compares with the study and research by Dudenhöffer from 2010 (Dudenhöffer, 2012). The measurement of the decision of a car purchase is thereby dependent on many personal choices of the customer. Nevertheless, some correlations and dependencies are decisive for how the customer buys. These are investigated in the context of this research work.

3. Research objective and methodology

The research objective is to identify which factors greatly influence or are highly significant for customers when buying a vehicle online. The following approach was used to achieve the research objective. In the following, the hypotheses that have emerged from the literature review and influence customers' online vehicle purchase behaviour according to the research and research conducted so far are first formulated. Based on the formulation of the research hypotheses, the questionnaire for the online survey was then constructed. In this process, Likert scales with the values 1-7 were elaborated to answer the questions. The questionnaire was then distributed and mailed to thus reach the most significant number of participants. The results were then contrasted concerning each hypothesis in a simple linear regression model to the stated online vehicle purchasing behaviour. Each hypothesis was then tested for significance. The resulting significant influencing factors were then contrasted into a multivariate linear regression model and tested again. The obtained significant results were then incorporated into the final results.

Hypotheses
Concerning the factors influencing online vehicle purchases mentioned in Chapter 2 and the further state of research, the seven individual factors will now be examined. The following hypotheses will be formulated and tested:

Employment status
Hypothesis 1 (H1): People with an employment relationship are likelier to buy their car online than those without an employment relationship. This hypothesis assumes that people with an employment relationship are more likely to use online media or obtain a company car that they put together online than people who do not have an employment relationship. It also assumes that people with an employment relationship use the advantages of online shopping in terms of time savings (Gehrckens et al., 2013).

Gender
Hypothesis 2 (H2): Men are likelier to buy their cars online than women. This hypothesis examines the influence of gender on purchasing behaviour. Kempe also confirmed this in his study and concluded that men are more likely to buy online and spend more money online than women (Kempe, 2011). It should also be noted that gender diversity was not examined here, as no one indicated that he or she was diverse during the survey.

Car purchase advice
Hypothesis 3 (H3): The more important advice is to customers when buying a car, the less likely they are to buy it online. This hypothesis examines the relationship between advice and online purchasing. One of the main problems in online purchasing is still the provision of a high and excellent level of recommendation. However, according to Möhlenbruch et al., this is still generally the case in stationary retailing (Möhlenbruch et al., 2016). Customers who want a high level of advice are more likely to buy at a static location or a car dealership. In their studies, Dudenhöffer and Del Don conclude that good advice usually occurs on-site (Dudenhöffer, 2012; Seidel, 2015).

Car price
Hypothesis 4 (H4): The more price-sensitive customers are concerned about vehicle prices, the more likely they are to buy online. This hypothesis examines the connection between online vehicle purchasing behaviour and customers' price sensitivity. Both the studies by Dudenhöffer and Ternès et al. conclude that customers are more likely to buy on the Internet if they are price-sensitive, as customers generally perceive prices on the Internet as being more favourable (Dudenhöffer, 2012; Ternès et al., 2015).

Already bought online
Hypothesis 5 (H5): Customers who have made a one-time purchase online will continue to buy their car online. The hypothesis states that customers who have switched from brick-and-mortar retail to online vehicle purchasing for the first time will no longer be returned to brick-and-mortar retail (Dudenhöffer, 2012).

Knowing online car platforms
Hypothesis 6 (H6): The more customers are aware of online vehicle platforms, the more likely they are to purchase their vehicle online. This hypothesis assumes a positive relationship between online vehicle platforms and online vehicle purchases. In this context, it can be considered that the platforms reduce uncertainty in online vehicle purchasing (Dudenhöffer, 2012).

General online shopping
Hypothesis 7 (H7): The more likely customers are to store online in general, the more likely they are to buy their car online. This hypothesis states that the intensity or affinity for available online shopping positively influences purchasing a vehicle online (Dudenhöffer, 2012).

Age
Hypothesis 8 (H8): The younger customers are, the more likely they are to buy their car online. This hypothesis states that younger customers would likely buy their vehicles online (Ternès et al., 2015).

Data collection
A questionnaire with 34 questions was prepared for data collection, although only 19 of the 34 questions were relevant to this study. These questions were answered predominantly in the form of a seven-point Likert scale. A separate question was asked for each of the hypotheses to be tested. This question relates to the one about the willingness to buy a car online as part of the methodological procedure. The questions to answer the hypotheses were always mandatory. The questionnaire was conducted with the online software "empiric - surveys for students" and was published there and was available from 22.11.2022 to 10.01.2023. A total of 253 people participated in the study and completed the questionnaire.

Data cleansing
Within the scope of the study, the data sets were checked for plausibility according to this study's requirements and determined whether an adjustment was necessary. There is no restriction in the investigation concerning age or other aspects. The questions on age, occupation, employment relationship, marital status, educational attainment, income or gender were mandatory, so they always had to be answered. During the plausibility check, it was also checked that no one had given an age below 17 or an unrealistic age above 100. In Germany, accompanied driving is already permitted from 17, so this age limit was chosen. The youngest respondent was 17 years old, and the oldest respondent was 73 years old. In addition, the questions used to answer the hypotheses were all mandatory. The gender "diverse" was not indicated by any participant.

The questions to answer the hypotheses were responded to as a 7-point Likert scale. The possible answers to the questions on the hypotheses are as follows:

Table 1. 7-level Likert scale

Question	Response options
Issue…	1 = fully agree
Issue …	2 = agree
Issue …	3 = rather agree
Issue …	4 = undecided
Issue …	5 = rather not agree
Issue …	6 = do not agree
Issue …	7 = do not agree at all

Source: Own survey

Descriptive statistics

In the context of descriptive statistics, the survey results are examined regarding the online purchasing behaviour of German automotive customers. In the context of the study, it is interesting to distinguish between the age of the respondents to see how the differences between the age groups are presented. Younger customers tend to have a greater affinity for online shopping. For this reason, the respondents are divided into two age groups for the descriptive statistics, one up to 30 and one over 30. Within the Likert scale, answers 1 to 3 are considered as agreement and 5 to 7 as disagreement. Answer 4 = undecided is accordingly not taken into account. Table 2 below shows the presentation of the data:

**Table 2.** The online purchasing behaviour of age groups

Age of Respondents	Online car buying Yes Quantity	%	Online car buying No Quantity	%	Online car buying undecided Quantity	%	Total numbers Quantity	%
17-30 years	85	50,00%	58	34,12%	27	15,88%	170	100,00%
>30 years	43	51,81%	35	42,17%	5	6,02%	83	100,00%
Sum of all ages	128	50,59%	93	36,76%	32	12,65%	253	100,00%

Source: Own survey

The results of the presentation in Table 2 make it clear that around 50% of all respondents are prepared to buy their next car online. Contrary to expectations, however, younger and older customers' online buying behaviour is the same. The average age of respondents is 32.24 years, while the median is 26 years. This also reflects the more significant proportion of younger respondents in the study. The standard deviation of age is 12.26 years (sd=12.6261), and the number of participants is 253 people (n=253). It also shows that the proportion of respondents up to 30 years old is 67.19%, about twice as large as that of respondents over 30.

In the context of the survey, the distribution of net income must also be considered once again. Automobiles tend to be high-priced products, so customers must have high incomes. The following figure shows the net revenues of the respondents:

**Figure 1.** Representation of educational qualifications
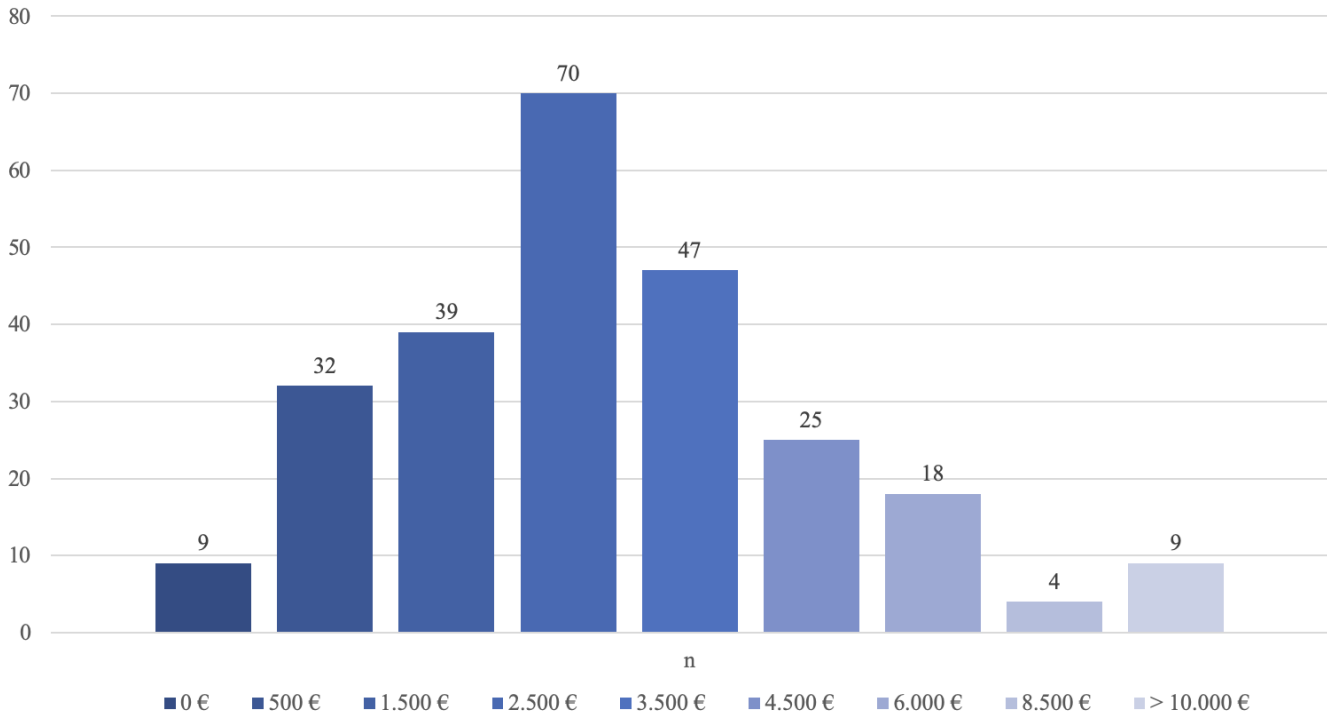
Source: Own survey

The distribution of net income in Figure 1 approximates a normal distribution. The average income of the respondents is 2.998,02 €, the median is 2.500,00 €, and the standard deviation is 2.158,03 € (sd=2.158,03€). It should also be noted that the income of the respondents was asked in intervals. In each case, the mean value of the interval was assumed for the evaluation. Only in the case of no income (0,00 €) and revenue of 10.000,00 € and more were the corresponding values of 0.00 € and 10.000,00 € selected.

It should be noted that the average net pay of German employees is around €2.131,92 per month (Bundesministerium der Finanzen, 2023). This means that the net income in the study is somewhat higher than the German average. In the context of descriptive statistics, it should also be mentioned that an income above €6,000.00 is seen as an outlier, which is why there are also 13 outliers in the study context. Figure 2 below shows the outliers graphically as a boxplot:

Figure 2. Representation of the outliers in the form of a boxplot
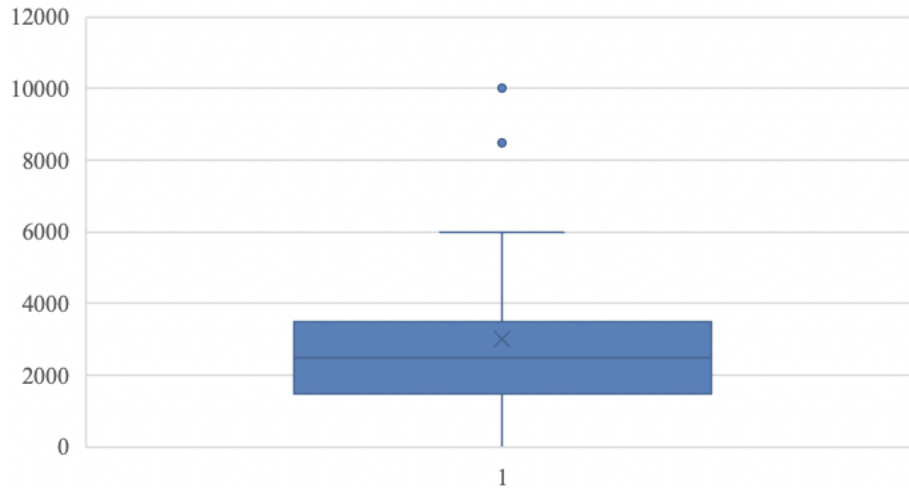
Source: Own survey

The gender distribution of the respondents should also be briefly discussed. At 59%, the proportion of male respondents is slightly higher than that of female respondents at 41%. There were no persons who indicated diversity as their gender in the survey. Figure 3 shows the distribution of gender:

Figure 2. Gender distribution
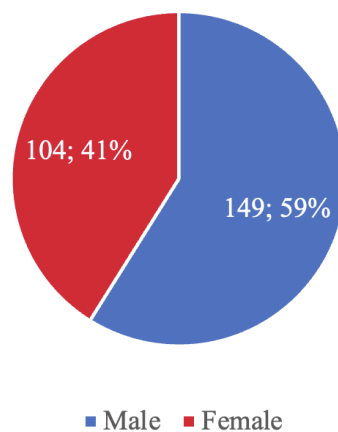
Source: Own survey

The following is a brief descriptive illustration of how age and online purchasing behaviour compare regarding gender. There were no respondents who indicated a diverse gender in the survey. Figure 3 shows the distribution of gender:

Figure 3. Comparison of the online vehicle purchase propensity and age distributed between men and women.
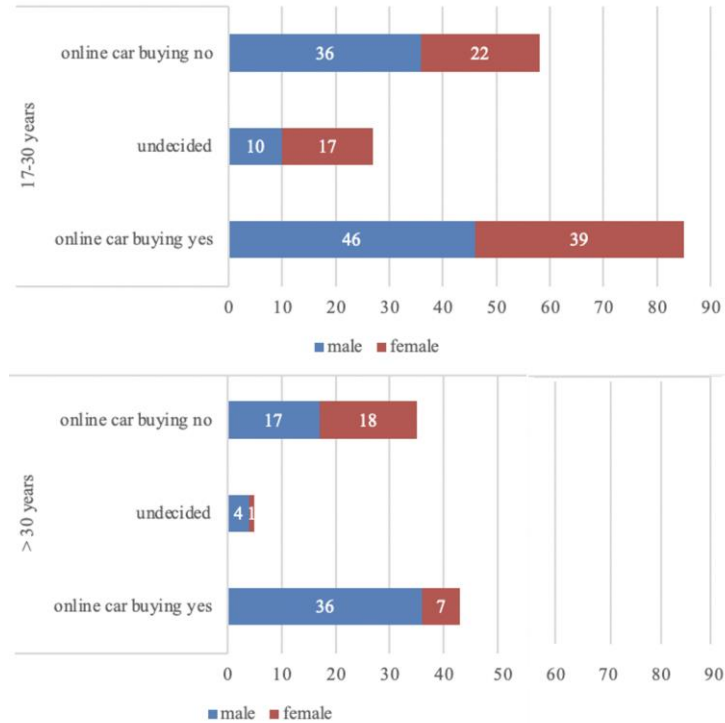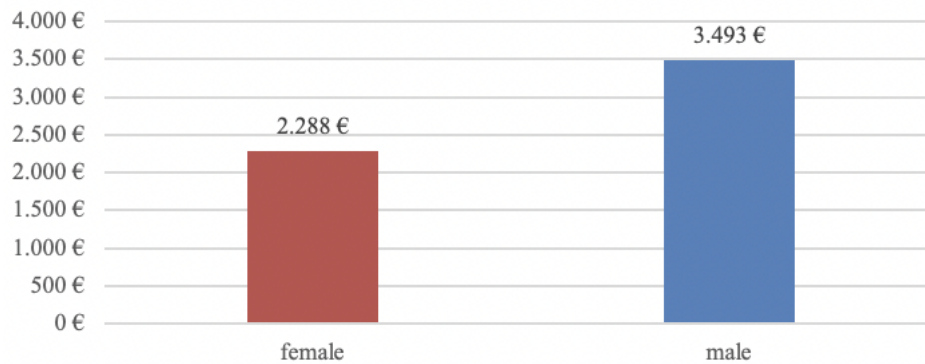

Source: Own survey

Data analysis shows that men are more willing to buy their next car online. Of the 149 men surveyed, 82 (55.04%) are eager to buy their next vehicle online. This proportion is only 41.35% for women or 43 out of 104 respondents. Furthermore, it is noticeable that the proportion of undecided buyers regarding online or offline vehicle purchases among the younger respondents is 27 out of 170 (15.88%). In comparison, the older respondents have a more precise opinion here, and only 5 out of 83 older respondents (6.02%) are undecided regarding this decision.

Finally, the average salary between men and women should also be discussed. Thereby it shows up in the context of the study the average net income of the men with approximately 3.493,00 € lies, while that of the female asked ones amounts to only 2.288,00 €. It can also be deduced from this that spending disposable income is made much more deliberately for those with a lower income than those with a significant disposable income. Figure 4 shows the average income of men and women in the study:

Figure 4. Average net income between men and women

Source: Own survey

It has already been shown here that there are differences between the online purchasing behaviour of men and women concerning a car. In addition, the age of the respondents and the financial possibilities also influence this purchase decision.

4. Results and analysis

As part of this research, a simple linear regression model was first established and tested for each hypothesis. This study's significance level is 5% (=0.05). If the results are significant, they are included in the final overall model as multiple linear regression.

Employment status
The results regarding the hypothesis that customers with an employment status are more willing to buy their next car online can be seen in the presentation of Table 3, where it should be noted that the employment status could also be indicated as a Likert scale with the values 1 (definitely working) to 7 (not working) by the respondents. This has the advantage that respondents can choose between employment and, at the same time, the intensity of their employment:

Table 3. Results H1 – Employment status

	Estimate	Standard Error	T-Statistics	P(>IItII)	
Constant = Online car buying	2,90886	0,19720	14,751	< 2e-16	***
Employment status	0,42509	0,09558	4,448	1,31e-05	***
n=253			Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1		

Source: Own survey

The results of testing the hypothesis, the effect is highly significant. Thus, the hypothesis is confirmed that working people want to buy their cars online. The adjusted coefficient of determination is 6.94%.

Gender
The results regarding the hypothesis that gender influences the decision to buy a car online are presented in Table 4:

Table 4. Results H2 – Gender

	Estimate	Standard Error	T-Statistics	P(>ItI)
Constant = Online car buying	3,8750	0,2088	14,563	< 2e-16 ***
Gender	-0,5193	0,2720	-1,909	0,0574
n=253			Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1	

Source: Own survey

Within the results of the hypothesis testing, it is shown that the result is not significant. Thus, the null hypothesis is not refuted. Gender, male or female, does not influence the decision to buy a car online or not. The adjusted coefficient of determination is 1.04%.

Advice on buying a car
The results for testing the hypothesis that the desire for advice when buying a car influences the decision to buy a car online are presented in Table 5:

Table 5. Results H3 – Advice on buying a car

	Estimate	Standard Error	T-Statistics	P(>IItII)
Constant = Online car buying	6,08450	0,17220	35,53	< 2e-16 ***
Advice on buying a car	-0,71263	0,04137	-17,23	< 2e-16 ***
n=253			Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1	

Source: Own survey

The results of the hypothesis test show that the result is highly significant. Customers for whom advice is crucial are more likely to buy their car at a fixed location, and those for whom advice on purchasing a vehicle is less critical may also want to buy their car online. There is a negative correlation. The adjusted coefficient of determination is 53.99%. Thus, just under 54% of the variance in online car buying behaviour can be explained by the importance of advice when buying a car.

Car price
The results for testing the hypothesis that the importance of the vehicle price or the desire for a low vehicle price influences the decision to buy a car online are presented in Table 6:

Table 6. Results H4 – Cheap price is important

	Estimate	Standard Error	T-Statistics	P(>ItI)	
Constant = Online car buying	2,67799	0,26569	10,080	< 2e-16	***
Cheap price is important	0,26096	0,06769	3,855	0,000147	***
n=253			Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1		

Source: Own survey

Hypothesis testing in the form of linear regression shows that the correlation between the importance of a low vehicle price and car purchases on the Internet is highly significant. This confirms the hypothesis that customers looking for a favourable vehicle price migrate to the Internet and leave the stationary trade.

Already bought a car online

Table 7 shows the results of hypothesis testing for hypothesis H5. H5 assumes that customers who bought a car online would also buy their next vehicle online. In the context of the survey, both the online purchase that has already taken place and the almost exclusive information gathering by customers online were evaluated as corresponding online purchases since the option to purchase vehicles entirely online has only existed for a few years. The results are presented below:

Table 7. Results H5 – Already bought a car online

	Estimate	Standard Error	T-Statistics	P(>ItI)	
Constant = Online car buying	1,37575	0,24177	5,69	< 3,52e-08	***
Already bought a car online	0,51863	0,05052	10,27	< 2e-16	***
n=253			Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1		

Source: Own survey

The hypothesis test in the form of linear regression shows that the correlation between the online vehicle purchase already made or the predominant online information procurement and the future online vehicle purchase is highly significant. This confirms the hypothesis that customers who have once purchased their vehicle online will continue to do so and leave the stationary trade. The adjusted coefficient of determination is 29.29%. Thus, around 29% of the variance in online vehicle purchasing behaviour can be explained by the online purchase that has already taken place or the most recent predominant information online when purchasing a car.

Knowledge about online car platforms

Table 8 shows the results of hypothesis testing for hypothesis H6. Here, H6 assumes that customers who know online vehicle purchasing platforms well will also tend to buy their next car online. The results are presented below:

Table 8. Results H6 – Knowledge about online car platforms

	Estimate	Standard Error	T-Statistics	$P(>\mid t \mid)$	
Constant = Online car buying	0,84937	0,15887	5,346	2,02e-07	***
Knowledge about online car platforms	0,84847	0,04218	20,115	< 2e-16	***
n=253			Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1		

Source: Own survey

Hypothesis testing in the form of linear regression shows that the relationship between knowledge of online vehicle purchasing platforms and future online vehicle purchases is highly significant. This confirms the hypothesis that online vehicle purchasing platforms are well-known among customers and thus significantly influence customers' future online vehicle purchases. The adjusted coefficient of determination is 61.56%. Therefore, almost 62% of the variance in online vehicle purchase behaviour can be explained by customers' knowledge of online vehicle purchase platforms.

General online shopping

Table 9 shows the results of the hypothesis test for hypothesis H7. Here, H7 assumes that customers who generally shop online will also tend to buy their next car online. The results are presented below:

Table 9. Results H7 – General online shopping

	Estimate	Standard Error	T-Statistics	$P(>\mid t \mid)$	
Constant = Online car buying	0,57655	0,13762	4,189	3,87e-06	***
General online shopping	0,88761	0,03491	25,424	< 2e-16	***
n=253			Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1		

Source: Own survey

Hypothesis testing in linear regression shows a highly significant correlation between general online shopping and future online vehicle purchases. This confirms the hypothesis that customers familiar with available online retailing and who use it a lot are also likely to buy their next car online. A highly significant influence on customers' future online vehicle purchases is confirmed. The adjusted coefficient of determination is 71.92%. Thus, nearly 72% of the variance in online vehicle purchase behaviour can be explained by respondents' use of general online shopping.

Age

Table 10 shows the results of hypothesis testing for hypothesis H6. Here, H6 assumes that customers who know online vehicle purchasing platforms well will also tend to buy their next car online. The results are presented below:

Table 10. Results H8 – Age

	Estimate	Standard Error	T-Statistics	P(>ItI)	
Constant = Online car buying	2,84028	0,36641	7,752	2,26e-13	***
Age	0,02260	0,01058	2,136	0,0336	*
n=253		Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1			

Source: Own survey

Hypothesis testing in linear regression shows a significant correlation between customer age and future online vehicle purchases.

This confirms the hypothesis that customers are more likely to reject buying a vehicle online as they get older or that they are more likely to buy their car online at a younger age. However, the adjusted coefficient of determination is only 1.40%. Thus, only about 1% of the variance in online vehicle purchase behaviour can be explained by customer age.

Consolidated view

In the context of the previous individual hypothesis tests, the effect of the "omitted variable bias" indeed emerges. The significant influencing factors identified are now compared again as part of multiple linear regression to reduce this effect.

The significant influencing factors of employment status, advice on buying a car, importance of a low price, already purchased a car online, knowledge about online car platforms, age and general online shopping is related to the respondents' online car buying behaviour. The results of the multiple linear regression are shown in Table 11 below:

Table 11. Results Multiple linear regression of significant variables

	Estimate	Standard Error	T-Statistics	P(>ItI)	
Constant = Online car buying	1,652957	0,287318	5,753	2,6e-08	***
Employment status	0,122483	0,040582	3,018	0,00281	**
Advice on buying a car	-0,314232	0,030644	-10,254	< 2e-16	***
Low price is important	0,015266	0,030998	0,492	0,62282	
Already bought a car online	0,102488	0,028265	3,626	0,00035	***
Knowledge about online car platforms	0,177122	0,047219	3,751	0,00022	***
General online shopping	0,485600	0,045553	10,660	< 2e-16	***
Age	0,004482	0,004623	0,969	0,33332	
n=253				Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1	

Source: Own survey

In the OLS estimation, the abovementioned significant factors were compared again using multiple linear regression. The result is that favourable prices and age are no longer critical for buying a car online. Highly effective factors for purchasing a car online are the respondent's existing employment relationship, the low or non-existent need for advice on the part of the respondent, the fact that in the best case scenario, the respondent has already purchased a car online before, the existing knowledge about online car purchase platforms, and the respondent's generally intensive online shopping. The regression analysis in the present consolidated study does not provide any clear indications for the two parameters of a favourable price and age.

Summary

Evaluating the factors mentioned above as part of the survey revealed several significant aspects that can be decisive for buying a vehicle online. In addition, it must be noted that purchasing a car is still one of the most expensive financial decisions for most customers, next to buying a house. Therefore, it must also be remembered that vehicle costs in maintenance still need to be revised in many places nowadays. With the advent of electromobility, it can be assumed that the cost of maintaining a car will decrease as maintenance intervals and fuel costs will be reduced. Therefore, if electromobility continues to increase, the survey will be conducted again to see if respondents' interest in purchasing vehicles online continues to grow, considering the abovementioned aspects. It should also be noted that for many customers, personal contact continues to be essential to have a personal contact in the event of such difficulties or maintenance costs arising, including in the form of possible warranty and maintenance costs; if the maintenance costs and thus the risk for customers after purchasing a vehicle fall, a further increase in online purchasing and its popularity among customers can be assumed (Reindl, 2017).

5. Discussion

The results presented here are based on selected questions on the purchasing behaviour of automotive customers. The questions and topics are based on results from other surveys and studies on this subject area. The answers given by respondents depend heavily on the question's wording in the questionnaire. It was not possible to influence the respondents when answering the questionnaire. Therefore, it cannot be said with certainty that all respondents answered the questionnaire correctly. In particular, the questionnaire was intended to compare with the study by Dudenhöffer from 2012 (K. Dudenhöffer, 2012). To obtain even more precise answers and to be able to produce an even more accurate evaluation of the corresponding results, it would be necessary to interview the participants themselves on-site accordingly and conduct a confidential survey.

Furthermore, it must be considered that the automotive industry, in particular, is currently undergoing one of its most vital processes of change for decades. Therefore, the survey topic is still a very new field. It is only in the last few years that customers have been able to find out about their next car predominantly online and then buy it completely online accordingly. It will therefore be necessary to repeatedly query the findings obtained in this study at regular intervals in the medium term. This will ensure that the results obtained fit the relevant framework conditions. The aspects of electromobility and online vehicle sales are particularly worthy of mention here (Bussmann, 2011). In addition, in the context of demographic change, it should also be noted that the number of older customers will continue to increase sharply in the coming years and that there will also be a generational shift, so that here, too, some of the loyal, stationary automotive customers will prioritise their vehicle purchases via the Internet (Pompe, 2011).

In the context of this work, the findings already available in the scientific community on online vehicle acquisition, in particular, were reviewed in terms of additional factors and up-to-dateness. This showed that the data situation still needs improvement due to the topic's novelty and that further research will be necessary. Future research should focus on addressing and advising older customers and investigating the proper target group selection for digital vehicle sales.

6. Conclusions

This research paper examined various factors to see if they impact a customer's vehicle purchase online. This was predominantly broken down into employment status, car buying advice, gender, age, the importance of vehicle price, previous use of online vehicle purchases, knowledge of online vehicle exchanges, and general online shopping. Eight hypotheses were formed to investigate these factors and tested in an online survey. More than 250 people were surveyed in the process. The purchasing behaviour of automotive customers is widely known in science. However, no recent study in the German market investigates which factors are decisive for customers to purchase online or in a traditional stationary store. A simple linear regression model was then formulated for each hypothesis individually, which was then tested for significance in a T-test. The significant results were then transformed into a multiple linear regression model. The influencing factors were again tested for significance. The characteristics of an employment relationship, desire for advice on a car purchase, previous online vehicle purchase or predominant online information in the last vehicle purchase, knowledge of online vehicle platforms, and use of general online shopping were highly significant. A favourable vehicle price and age could not be confirmed as substantial factors in the multiple linear regression.

This paper provides a good overview of which factors are decisive for customers to buy their vehicle online or stationary. A change in the customer structure can be expected in the coming years, with the proportion of customers in Germany who want to buy their vehicle online continuing to increase. In parallel, the proportion of older customers will continue to grow strongly due to demographic change. Future research should also consider the components of demographic change in this context and differentiate the survey more strongly between young

and old customers. Further research in this area is essential because the existing retail structure and the current distribution network of manufacturers are facing significant change. It is, therefore, important that manufacturers and dealers know their automotive customers as well as possible to tailor their sales processes to customers optimally. This is the only way to ensure the optimal customer approach (Graf, 2008).

The research results also make it clear that customers want more flexibility and, above all, digital offerings in the area of vehicle acquisition. Only with the proper knowledge of customers and their expectations will it be possible to continue to retain customers and provide them with optimum service in the future. In this context, intelligent and intermodal mobility offers will also become a risk for established automotive sales (Bruhn & Hadwich, 2022b). At the same time, demand for vehicles in Germany continues to grow, which will undoubtedly result in further sales options (Dudenhöfer & Paul, 2022).

This study critically examined existing results, and new findings were obtained. Concerning the limitations of the work, it must be mentioned that the study refers to the effects on the behaviour of German automotive customers. The findings can, therefore, only be transferred to other countries to a limited extent since cultures differ from country to country, mainly concerning consumer behaviour. It should also be noted that the survey results depend on the wording of the questions. Future research could start here, transfer the results to other countries, and critically examine them. In addition, purchasing behaviour and usage patterns, especially in the automotive sector, will change significantly due to constantly changing offers and the speed of the digital environment.

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Robert VON BÖHLEN, MSc is a PhD. Candidate at Brno University of Technology (BUT) in Czech Republic and lecturer at Fresenius University of Applied Sciences in Cologne (Germany). He started his career at a medium-sized automotive retail group in Germany in 2012, where his responsibilities included digital sales, CRM and customer satisfaction. He also spent time in America and Denmark. At the end of 2019, he worked for a management and strategy consultancy and from mid-2020 for another automotive retail group, where he was responsible for similar key projects and department management. In 2022, he founded his own companies with his expertise. Robert von Böhlen holds a degree as a Bachelor of Arts in Business Administration and a Master of Science in Business Consulting and Digital Management. He has also completed study visits in San Diego, Atlanta and France.

ORCID ID: https://orcid.org/0000-0002-6065-8467

Iveta ŠIMBEROVÁ is associate professor in field of Economic and Management, since 2012 she worked as the vice-dean for International Relationship at Faculty of Business and Management, Brno University of Technology and since 2022 as the vice-rector for internationalisation at Brno University of Technology. She worked as coordinator of several international projects and grants, She has been appointed as an expert in the Evaluation of Higher Education Study Programmes within the branch "Economics and Management" in Latvia. She has also received expert rights from Latvian Scientific Council for 3 years (2013-2016). Research interests: digital transformation, business models, corporate governance indicators, modern marketing concepts including stakeholder marketing management, and the internationalisation of small and medium enterprises. During her work she was active in several International Boards of Scientific Journals and Scientific International Conferences and she is one of co-founder and scientific editor of the faculties scientific Journal "Trends Economics and Management". She has published more than 90 publications (book chapters, scientific articles and research results), she has more than 700 citations of published papers (88 citations in WoS and 166 citations in Scopus), H-index: 5 (WoS), H-index: 6 (SCOPUS).

ORCID ID: https://orcid.org/0000-0002-9236-4439

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