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Mobility in Germany

Digital Transformation, Megatrends and the Evolution of New Business Models

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Cordelia Friesendorf
International School of Management
Hamburg, Germany

Luca Uedelhoven
Hamburg, Germany

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Contents

1	Digital Transformation of Global Mobility Markets	1
1.1	Germany’s Mobility Industry: Stakeholder Needs	4
1.2	German Industrial Tradition vs. Disruption	5
1.3	Plan of the Book	7
	References	8
2	Macro-Environment of Mobility	11
2.1	Regulatory and Policy Barriers	11
2.2	Germany’s Stable Economic Position	12
2.3	The “Social German”: Consumer Mobility Behavior	13
2.4	“Innovationsstandort Deutschland”: Does Technology Match Mobility?	15
	References	16
3	Megatrends Influencing Mobility	19
3.1	Digital Mobility: An Undeniable Reality	19
3.2	Urbanization: Exploiting Untapped Potential	20
3.3	Social Needs: The Decline of the “Car-Owning Cult”	21
3.4	Sustainability Championing: A Mass Movement	22
	References	22
4	Traditional Mobility Models	25
4.1	Individual Transportation: The Indelible Passenger Car	25
4.2	Local Public Transport: Germany’s Socioeconomic Arteries	27
4.3	German Train System: The Ubiquitous ‘Deutsche Bahn’	28
4.4	Taxi: A Protected Local Market	29
	References	29
5	New Business Models in Mobility	31
5.1	The Business Model Canvas (BMC) Approach	31
5.2	Carsharing: What Makes SHARE NOW the Market Leader?	31
5.3	Ridepooling: How Successful is MOIA?	34

- 5.4 Ride Hailing: Is FREE NOW’s Marketing Its Strength? 36
- 5.5 Long-Distance Services: Is FlixBus a Survivor or a Thriver? 39
- 5.6 Last Mile: Is Lime Here to Stay or Just a Fashion-Fad? 40
- References 42
- 6 Customer Outlook on Mobility: Survey Design 45**
 - 6.1 Research Gaps in Mobility Literature 45
 - 6.2 Empirical Tool: Survey Objectives 46
 - 6.3 Survey Design, Administration, and Content 47
 - 6.4 Sample Description 48
 - Reference 50
- 7 Customer Outlook on Mobility: Survey Results 51**
 - 7.1 Customer Mobility Usage and Intensity 51
 - 7.2 Customer Awareness of Diverse Mobility Options 52
 - 7.3 Customer Usage Intensity of New Mobility Options 54
 - 7.4 Customer Convenience as a Business Success Factor 59
 - 7.5 Customers’ Needs and Mobility Perception 61
 - 7.6 Influence of Megatrends 66
 - 7.7 Critical Review 67
- 8 Business Recommendations and Future Trends 69**
 - Reference 72

About the Authors

Cordelia Friesendorf is Professor of economics and finance in the management faculty of the International School of Management (ISM) in Hamburg, Germany. She is Program Director of Graduate Studies in *International Management* and *Finance and Management* in ISM Hamburg. She teaches and conducts research on multinational companies' management, strategic change, and innovation with specialization on companies based in the European Union. Additionally, Prof. Dr. Friesendorf offers consultation to companies on new business models and digital leadership in Germany. Her doctoral studies covered the progress of European Retail Banking Integration at the Jean Monnet Centre of Excellence at the Free University in Berlin. For her work on EU financial markets, she received the *Europe Prize* in 2011 awarded by the Berlin Industries and Traders' Association (VBKI). Prior to her academic career, Prof. Dr. Friesendorf held senior managerial positions in companies and in the government: she was Campus Director and Vice-Dean of the ISM Hamburg, Economic Advisor at the British High Commission and the Foreign and Commonwealth Office of the UK, and Project Head at Tata Energy. She is Visiting Professor at Toulouse Business School, Groupe sup de La Rochelle, and Haag Helia University, among others. Prof. Dr. Cordelia Friesendorf offers workshops and training programs to startups, banks, and government organizations on strategic transformation, design thinking in innovation, and sustainability leadership.

Luca Uedelhoven completed his Bachelor of Science in International Management at the International School of Management in Hamburg, Germany, in the academic year 2020. During his program, he spent a semester abroad at the University of California, San Diego, in the USA in 2019. Uedelhoven specialized hereby in the subjects consulting, mergers and acquisitions, investment management, and corporate finance. He gained practical experiences as intern in the broader fields of capital markets, manufacturing houses, and IT project management office in Germany, Singapore, and China. Uedelhoven underwent a gap year, during which time he worked at the in-house consultancy of a leading E-commerce company and at an international Mergers and Acquisition Boutique in Hamburg. He will be starting his

master's in management at the NOVA School of Business and Economics in Lisbon, Portugal, in the fall of 2021. Uedelhoven is a passionate football fan and enjoys skiing, traveling, and good food.

Chapter 1

Digital Transformation of Global Mobility Markets



Mobility vs. Mobility as a Service (MaaS)

Mobility is the ability to freely move or move in an unhindered way. The mobility market includes private and public passenger transport as well as the transport of goods. Private passenger transport includes motorized vehicles such as cars, while nonmotorized transport includes bicycles. Short-haul and long-haul transport routes via road, rail, waterways, and air move people and goods between destinations.

In contrast, MaaS is a type of service that is a result of the market convergence combined with the growth of the transportation and telecom industries. MaaS services offer a joint digital channel that views customers as users, enabling them to plan, book, and pay for multiple services. A user-centric approach in an integrated system lies at the heart of MaaS business models.

Never before has the world changed as rapidly as it does today. Technologies have ushered in a new era that remained unknown to us in our multiple roles as consumers, taxpayers, managers, employees, savers, or investors. This new age of digital technologies offers unlimited opportunities that dramatically impact our way of life, our methods of transacting and conducting business, how we gain and grade satisfaction from various activities, and overall how we derive or assess the quality of life. The age of innovation-based transformation triggered and perpetuated by brand-new technologies such as web or cloud-based services, mobile internet technologies, big data architecture, Internet of Things, and artificial intelligence tools has not only reconfigured products and processes in companies and governments but also resulted in a total change in our perspectives of goods and services. Innovative ideas and business models today influence new customer needs that center on convenience as an imperative factor in daily living.

New technologies, arranged under the umbrella term of digital transformation, have ushered in a sweeping change across industrial structures covering tangible goods and intangible services. Be it retail segments, fashion or luxury articles, or the quintessential food sector, none remain spared by the wave of technological transformation. Having impacted almost all areas of the economy, digital transformation finally arrived in the mass-consumption industry of mobility. Known to be an industry noted for its high research and development (R&D) budgets, mobility stayed a conservative global sector for a long period of time until digital transformation forced traditional players into taking on modern roles that aligned with the needs of the customers whose perception of mobility keep evolving on a daily business driven by rising urbanization, networking, and sustainability needs.

The Meaning of Digital Transformation

George Westerman, an MIT principal research scientist and author of *Leading Digital: Turning Technology into Business Transformation*, defines digital transformation as a radical rethinking of how an organization uses technology, people, and processes to fundamentally change business performance. Experts identify four types of digital transformation, namely, business process, business model, domain, and cultural/organizational.

Following this trend, we observe that in recent years, numerous new companies and business models have emerged. Tech-driven start-ups have revolutionized the business of mobility, which has already been on a trajectory of economic prosperity since the invention of the first car. Technologies are in fact quickening the pace of globalization as we know it from international trade or the flow of capital flows between countries. We capture here a few prominent examples to highlight the phenomena discussed above. In Germany, globalization in combination with technological development has led to new competition for the established original equipment manufacturers (OEMs).

Tesla, a new entrant producing highly innovative electric cars, was only founded back in 2003 (Tesla, [n.d.](#)). In 2020, Tesla became the most valuable automotive company globally at an estimated value of 208 billion USD or 170 billion Euros (Klebnikov, [2020](#)). In January 2021, China's largest search engine company Baidu started a strategic collaboration with car manufacturer Geely, which is China's largest car manufacturer. The independent subsidiary form of the collaboration aims to produce climate-friendly intelligent electric vehicles that build on artificial intelligence and mapping system technologies. The collaboration follows the global OEM wave of abandoning the internal combustion engine for savvier alternatives that combine technology and electric options.

Uber Technologies Inc., founded in 2009 in San Francisco Bay Area (Uber, [n.d.](#)), offers ride-hailing via phone. This business is operated by private persons who can register themselves as drivers even without having to obtain a license. This new business model had a disruptive impact on the well-established taxi business making

it redundant in a dramatically short period of time such that in 2019, more than 100 million persons booked an Uber quarterly.

The Electric Drive

E-mobility substitutes the classic combustion engine in automobiles with energy sources. Current e-vehicles rely on portable supplies such as batteries that have varying features such as the range provided measured in kilometers, the speed at which the vehicle can be charged, or in total the intensity or the degree of electrification. The current classification of e-vehicles is based on the source of energy supply. Accordingly, there are the following four types: (1) the internal combustion engine vehicle, (2) the hybrid electric vehicle, (3) the plug-in hybrid vehicle, and (4) the battery electric vehicle.

Not succumbing to panic because of the new developments, leading German OEMs, namely, Daimler AG and BMW AG, started combining their forces and piecing together a start-up network in the form of joint ventures (JV). Together, they introduced the car-sharing service ShareNow (n.d.), the ride-hailing provider FreeNow (n.d.), and other new mobility businesses into the German market (YourNow, n.d.). These ventures, however, hardly make a dent in the revolution happening in the mobility market especially since new investors and innovative founders are introducing start-up business models that did not exist before. Local and long-distance ride-pooling is one such mobility segment with providers such as MOIA (n.d.) and BlaBlaCar (n.d.) that are disrupting short- and long-distance travel. Flixbus (n.d.-a, n.d.-b) is an emerging competitor in long-distance services. While in the shortest routes, driven by the urbanization trend, e-scooters have transformed the last-mile transport mode and the city landscape. Furthermore, local public transportation (ÖPNV), which is often subsidized by different institutions, represents another competitor in the contested, continually evolving market.

The importance of the classical car-selling approach is diminishing, while the significance of shared and data-based services, which provide data analyzing platforms, tools, and methods to mobility businesses, is sharply increasing. Statista 2017 mobility trends report that the overall global turnover in the mobility market amounted to 2830 billion USD or approximately 2314 billion Euros in 2017, of which more than 97% were generated through the sale of cars. Whereby, the share of car sales in total turnover is forecasted to fall to around 76% in 2030 and to 45.9% in 2050. In this time, shared mobility services can record a compound annual growth rate (CAGR) of 24.22% from 2017 to 2030 and a CAGR of 5.34% in the following 20 years, developing the shared mobility revenues from 58 to 2518 billion USD or approximately 2060 billion Euros in total. Compared to this, the CAGR of the data-based services amounts to 22.58% and 8.43% in the respective periods.

Multiple factors influence the changes in the mobility-sector. Firstly, the users' evolving requirements such as flexibility and connectivity because of the digitalization trend demand an adjustment of the outdated structures of the dominant

individual transportation systems. Secondly, the need for accessibility to work, leisure activities, and household requirements compels many to move into urban areas, thereby creating an active demand for innovative solutions that offer the convenience of transportation at affordable prices. Thirdly, the increasing awareness of the value of environmental protection creates a market gap for service providers who develop sustainable product solutions (Teichmann, 2018).

Fourthly, the trendy evolution of on one hand the sharing economy that is valued across generations and income groups and on the other the introduction of electric cars are redefining mobility. Together, the above factors are expected to guide providers to supply products and services that will be tailored to the customers' individual needs and affordability. In quantitative terms, these circumstances expected to build an intense competition in Germany's mobility industry that will cater to 1200 billion passenger-kilometers that is aimed to be set up by 2025 (Pro Mobilität, 2013).

1.1 Germany's Mobility Industry: Stakeholder Needs

Mobility needs in Germany today cover the areas of transport infrastructure, urban development, mobility logistics, public transport, cycling networks, safety concerns, clean air promises, technology, and, finally, smart mobility. Changing aspirations of German citizens in the economic, social, and ecological fields are putting pressure on the mobility sector that includes transportation services and infrastructure to approach daily bottlenecks in a strategic, operational, and most of all sustainable fashion to limit the negative externalities arising from moving people and goods from one to another location.

Specifically, there is increasing pressure on the German government to make alterations to the existent systems that create the problems of polluting emissions, fatal accidents, resource depletion, noise, and inaccessibility of necessary amenities. Moreover, businesses and citizens are beginning to have an intrinsic motivation to change mobility behaviors that serve their personal needs better while harmonizing their work and leisure patterns with new technology trends that are shaping individual and collective lifestyles. Even though mobility behaviors in Germany show little change when measured quantitatively, many facts observed in terms of travel demands show qualitative differences. Some of these insights measured by German authorities are discussed below to present an idea of stakeholder needs and preferences.

The "Mobility in Deutschland" survey conducted in 2017 by the Federal Ministry of Transport and Digital Infrastructure provides the latest information on mobility stakeholder behavior and consumption. It showed that 260 million trips were made per day in Germany and that the total transport distance covered was 3.2 billion passenger-kilometers per day. The report recorded statistics on mobility showing that 43% of all trips were made using cars, 14% by a car passenger, 10% using public transport, and around 22% by foot. About 43 million cars as vehicles were owned by

households of which almost 90% of those living outside urban areas owned at least one car. The report pointed out that despite this trend, 23% of overall Germany did not own a car. The occupancy rate per car has stayed steady at 1.5 persons in the last decades. Interestingly, the report indicated that driving license possession had fallen, which indicates a significant change in the attitudes of younger generations towards driving.

These conclusions show that the car continues to be a beloved mode of transport; however, despite the market segmentation that provides cars of all types and prices, the younger population tends away from car consumption as compared to their older automobile-loyal peers. The patterns of urbanization have a direct link to car usage behavior. Approximately 11% of Germany's population relies on cycle transport such that since the year 2015, many urban German regions reformed their road systems to make cities and towns cyclist-friendly locations.

An important development of the influence of digitalization and the internet age is the change in customer behavior in terms of purchasing. Zero- and low-carbon behaviors are strong influences among the younger age groups. Across the population, the advent of smart devices encourages customers to purchase online than go to stores. At the same time with the need to bring customers the product, e-commerce companies are competing for efficient yet sustainable solutions to win customer loyalty and brand themselves as sustainable operators. Smart mobility is therefore not only a trend but also an evolving need in the eyes of all mobility stakeholders.

To summarize, never before have market circumstances changed as fast as they do today accelerated by the era of digitalization. The expansion of numerous innovative business models in the German mobility sector makes it difficult to comprehend current shifts and requirements. A detailed analysis of the market situation and changes as well as of the customer-oriented success factors of the emerging business models is an urgent requirement that will equip mobility professionals, regulators, infrastructure experts, and investors in decision-making.

This book, therefore, provides a thorough analysis of the development of new business models in the German mobility market, emphasizing individual performance and success factors, while studying disruptive megatrends that trigger market change. The study does not focus on data-driven service providers nor nonmotorized mobility options, such as bike rentals as these topics are peripheral in the mobility industry. Likewise, the study does not cover the impact of the global pandemic COVID-19 as it is still early to assess the consequences as of December 2020.

1.2 German Industrial Tradition vs. Disruption

Essentially, this book takes a critical look at the mobility industry development in Germany by comprehensively analyzing mobility operators which are established companies and providers in the market and evaluating their mobility offers to customers in the light of external market influences as well as the impact of megatrends. While doing so, the book points to the start-up culture that is booming

Table 1.1 Objectives of the study

1	Development of a comprehensive overview of the general market, focusing on the macro-environment, examining the pre-given requirements and barriers. Diverse influences will be explained, and the recent market developments will be elucidated.
2	Analysis of the established business models and market participants, as well as their development and reactions to the shift in the market situation.
3	Exploration of the most relevant megatrends in terms of their disruptive influences on the established businesses, as well as the impact degree for the new ones that occurred.
4	Examination of the newly developed business models under case-based consideration of market participating companies.
5	Evaluation of the most critical success factors of consumers of the mobility market in Germany, giving an insight into the actual situation, changes, and requirements for the new and established businesses.

for a decade in Germany in multiple industries. Start-up businesses basically represent new business models that grow in technology-fertile clusters aiming to provide far-reaching innovative, flexible, and user-friendly solutions for daily problems.

The German Association of the Automotive Industry (VDA) and the German Startups Association (BVDS) announced a joint paper in 2017 to develop Germany as a cluster to represent “Mobility of the future.” Accordingly, there is a conscious understanding of mobility providing companies and regulators of the changes taking place in the mobility environment and seeking a way to combine coordinated efforts in advancing the German mobility sector. This book effectively analyzes this new developing incubatory area of new business models that are also referred to as new mobility options or alternative mobility modes. The aim is to present the reader with new mobility concepts that have successful market penetration and highlight those features that may transform them into regular players in the highly concentrated mobility market of Germany.

Concentrating on the German ground-based or onshore mobility sector, the goal of this book is to elucidate mobility transformation in Germany in a systematic way and provide a comprehensive inspection of the trends that triggered the changes in the mobility market and their role in the further evolution of this industry. Using management tools, the book scrutinizes traditional business models, illustrates their reactions of established companies to evolving market changes, and points to the consequences or threats of new market entrants. It also looks at the success levels of the new mobility options and their inherent business models and finally reaches out to the mobility customer or user to obtain their thoughts on the value proposition that will eventually drive the mobility industry changes. A systematic representation of the objectives of this book can be found in Table 1.1.

1.3 Plan of the Book

The principal motivation of this book is to provide firstly a holistic presentation of key stakeholders in the German mobility market, their complex interrelations, their market positions, their value creation models, and their support systems most of all. Secondly, the book is motivated to comprehend the changes that megatrends bring about on the mobility sector, and thirdly, it aims to assess the customer or user as the principal participant or revenue creator in the mobility market. Overall, the book aims to provide an explanatory narrative to generate an overview of the current challenges of the market with the intention of equipping mobility professionals, policy makers, banks, investors, and entrepreneurs with adequate knowledge to enable optimal decision-making on the topic of mobility in Germany.

This chapter introduces the concept of mobility services as understood in the German industrial context and gives a description of the development of the sector so far by identifying stakeholders, traditional players, and innovative concepts such as the electric drive along with recent technological trends that are changing the mobility landscape. The chapter lists down the broader goals of the book and acts as a preparatory guide for helping the reader navigate the book.

Chapter 2 begins with detailed scrutiny of the macro-environment of mobility companies, traditional and new, in the German market that has the goal of deducing or deriving the factors from the political or regulatory, economic, social, and technological dimensions. The idea is to establish the potential for growth for each dimension so that readers can get a good idea of hindering vs. facilitating factors when making mobility production or investment decisions in Germany. This evaluation is carried out using the PEST-analysis introduced by Aguilar (1967) that is a commonly used tool in management studies for getting an overview of an industry.

Chapter 3 discusses the impact of megatrends that making sweeping changes in various global business segments. Mobility segments are expected to be transformed in the forthcoming years by the megatrends: digitalization or digital transformation, emerging social needs structure, urbanization, and sustainability or ecological impact. This chapter discusses these megatrends in the context of Germany.

Chapter 4 examines the existing or established on-road mobility providers and their business models from a critical perspective. The analyses cover private and public modes of transportation covering private and rental usage of cars, public and private trains, and the system of taxis and their competitors. For each mode, their survival strategies and support systems are laid out for enabling reader comprehension to understand the ease of market entry or consideration for investment or strategic partnership with these key stakeholders in the German mobility market.

Chapter 5 uses the business model canvas (BMC) approach to analyze the new business models that have steadily continued to emerge in Germany's mobility landscape. The chapter covers short- and long-range mobility routes including last-mile distances to capture the spectrum of opportunities emerging for start-up companies and equity investors who wish to tap into this potentially profitable market. In doing so, the analyses pick market leaders in each emergent segment to provide their

strengths and weaknesses while highlighting their unique value propositions and selling points to their reader. A critical approach is taken to identify potential revenue growth or roadblocks in company development.

Chapter 6 aims to put the mobility customer or user at the heart of the discussion of the market-based and megatrend-driven transformation of the mobility industry in Germany. To this extent, an empirical analysis exercise using the survey tool was prepared and administered. This chapter describes the literature gaps in mobility studies in the context of macro-environment and megatrend changes, discusses the survey design, and documents the administration of the survey. It provides details on the sample size, representation commentary, and study limitations.

Chapter 7 provides an elaborate account of the results from the survey with discussion, comparison, and diagrammatic detailing of the questions raised and the responses given by the customer or users. These are brought into context with analyses presented in previous chapters to provide the reader with a holistic view of the developments and the direction of change in the mobility sector.

Chapter 8 concludes by summarizing the empirical results and matching them with the previous results. It provides a handy narration and a set of recommendations that would equip mobility professionals, regulators, and students to follow the transformation taking place in this sector. It also provides a portrait of the imminent changes in mobility in Germany.

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Chapter 2

Macro-Environment of Mobility



2.1 Regulatory and Policy Barriers

A principal yet an often-underestimated advantage of mobility companies founded, i.e., set up, in Germany is their freedom to operate and expand businesses into other countries of the European Union (EU) with null restrictions. This enabling function allows them to quickly advance their respective value chains beyond sales and marketing functions across the EU while simultaneously giving these companies much-needed access to local labor, capital, and infrastructure resources in a barrier-free method (EUR-Lex, n.d.).

Inside Germany, the key regulator which is the German Federal Cartel Office oversees and controls mergers and acquisitions to prevent industrial concentration, most of all to restrict monopolies in industries in order to maintain a fair, transparent, and competitive market environment to prevent costly entry or exit barriers (Bundeskartellamt, n.d.). According to the German Industries Association, namely, Bundesverband der Deutschen Industrie (BDI), the German government reserves the right to restrict foreign direct investments (FDI) into German mobility companies. Especially, investments from the list denominating third countries will be restricted with additional rigor in the future so as to sustain the competitiveness of the German companies (BDI, 2019).

In Germany, strict legal regulations on passenger transportation prevail as stated in the Personenbeförderungsgesetz (PBefG). As a profit-oriented transportation business, legal authorization is required to operate in Germany. These authorizations are granted by individual cities or regions (PBefG, 2020). This requirement leads to a strongly limited, tedious, and bureaucratic system, which diminishes the possibilities of quick business expansion. The authorizations are limited due to various reasons offered by the monitoring authorities. The most frequent explanation provided is the need for noninterference with other public transport systems such as the local public transportation infrastructure that also includes taxis, which are regulated by public authorities in the PBefG.

These rigid passenger transport license regulations hinder successful international companies like Uber from entering the German market that would otherwise take the usual FDI route to enter the German market. According to the PBefG, private persons do as well need approval from the authorities to transport people in return for payment, which contradicts the basis of Uber's business model. To be able to operate, the profit-oriented companies have to distinguish themselves from the current legal mobility options clearly and provide arguments that explain the value gained for an individual German customer.

Based on the regulation and policy orientation in the German mobility sector, it can be concluded that Germany can exploit the potential of new technologies and business models only on the condition that monitoring authorities relax many of these restrictive regulations. As of in December 2020, fixed tariffs of taxis are planned to be abolished, and the obligation of return as illustrated above is predicted to be watered down (Bundesverband Taxi und Mietwagen, 2020). This relaxation certainly creates room for new market opportunities; however, regulation in the larger mobility sector is positioned to change only from pressure from mobility businesses and service providers.

2.2 Germany's Stable Economic Position

Germany is the leading economy in the EU with the fourth-highest GDP in the world (World Bank, 2019). The 83.73 million inhabitants generate a GDP per capita of more than 41,000 Euros, recording a constant growth from around 30,000 Euros in 2009 (Destatis, 2020). As mentioned earlier in this book, there is a forecasted shift within the mobility economy, with sharing and supportive data-based services recording high growth numbers, while the importance of cars sold is shrinking globally.

The in-country revenues of the German OEMs amounted to around 150 billion Euros in 2019 (Destatis, 2020). The generated revenue by other mobility providers aggregated to approximately 13.45 billion Euros in the same year, with a forecasted CAGR of 2.44% until 2024. The highest revenue was accomplished by ride-hailing and taxi services with more than 5 billion Euros, while car-sharing accounted for comparably low revenues with less than half of billion Euros (Statista, 2020). Figure 2.1 shows the revenue distribution in Germany's mobility sector.

Mobility accounted for around 7.23% of consumer expenditure per household, i.e., around 348 Euros of 2517 Euros per month, constituting the joined second-highest spending type (Destatis, n.d.-a, n.d.-b). The high-growth market potential attracts numerous new businesses, which will be exemplarily elucidated in later chapters. To conclude, the economic factor analysis shows that German mobility spending per household is set to increase. The willingness and ability to spend demonstrate an increasing trend and bode well for new players to enter the market.

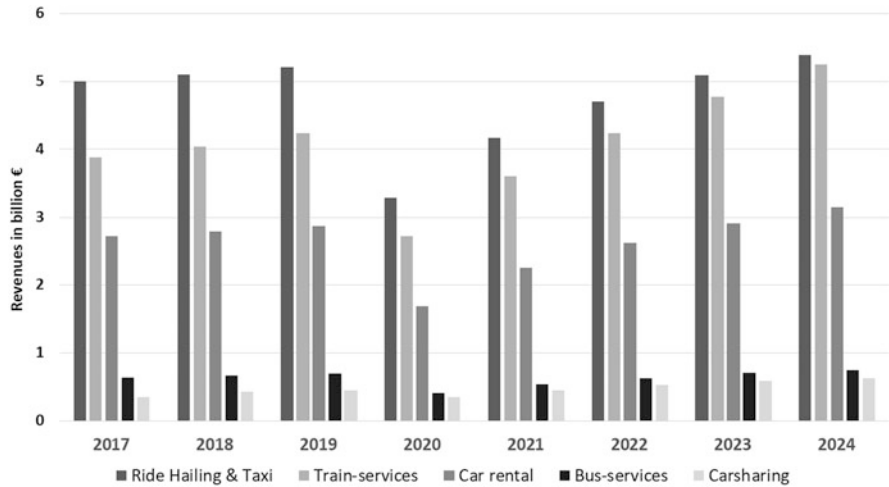


Fig. 2.1 Revenue distribution non-car selling mobility segments in Germany, 2020. (Own illustration based on Statista 2020)

2.3 The “Social German”: Consumer Mobility Behavior

This part of the PEST-analysis is concerned with different social aspects affecting the mobility market and the overall changes and preserving factors in society. Owing to the relatively higher significance of the megatrends—urbanization, sustainability, and the main social changes that occur around these—we will undertake a detailed discussion of these factors additionally in the forthcoming chapters.

With an overall daily transport of 3214 billion km a day (BMVI, 2020), Germans circle the earth more than 30,000 times each day. In 2018, the traffic participation in Germany, representing the share of the people, namely, tourists, students, and business travelers, that make at least one trip per day away from home, amounted to 90% with an average covered a distance of 41.3 km, distributed as 3.23 trips per day (KIT, 2020).

The highest share of traffic volume accounted for by private car transportation, covering 55% of all kilometers and 42% of all trips. The importance of transport as a passenger in an individual car decreased from 25% to 20% in km share from 2002 to 2017, representing about 15% of all trips taken. Therefore, combining routes is generally focused on medium- to long-range trips. While only 3% of the total kilometers are walked, people prefer to make short trips by foot, leading to a trip share of 22% in 2017. The same proportion of kilometers is covered by bike, albeit representing only 10% of the trips done (BMVI, 2020). Figs. 2.2 and 2.3 provide an overview of the volume and traffic split over different years.

Traffic volume (% of total trips)

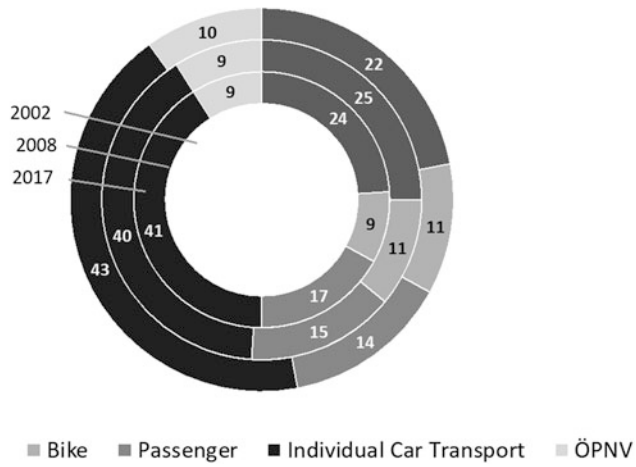


Fig. 2.2 Own illustration based on BMVI (2020) on traffic volume

Traffic performance (% of total kilometers)

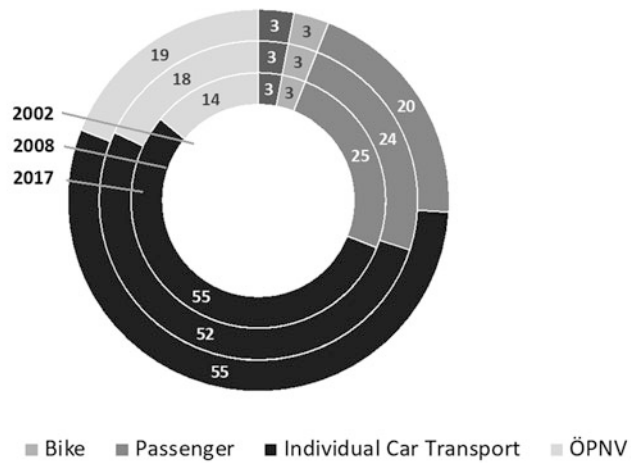


Fig. 2.3 Own illustration based on BMVI (2020) on traffic performance

2.4 “Innovationsstandort Deutschland”: Does Technology Match Mobility?

The digitalization of the modern world is one of the main aspects triggering the overarching changes in all aspects of life. Increasing internet penetration over the last decades and the widespread use of technological devices from smartphones to pads have advanced connectivity among people and have made digital services desirable among many. This is true in Germany, also because the country has since the 1960s during its post-war economic miracle era positioned itself as a dominant player in Europe and globally in innovative technologies. Industrial manufacturing and mobility are the leading areas where Germany holds worldwide patents endowing it with the quality brand of “Made in Germany.” A culture of innovation and risk-taking were significant factors that propelled German companies in technology leadership. In 2019, Germany continued to hold Europe’s top spot as the highest innovator holding 22 technology patents this time, even though it lost some of its sheen to China.

5G, Industry 4.0, Internet of Things, and artificial intelligence, among others, are areas where German companies are heavily investing, while the Federal Government is embedding entrepreneurial thinking in various forums of stakeholders to sustain technology and innovation leadership globally. Despite the efforts, there is much criticism that these are inadequate and there is the critique that German companies could get left behind. Innovation competition essentially arises from the USA, a traditional challenger as seen in Germany. The new players such as China and South Korea are offering stiff competition to Germany making the topic of innovation imminent and emotional in large- and medium-sized companies.

These opinions influence and determine the tenor in the mobility sector as well. As discussed in Chap. 1 of this book, e-mobility, as provided or defined by Tesla, is increasingly an important factor that is shaping the mobility perception in Germany. Inadequate charging infrastructure, doubts on battery capacities on the private business side and on the governmental or policy-making side, and the lack of robust concepts are slowing down the spread of e-vehicle popularity in an otherwise automobile innovation-friendly Germany. The comparably low-sales record of electric (including hybrid variants) cars of around 8% of the overall car sales in 2019 (UBA, 2020) is mainly due to insufficient technological factors (BDEW, 2019). According to this report, the low kilometer range, insufficient charging possibilities, and long charging times are, besides the high price, the main reasons for customers to shun buying an electric car.

In order to be able to overcome these obstacles, the German OEMs are heavily investing. An example is the Volkswagen Group, which plans to spend 50 billion Euros in battery cell R&D (Volkswagen, n.d.). In recent years, the leading OEMs were able to increase the battery range to about 300–400 km. Simultaneously, speed charging stations with around 150 kW compared to about 50 kW for a usual charging station have been developed. Nevertheless, the accessibility of the charging stations is still insufficient according to ADAC (2020), which diminishes the attractiveness

of purchasing an electric car. KBA provided data by the end of 2020 that demonstrated that the German OEMs Volkswagen and Mercedes managed to sell the most number of e-vehicles during the year. Their data pointed out that customers purchased small cars in the electric variant that has delivered an important feedback on user preference to the established OEMs in Germany.

In the long-term, artificial intelligence is expected to change transport with the introduction of autonomous driving vehicles. Waymo, a subsidiary of Google, already tests robotic taxis in the USA (ADAC, 2019). Right now, the biggest open questions for German operators are the legal situation and ethical decisions in a situation of unavoidable damage during or after testing. According to the prevalent legal environment, the driver that causes the accident is liable. For a situation of damage and liability, where the driver cannot be determined such as in the case of an autonomously driven car, there is little to no legal implication that however does not rule out whether the car manufacturer or the owner is or are liable for consequences. In German legal terms, this would mean that there is yet no legal reflection on this and the area remains underdeveloped.

Added to this practical problem, there is no conclusive thought process nor concepts that indicate or suggest how self-driving machines should decide in situations where a decision between two options, both causing damage, has to be taken. In other words, replicating human behavior and decision-making skills using ethical, logical, and aesthetic factors is still a huge area that is yet to be comprehended by the German mobility R&D developers. A forecast by the ADAC showed that around half of the German population is very skeptical about autonomous driving, which is why a high degree of automated driving on public roads is not expected for the next 20 years (ADAC, 2019).

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Chapter 3

Megatrends Influencing Mobility



3.1 Digital Mobility: An Undeniable Reality

The leading IT Glossary Gartner defines digitalization as “the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business” (Gartner IT Glossary, n.d.). Digitalization offers new possibilities in connecting mobility services via the Internet and smartphones. Platforms over devices such as pads, smartphones, chip-based devices, and computers and applications (apps) get connected, e.g., while directly booking a ride when planning a certain route via the app Google Maps.

To successfully integrate digital business models in the business environment, the availability, speed, and usage of the Internet are indispensable. Since 2001, the Internet usage rate in Germany has risen from 37% to 86% in 2019 (Initiative D21, 2020), leading to a substantial increase in overall connectivity and the possibility of implementing digital business models. In 2007, the number of connected devices equaled the number of the global population for the first time. Since then, this number has multiplied, resulting in a permanent and multidimensional global connection (PwC, 2016).

Users of smartphone steerable apps have various new mobility options due to digitalization. Apps show the fastest routes, can book different services, and show life locations of the booked ride or available means of transport, such as cars or e-scooters. Internet-based mobility services can automatically analyze and combine individual people’s trips and, therefore, operate more effectively and sustainably. The so-called seamless mobility enables the frictionless combination of diverse services in one trip.

Intermodal transport is one of the central potentials of digitalization in the mobility sector. Thus, digitalization enables higher utilization of transport capacities and offers highly flexible, individual services for the consumer. The privacy and data protection of individuals are often referred to as some of the main issues of digital mobility. The current laws in this regard are inadequate and need to be revised more

comprehensively. To support the development of digital mobility, the Federal Ministry of Transport and Digital Infrastructure (BMVI) invests more than 12 billion Euros into a higher density of high-speed Internet connection in Germany.

3.2 Urbanization: Exploiting Untapped Potential

An urban area is, under varying definitions, a section of a country with a comparably high density of population, which is pursuing economic functions outside of the agricultural sector. Urban growth and urbanization describe a process of an increasing proportion of the population living in cities and metropolitan areas (UNICEF, 2012). Urbanization globally refers to the growth of cities, especially those coined as “megacities” that will have a population of more than 10 million. Urbanization and mobility are often positively correlated in growth such that mobility is even referred to as the lifeblood of cities. Additionally, electrification, connectivity, and autonomy are factors that are expected to accelerate and intensify the process of urbanization.

The above relationship holds precisely for Germany. Approximately 77% of the German population live in urban areas, mainly distributed across 79 major cities that have more than 100,000 inhabitants. Of those cities, four account for a population of more than a million people. The process of urbanization has not reached its full cycle in Germany. Especially, the rural parts of Eastern Germany are drastically affected following the tearing down of the Wall in 1989, with an estimated decrease in population by an alarming one-third.

A continuous migration from East Germany to the West is an established trend in German demographic studies resulting in crowded urban areas in Western Germany. This unhindered migration leads to a competition of scarce resources resulting in inflated housing, rental, transport, education, culture, and food prices. On the other hand, Eastern Germany is suffering an unhealthy trend of deflation and economic downfall accompanied by social declines such as criminality and radicalization. For these reasons, urbanization is perceived as a socially divisive phenomenon by different factions of policy, industry, and society.

The German Federal Government has identified this crucial trend and aims to make policies that adopt an integrated approach that combines urbanization, migration, and mobility to contain inflationary trends while making the cities livable and vibrant. They recognize the important fact that the high population density of the cities results in Germans spending up to 154 h/year in in-city traffic (Nier, 2019).

To reduce the high level of traffic and the resulting environmental burden in cities, the United Nations (UN) has set a target that at least half of the urban population should use sustainable transport for everyday purposes, leading to increased importance of new mobility options such as car-sharing. The UN describes the city of the future to be sustainably mobile by 2030—for which, it prescribes mobility to comprise bicycles, bus, tram, metro, electric and hybrid car, and on foot.

Germany is an avid adopter of UN goals and has integrated these factors into its policy-making programs.

Federal, state, and local authorities in Germany allowed transport modes that fit into the individual requirements of the communities. Moreover, German urban regulation demands that cities must have intelligent guidance systems, a functioning parking management system, and well-developed cycle paths in order to cope with increasing traffic (BMZ, 2016). These so-called smart cities are able to collect and process live data in order to manage mobility resources. However, the German authorities also recognize that such efficient utilization of limited resources requires a post-ownership society, leading to an increased sharing system of resources (BMU, 2017).

3.3 Social Needs: The Decline of the “Car-Owning Cult”

In the era of sharing economy, the importance of owning a car is diminishing. Possessing a German car was close to a cult practiced even prior to the Second World War stretching from the East to Germany’s western borders. Its value as a status symbol has regressed over time as multiple car sales reports demonstrate. Until 2030, the number of cars in the EU is forecasted to decrease from approximately 280 to 200 million.

According to a survey that evaluated the implications of Germans that plan to buy a car in the next 12 months, only 20% consider a car as a status symbol, while 59% only see it as a tool (Horizont, 2017, cited from Statista, Statista, 2019). According to a study by Deloitte, this change will continue; hence high-priced car manufacturers, in particular, need to revise their brand strategy and market their cars less as status symbols and more as means of transport to be competitive in the long term (Deloitte, 2019).

The Fraunhofer Institut identifies the first users of new mobility options, so-called early adopters, as predominantly younger people with higher educational levels and thereby higher awareness of socioeconomic and environmental impacts. In addition, it was evaluated that a reduction in private vehicle ownership through car-sharing is only possible to a limited extent, about 7% for car-sharing services (Krauss et al., 2020). Therefore, a strong dependence on private cars remains.

Germany is currently undergoing a demographic change. The number of people aged 65 and above increased by 54% between 1990 and 2018 from 10.4 to 15.9 million. Until 2039, the number will further increase by five to six million people, with a relatively stable number of the total population (Destatis, n.d.-a, n.d.-b). As the older generation does not represent the current target group, the mobility providers need to create strategies to include this group in their businesses to not lose a large portion of potential customers that possess high purchasing power.

3.4 Sustainability Championing: A Mass Movement

On the 20th of September 2019, more than 1.4 million people participated in the “*Fridays for Future*” demonstrations in Germany (ZDF, 2019). These demonstrations, first initiated by pupils, are committed to climate protection. Since the 1950s, the annual growth rate of CO₂ emissions has more than quadrupled. Until now, the average global temperature has risen by about one degree Celsius and continues to rise further. Even if today’s society manages to limit the temperature increase to 1.5°, there will be noticeable consequences.

The change in average temperature will lead to an accumulation of extreme weather events such as drought, heavy rain, heat waves, or floods. According to German regulators, the transport sector emitted 163 million tons of greenhouse gases in 2019 and is thereby the third-highest emitter following the sectors of energy production and industrial manufacturing (BMU, 2020). Due to these circumstances, the authorities are attempting several forms of limiting the burden to the environment including the climate.

The EU established mandatory emission standards for the automotive sector. These standards oblige the OEMs to go along with a maximum emission value of newly produced cars to reduce emissions (European Union, n.d.). Even though the restrictions prevailed, multiple car manufacturers, preliminary the Volkswagen AG, falsified their emission test results to ensure that the vehicles were approved. This event is known in international media as Dieselgate, as mainly the results of diesel-operated cars were counterfeit.

This led to a global series of charges and fines, as well as stricter monitoring of the regulations (Handelsblatt, 2020). While this damaged the image of Germany as a quality producer of goods, it also dented the sales performance. In addition, multiple German cities and communities introduced a ban for diesel cars that do not correspond to the most current emission standards. (Verbraucherzentrale, 2020). These rigid regulations are forecasted to become even stricter. As stated earlier, environmental-friendly alternatives like electric cars and alternative transport options will be more critical for the market in the future given the above set of developments. There is a higher awareness among customers for realizing environmental needs and also a fall in the trust of German OEMs to solve environmental problems following Dieselgate. For these reasons, sustainable solutions are expected to boom in Germany.

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Chapter 4

Traditional Mobility Models



4.1 Individual Transportation: The Indelible Passenger Car

In recent years, motorized private transport has accounted for more than 82% of Germany's total transport performance (BMVI, 2017). Passenger cars perform about 642 billion km/year (BASt, 2019). Following a temporary demand collapse in the aftermath of the economic crisis in 2008, the number of registered cars in Germany continued to rise steadily. Since 1960, the number has increased more than tenfold (KBA, 2020, cited from Statista, 2020).

Of the more than 500 billion km traveled by nonelectric and non-hybrid cars, around three-fifths were covered by petrol and two-fifths by diesel cars (UBA, 2020). Distance traveled by kilometer can be strongly distinguished into different age groups. The usual working groups, aged 30–59, cover the most distance with an average of 12,000 km annually, while older people, aged 70 and above, and younger people under 20 cover considerably less distance with partly less than 10,000 km (Check24, 2018).

The domestic OEMs strongly dominate the German automotive sector. Most cars are sold by Volkswagen Group accounting for 17.3% of the market share that is closely followed by Mercedes (Daimler), BMW, Ford, and Audi. Out of the top ten car manufacturers or OEMs, four, namely, Volkswagen, Audi, Seat, and Skoda, are all part of the Volkswagen Group. Together, they account for an overall market share of 35.2%. In addition, the Group owns high-priced brands that are in the upper market segment such as Porsche, Lamborghini, and Bentley.

Ford has the highest market share of any non-German manufacturer. Also notable is that the third largest car manufacturer in the world, General Motors, is not in the top 15. Even the second- and fourth-largest manufacturers, Toyota and Hyundai-Kia, only have a market share in the low single-digit percentage range (KBA, 2020). The world's most valuable car company, Tesla, having a market capitalization that is higher than the one of Volkswagen, BMW and Daimler combined (Janson, 2020), is

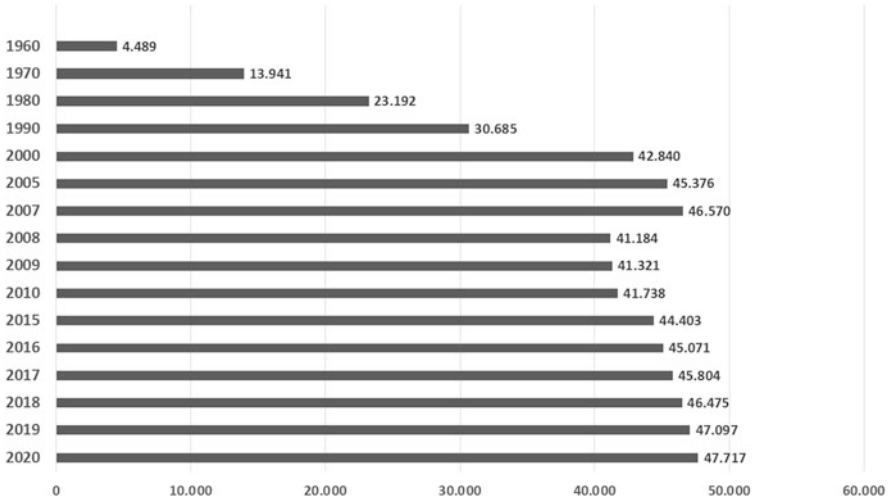


Fig. 4.1 Own illustration based on KBA (2020) Car registrations in 1000s

not included in the list of the 15 highest selling manufacturers in Germany. Figure 4.1 provides an overview of the respective market shares of OEMs as measured in the number of car registrations.

In order to tackle the current market changes, the German OEMs founded their own new mobility services. The Volkswagen Group invented the ride-pooling service MOIA, which provides electric shuttles that can be booked individually and flexibly via an app. Due to the authorities' limitations (see Chap. 2), in Berlin, MOIA is currently only active in Hamburg and Hannover.

Daimler and BMW started separate businesses before bundling their resources into the car-sharing provider SHARE NOW, which expanded its business to Europe and Northern America. SHARE NOW is the leading car-sharing provider in Germany (Kaleta, 2019). In order to be viable for the future, Daimler and BMW founded the YourNow Group, which combines numerous services in addition to car-sharing. The network also includes the leading ride-hailing provider FreeNow, park service provider as ParkNow, as well as a charging network for electric cars, ChargeNow. Therefore, the German OEMs not only rely on the traditional car sales market but also are preparing for the turnaround in the course of new mobility and are already dominating important market segments. Figure 4.2 illustrates the brands and the respective market shares.

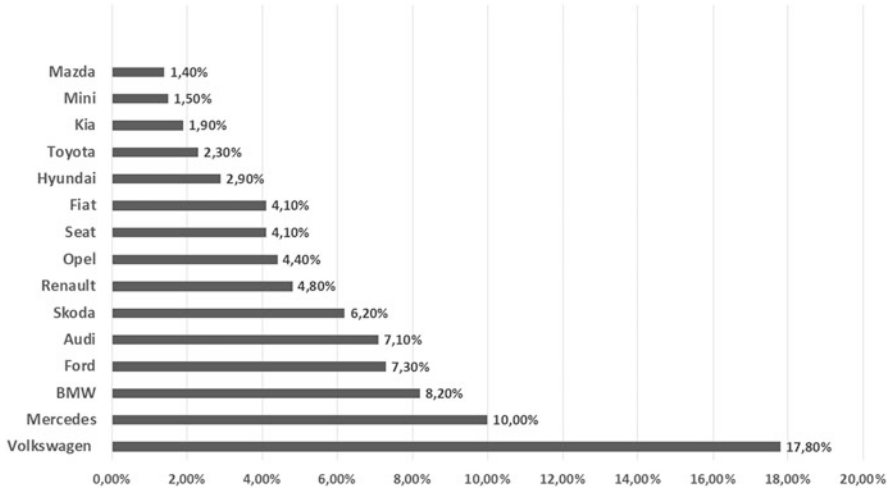


Fig. 4.2 Own illustration based on KBA (2020) Market share of OEM brands

4.2 Local Public Transport: Germany's Socioeconomic Arteries

Local public transport describes different, subsidized means of transport, mainly represented by buses, as well as local trains and metros. Local public transport is commonly known as ÖPNV and is regulated by the local authorities of the respective city or community. Each day, more than 30 million people in Germany use local public transport services, which reduces the calculated individual transport numbers by 20 million. In 2018, 10.4 billion passengers used public buses and trains, of which rail transport alone covers 67,000 km.

There is an inherent motivation of authorities to incentivize local public transport usage so as to achieve the results of significantly reduced energy consumption and harmful emissions, thus making ÖPNV an environmentally friendly alternative. The overall reduction amounted to 15 million tons of carbon dioxide (VDV, n.d.). In addition, public transport reduces noise pollution, traffic jams, and lack of parking space, especially in urban areas. Moreover, local public transport provides a strongly connected transport option for children and people that are not able or willing to drive.

Germany's public transport also offers economic opportunities. Around 621 transport providers are conjoined under the single umbrella organization Verband Deutscher Verkehrsunternehmen (VDV). The transport providers have a route length of more than 12,000 km. The total available lines amount to around 645,000 km, distributed over 17,000 transport options with 60,000 active vehicles. In 2018, the average number of annual public transport journeys in Germany was 127/person with yearly average revenues of 212 Euros per inhabitant. The average distance traveled per trip was around 13 km, with a total distance covered of

1660 km/inhabitant. Despite these figures, the local providers have much higher capacities with relatively low utilization of only about 25% (VDV, 2019).

Even though the individual federal states and regions are responsible for local public transport, the Federal government supports local public transport with almost 10 billion Euros invested in public transport. To make local transport more accessible, apps, including route planning and timetables, are provided free of charge. Many employers and universities subsidize long-term tickets.

4.3 German Train System: The Ubiquitous ‘Deutsche Bahn’

Deutsche Bahn AG (DB) is a German private joint-stock railway company offering long-distance train services, which is headquartered in Berlin and held in ownership by a single shareholder, which is the German Federal Government. DB also offers medium-range services under the sub-firm DB Regio that connects municipalities with different local transport providers. Under the spectrum of DB, around 23,500 trains are operating on a daily basis. It is noteworthy that the long-distance transport route carries 150 million passengers/year over an average distance of almost 300 km, thereby accounting for an average utilization of 54%. Especially, the higher-priced journeys led to a total turnover of around 5 billion Euros in 2019. To make the journeys more attractive for frequent travelers, DB offers discount cards with even up to 100% discount. In 2019, around five million people possessed a discount card (Deutsche Bahn, 2020).

Notwithstanding much criticism from various stakeholders, Deutsche Bahn holds an almost monopoly position in the railway market. A principal factor that causes the monopoly is that the DB owns the railway network infrastructure that seems to encourage DB to force out market participants or competitors out of the market by charging high track usage prices. The contestants, such as FlixTrain, hold a market share of only 1% (Monopolkommission, 2019).

In regional transport, which is tendered by the local authorities, Deutsche Bahn holds around 75% of the market share, compared to 54% in rail freight transport (Bundesnetzagentur, 2018). However, since DB cannot be obliged to grant other market participants access to the network but is still dependent on subsidies to maintain the rail network, the state invests in Deutsche Bahn and the associated rail network. Additionally, the state grants a reduced value-added tax on tickets of the Deutsche Bahn (Schlesiger, 2020).

4.4 Taxi: A Protected Local Market

As already mentioned in the PEST analysis, taxis are among the state-regulated transport options, as drivers need a license to operate legally. The individual states, municipalities, and regions set a fixed tariff. Additionally, special subsidies, such as the provision of taxi lanes in road traffic or taxi stands at specific points. The taxi business turnover has shown growth in recent years, which is also forecasted for the near future. Thus, the sector's total turnover increased from around 3.7 billion Euros in 2011 to 5.3 billion Euros in 2023 (Statista, 2019).

Taxi prices are set by the local authorities, which results in regional differences. For example, the first kilometer in Kassel costs 3.80€, compared to 1.90€ in Aachen. The prices in the major cities Berlin, Munich, Hamburg, and Frankfurt are between 2 € and 2.50€/km. The price will gradually be decreased with a rising number of kilometers. In addition, there are basic fees, as well as possible night or holiday surcharges (HALE Electronic, 2019). In contrast to the otherwise fast-growing markets of the mobility industry, the number of taxis has stagnated over a long period of time.

While the number of taxis in Germany in the 1960s was still under 10,000, by 1992, the number had risen to over 52,000. With slight fluctuations in recent decades, this figure is still valid today; in 2016, there were around 53,000 registered taxis in Germany (BMVI, 2017, cited from Statista, 2018). Thus, the number of persons transported changed only slightly. The numbers fluctuated in the twentieth century, mostly due to economic crises, between 350 and 465 million people/year. The highest value for the years 2000–2018 was recorded in 2000. At present, the figure is just below the record high at about 440 million (Bundesverband Taxi und Mietwagen, 2019).¹

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¹These numbers as well include car hire services.

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Chapter 5

New Business Models in Mobility



5.1 The Business Model Canvas (BMC) Approach

The BMC is a method developed by the management professional and academic Alexander Osterwalder of Strategyzer that raises nine strategy-oriented questions. Answering these provide a valuable overview of an organization while helping determine the most critical factors driving the business constitution of an organization. The BMC is a commonly used tool in international environments to analyze and generate an overview of the most relevant elements determining the success of a company. This approach is used in practice for young companies such as start-ups to gain a quick conceptualization of the value offered. For the above reasons, we apply this method towards identifying the business model of the innovative start-ups in the German mobility industry. The BMC covers nine dimensions listed in Table 5.1.

5.2 Carsharing: What Makes SHARE NOW the Market Leader?

Carsharing

Carsharing describes a form of service which provides cars to rent for a limited time horizon, typically for a short time period. The services are offered via an app, which the customer use to search for cars, reserve, and book, as well as to open the car and to finish the trip.

Carsharing can be divided into free-floating and station-based. Free-floating carsharing describes a model in which trips can be started and finished on free chosen places within the area of operation, while station-based carsharing limits the freedom of the trip, prescribing certain locations to start and finish.

Table 5.1 Business model canvas: nine dimensions

1	Key partnerships	The most relevant business partners who can help to leverage the business model
2	Key activities	Key activities the company needs to perform
3	Key resources	Infrastructure needs to create, deliver, and capture value
4	Value proposition	Bundle of goods and services the business provides
5	Customer segments	All people that create value for the business, as well
6	Channels	How the company interacts with its customers in order to create value
7	Customer relationships	Established relationship with its customers
8	Revenue streams	How and through which revenue streams the business is capturing revenues
9	Cost structures	Provide the most relevant cost factors

The BMC is formulated as a template that can be administered for multiple companies. In the following sections, using the BMC approach, the new business models in Germany's mobility industry, namely, car-sharing, ride-pooling, ride hailing, long-distance service, and last mile, are analyzed and presented

	Free-floating	Station-based
Number of Providers	7	218
Number of Cars	14.200 (+48,9%)	12.000 (+7,1%)
Available Locations	17 (+0%)	840 (+13,5%)
Total Customers	1.580.000 (-12,7%)	710.000 (+9,2%)
Number of Stations	-	6.150
Average usage Time per Trip	30 minutes	5 hours
Average Distance per Trip	10 kilometers	45 kilometers

Fig. 5.1 Own illustration based on Bundesverband CarSharing (2020). Free-floating vs. station-based

Carsharing demands a dense network and therefore making the free-floating option a suitable business model that is mainly operated in larger cities in Germany such as Berlin, Munich, Frankfurt am Main, and Hamburg. Station-based carsharing is developing as an excellent option of mobility in 840 municipalities in Germany (Bundesverband CarSharing, 2020). Crucial data of both service options are presented below in Fig. 5.1.

As can be inferred above, both options were able to generate high growth rates in the services provided. Car2Go and DriveNow, which were competing players in the market were merged into SHARE NOW, which helped consolidate customer data, the result of which shows a negative trend, even though the actual numbers of SHARE NOW usage have been on a rise. Following the bundling of resources, especially the fleet of cars and merging the customer database, the JV heavily invested further into acquiring a new fleet, thus creating a larger supply of their services in the German market.

Ranking according to fleet-size	Free-floating	Station-based
1 st	ShareNow	Stadtmobil
2 nd	Sixt share	Cambio
3 rd	We share	teilAuto (Mobility Center)
4 th	Miles	book-n-drive
5 th	book-n-drive	DB Connect

Fig. 5.2 Own illustration based on Bundesverband CarSharing (2020). Ranking

Owing to the high number of market participants, the station-based carsharing market is divided into regionally active service providers, while in free-floating carsharing, there are only a few market participants. Free-floating services are commonly used for short-range trips, while a longer route and a higher average time are covered with station-based services (Bundesverband CarSharing, 2020).

As presented in Fig. 5.2, the carsharing market is led by SHARE NOW, followed by Sixt Share. Among the top five is the market player Miles, which offers a different payment approach. Usually, customers pay per time (commonly per minute), while Miles offers payment per distance, which offers an advantage in traffic. More than 10% of all carsharing utilities are electric (Bundesverband CarSharing, 2017, cited from Statista, 2020). As stated in the PEST analysis, the generated revenue in the last year was less than close to a billion euros, with a steady increase forecasted for the upcoming years.

As inferred above, SHARE NOW is currently the most influential brand and market leader in the free-floating sector. The BMC analysis discussed in the subsection below illustrates the business model and the valuable factors driving the success of the business.

SHARE NOW: Business Model Canvas

Key partners of the JV are the shareholders, Daimler, and BMW that primarily contribute to equipping the company with a fleet of cars. It is noteworthy that SHARE NOW owes its success to several strategic business cooperations. For example, on the services side, SHARE NOW cooperates with local cleaning services or gas station chains, while on the customer site, different corporations provide a variety of cars in multiple segments that appeal individually to each customer. An additional success factor is the exclusive parking spots provided by local governments that make it attractive for customers to make use of the service centrally.

Key activities include fleet and platform management, as well as customer service. Key resources possessed are the IT platform and several different types of cars for varying requirements. Additionally, the mentioned provided parking spots lead to a competitive advantage. The value proposition of SHARE NOW is extremely customer-friendly. The customers can search, reserve, and book different cars with openly shown conditions via an app. The parking spots are provided without any costs, and each car has a credit card for fuel or electricity charging on board. Furthermore, customers do not have to pay any insurance costs and can pay directly via the app without a deposit.

There is no time limit of operation, even though the regions are limited. Although the recent merger offers a higher density of available cars and reduces the customer's overall effort, the relationship requires rebuilding. The channels of SHARE NOW are primarily via an app, although there is an offer of customer service on the website. As stated in the general introduction to the carsharing sector, free-floating services such as SHARE NOW are rather used within bigger cities and for short-range trips.

Regarding the different purposes and occasions, customers can choose out of a wide range of vehicles. Therefore, the customer segment is not clearly definable.

To generate revenue, SHARE NOW takes a registration fee of about 30 Euros, as well as varying usage fees for different cars, starting from 19 cents/min. The service provider offers additional hourly and daily rates. Moreover, fees for parking at certain locations, such as airports, can occur. The cost structure includes the fleet itself, its maintenance and insurance, as well as fuel and electricity charging. Moreover, SHARE NOW has to provide IT for the overall business and customer services. Furthermore, SHARE NOW has to reallocate its vehicles frequently to keep a balance of the available locations and cars, leading to high operational costs (SHARE NOW, n.d.). A snapshot of the BMC is presented in Fig. 5.3.

5.3 Ridepooling: How Successful is MOIA?

Ridepooling

Ridepooling describes a service that combines the routes of individual people using Internet technology and communication devices that result in more efficient, cheaper, and environmentally friendly transportation. The principal advantage lies in reducing the overall number of cars and traffic while offering flexible services in a sustainable fashion. Customers use an app to book the shuttle by feeding in their "start and final" destinations. Shuttles driving on this route collect passengers on the way and bring them to their exact destination, which is a service neither private nor public transport that delivers thus far. Ridepooling services are offered in-city or on a long-range basis.








Key partners  <ul style="list-style-type: none"> - Shareholder (Daimler AG & BMW AG) - Local authorities - Businesses on the service and customer site - Cleaning services - Maintenance services 	Key activities  <ul style="list-style-type: none"> - IT / Platform management - Customer service - Fleet management 	Value proposition  <ul style="list-style-type: none"> - Unlimited operation times - Possible reservation - No fuel/ electricity charges - No insurance payments - Fully operable and payable via app - Free parking spots 	Customer rel.  <ul style="list-style-type: none"> - Easier handling and less effort due to bundling of resources - Higher availability of (customer) services 	Customer segments  <ul style="list-style-type: none"> - Short-range and time routes - High diversity of cars lead to a high diversity of customers - Environmentally aware people - Businesses
Cost structure  <ul style="list-style-type: none"> - Fleet management (including reallocation of vehicles) - IT infrastructure - Insurances, fuel and electricity - Personnel costs 		Revenue streams  <ul style="list-style-type: none"> - Registration charges - Usage fees - Additional charges, for example airports 		

Fig. 5.3 Own illustration SHARE NOW business model canvas

The most known services for in-city ridepooling are MOIA, a subsidiary of Volkswagen, and Clevershuttle, which is part of Deutsche Bahn. However, the services are not particularly profitable so far, and the demand is relatively low. As for now, only around 25% of the expenses have been covered. According to the management consultants McKinsey, the main reasons are the long waiting times and the comparably high prices compared to private transport. In addition, there are restricted business areas and limited availability (Schwär & Meyer, 2019). Due to the low profitability, CleverShuttle has already had to withdraw from some locations (Handelsblatt, 2020). MOIA also had to limit the offer.

Additionally, there are long-distance services like BlaBlaCar. The business only provides the platform used by private persons to arrange for joint journeys to reduce costs. Unlike the models mentioned above, BlaBlaCar does not provide a vehicle and driver (BlaBlaCar, n.d.).

The following BMC analysis will elucidate the most relevant factors of the business MOIA.

MOIA: Business Model Canvas

The most relevant partner of MOIA is the shareholder, Volkswagen, which provides the fleet. MOIA operates only electric vehicles for which reason it has to cooperate with charging providers and, to an extent, built their own charging locations to power their fleets. As for all business models in the mobility sector, maintenance services do apply as key partners as well. Just like SHARE NOW, MOIA offers corporate businesses special conditions due to the high importance of this customer

group. The key difference in activities in comparison to SHARE NOW is that the vehicles are operated by MOIA employees. MOIA is completely in charge of the IT infrastructure and customer service to deliver on optimal fleet management.

Key resources are the IT platform via which the bookings, payment, etc. are processed, as well as the vehicles and the driver of the shuttle, who is responsible for the cleaning. The driver of the shuttle is one of the main value propositions, as it gives the customers the freedom of not driving themselves. They also do not have to search for parking spots once they arrive at their destination, which saves much time. Even though MOIA does not start and end at the exact target location, the radius is within a small region. MOIAs are equipped with a high number of extras within the vehicle, such as offering free WIFI and USB options. One MOIA vehicle can transport up to six persons, making it a suitable opportunity for medium-sized groups. Additionally, MOIAs can be booked and paid via app, and the current location and time to the target location are visible live on the app and within the vehicle.

Having a driver adds to MOIA's personal interaction in the customer relationship. Channels used in order to market the service and process the customer service are the app and the website. Ridepooling increases the number of possible routes, thus providing the potential for developing a large customer group. MOIA is especially interesting for the following customers: (1) medium-sized groups, (2) people who cannot or do not want to drive by themselves, and (3) being the sole provider of electric vehicles, for environmentally aware individuals. The large vehicles allow people to transport luggage; additionally, MOIA allows for the booking of a chauffeur service making it an attractive option for business customers.

Notwithstanding the above fine features, MOIA is nowhere near profitable due to the relatively low demand in comparison to the high costs. The vehicles of MOIA are developed for the service and come with high administrative costs. In addition to the high IT infrastructure expenses, the operational costs are extremely high due to the personnel. The high costs are only contrasted by low revenues from private and business customers (MOIA, n.d.), making MOIA unprofitable. A snapshot of these facts is presented in Fig. 5.4 in the BMC format.

5.4 Ride Hailing: Is FREE NOW's Marketing Its Strength?

Ride Hailing

Ride hailing describes individually bookable rides operated by a driver. The service is similar to that of a taxi provider with the difference that it allows for an expansion into the traditional business model of a taxi by facilitating the customer to book a ride online. Traditional taxi businesses in Germany rely on telephone booking.










Key partners  <ul style="list-style-type: none"> - Volkswagen as shareholder and fleet provider - Electricity charging businesses - Cleaning and maintenance services - Businesses as customers 	Key activities  <ul style="list-style-type: none"> - Operating the vehicle - IT / Platform management - Customer service - Fleet management Key resources  <ul style="list-style-type: none"> - Vehicles - IT platform - Driver 	Value proposition  <ul style="list-style-type: none"> - Driver as part of the service - Up to 6 persons - Fully electric - Inner room equipment (WIFI, USB etc.) - Start and drop-off close to target location - No parking etc. 	Customer rel.  <ul style="list-style-type: none"> - Human interacting with the driver - Combines group of people Channels  <ul style="list-style-type: none"> - Smartphone app - Website 	Customer segments  <ul style="list-style-type: none"> - Larger groups - Environmentally aware people - People that cannot / do not want to drive themselves - People that want to transport luggage - Businesses / individuals preferring a chauffeur service
Cost structure  <ul style="list-style-type: none"> - Fleet management - IT infrastructure - High personnel costs - Costs for car production 		Revenue streams  <ul style="list-style-type: none"> - Individual and business fees 		

Fig. 5.4 Own illustration MOIA business model canvas

As discussed earlier in the distribution of non-car selling revenues in the German mobility sector, ride-hailing and taxi services are emerging as vital supplementary services to meet the needs of customers. The German market was initially led by the provider MyTaxi, which was recently acquired by the start-up network of Daimler and BMW and is now active as FREE NOW. Owing to legal restrictions discussed in the previous PEST analysis, world-renowned ride-hailing leaders like Uber could not complete the German market penetration failing to remodel their business proposition to be consistent with the PBefG. This has been a valuable opportunity or market gap for FREE NOW to fill in. Using the advantages as a local player, FREE NOW connects local existing taxi services with customers via the digital platform. Furthermore, FREE NOW integrated a service called Ride, which offers bookings of rental cars (FREE NOW, n.d.).

FREE NOW's main key partners are the shareholders Daimler and BMW. As FREE NOW uses current taxi services for ride-hailing services, these play a vital role in the success of the JV. Taxi services are subsidized and obliged to apply a given tariff; thus, local authorities are also crucial for the company. Services are required for cleaning and maintenance. Key activities of FREE NOW contain the platform management and the coordination of the taxi services, as well as the management of the respective partner taxi companies. Additionally, FREE NOW has to take care of customer service. The joint venture has multiple advertising cooperations, such as Google Maps, which directly proposes a vehicle booking when planning a route via the app.

The individuality of the user or customer is at the heart of FREE NOW's value proposition. Privacy and the efficiency or speed of reaching one's destination position FREE NOW to attain quick market leadership. Unlike sharing or pooling models, ride hailing is an individual service that neither takes any detours nor










Key partners  <ul style="list-style-type: none"> - Shareholder (Daimler AG & BMW AG) - Local authorities - Businesses on the service and customer site - Cleaning services - Maintenance services - Taxi services - Advertising as via Google Maps 	Key activities  <ul style="list-style-type: none"> - Collaboration with the taxi services - IT / Platform management - Customer service 	Value proposition  <ul style="list-style-type: none"> - Driver as part of the service - No parking etc. - Individual service - Privacy - Speed - Booking & payment via app 	Customer rel.  <ul style="list-style-type: none"> - Human interacting with the driver - Cooperation with taxis increases image 	Customer segments  <ul style="list-style-type: none"> - People that value privacy - People that cannot or do not want to drive themselves - People that need to transport luggage - Businesses / individuals preferring an individual & fast service - Higher income levels
Key resources  <ul style="list-style-type: none"> - Taxis - IT platform - Driver 		Channels  <ul style="list-style-type: none"> - Smartphone app - Website 		
Cost structure <ul style="list-style-type: none"> - Fleet management - Taxi collaboration costs - IT infrastructure 		Revenue streams <ul style="list-style-type: none"> - Individual and business fees 		

Fig. 5.5 Own illustration FREE NOW business model canvas

requires time for parking. Customers are likewise able to pay and book via the app. Having a personal driver is marketed as a factor of human interaction that fulfils an emotional need that is also representative of the taxi sector making it a beneficial aspect to retain good customer relationships. A big advantage of FREE NOW in contrast to the global player Uber is that it does not eliminate taxis. Instead, it cooperates with the taxi industry and therefore gives new options to a threatened business model and makes it seem a more benevolent and inclusive player in the market.

The channels of business are the same as for the business models discussed above. It entails a combination of the smartphone app, platforms, and website alternatives catering to the needs of different customer needs. Since a taxi is tied to the prescribed fees, which are comparatively high, FREE NOW is an offer for customers who value privacy and efficiency rather than the lowest possible price. The OEM subsidiary offers separate corporate pricing structures as well. Important value addition is the possibility of luggage transport that attracts requiring more space personal and luggage space. The main costs occurring are from fleet management, the administration of the platform itself, as well as fees charged by the taxi operators. The costs are offset by income from individual and corporate customers. Figure 5.5 illustrates the BMC for FREE NOW.

5.5 Long-Distance Services: Is FlixBus a Survivor or a Thriver?

Deutsche Bahn, the market leader in inter-city transport, faced new competition in 2013 when FlixBus entered the market. As the market leader in bus inter-city transportation, FlixBus transports more than 62 million people a year, with more than 2500 destinations in 33 countries all over Europe (FlixBus, n.d.-a). The long-distance service provider offers low prices, e.g., offering trips starting at 5 Euros (FlixBus, n.d.-b). In recent years, FlixBus started their train service, called FlixTrain. As stated in the Deutsche Bahn analysis, the market share is still comparatively low. The following business model canvas analysis will elucidate the most relevant success factors of FlixBus.

FlixBus: Business Model Canvas

The low-price policy of the company is possible due to the extensive partner network. FlixBus itself owns only one single bus, and this is only for licensing reasons. Still, the company generates a market share of roughly 90% (Schlesiger, 2016). The most important part of the company's success is based on the extensive network of bus companies, which act as main partners and perform the trips. Also, travel agencies, which market the trips, are an essential part of the value chain. Numerous external marketing agencies promote the company's services internationally. In addition, FlixBus cooperates with various innovation hubs to make the offer future-proof and sustainable. Hence, the company's main activities are collaboration management and the operation of its platform, as well as customer service.

As FlixBus operates on a light asset principle, thereby, physical key resources are kept minimal. Apart from the IT platform, the established collaboration network is the most crucial part of success. Besides the low price, the key value drivers are led by a wide variety of target locations, which can be approached at a low price. Due to the intermediate stops, groups can travel together from different starting points. Buses are equipped to offer highly comfortable services. Besides, group fares and discounts for children are offered, resulting in an even more attractive price. The customer relationship is strengthened through the high human interaction, given by the permanent presence of various contact persons.

The channels range from their own app and website to the already mentioned travel and ticket providers, as well as various advertising partners such as affiliate agencies. Due to the long travel times and the inconvenience this causes, FlixBus tends to appeal to the low-price sector. Since bus travel reduces the emission levels of individual transport, which would otherwise occur, due to the number of passengers, environmentally conscious people, in particular, tend to choose this option. In addition, people who cannot, do not want to, or are not allowed to travel long distances themselves are attracted to the offer. A luggage compartment in the








Key partners  <ul style="list-style-type: none"> - Official bus stations - Bus partners - Travel agencies and ticket outlets - Advertising partners - Innovation partners - Affiliate partners 	Key activities  <ul style="list-style-type: none"> - Collaboration management - IT / Platform management - Customer service 	Value proposition  <ul style="list-style-type: none"> - Bus is operated - Low prices due to light assets - High variety of inter-city target locations - Reductions for groups, children or people with disabilities - Environmentally friendly 	Customer rel.  <ul style="list-style-type: none"> - Strong human interaction due to high amount of staff taking care of the customers 	Customer segments  <ul style="list-style-type: none"> - Lower income levels - People that cannot or do not want to drive themselves - People that need to transport luggage - Environmentally aware people
Cost structure  <ul style="list-style-type: none"> - Administrative costs - Partner fees 	Revenue streams  <ul style="list-style-type: none"> - Individual and group fees 			

Fig. 5.6 Own illustration FlixBus business model canvas

coach also makes the model suitable for passengers with a high volume of luggage. As FlixBus does not operate the buses itself, only administrative costs apply. The revenue generated by the paid individual or group fees is split into a fixed portion between the market leader and the service providers. The BMC is presented as a snapshot below for quick reference (Fig. 5.6).

5.6 Last Mile: Is Lime Here to Stay or Just a Fashion-Fad?

Last-Mile Delivery

Last mile is a logistic and supply chain term that refers to the short geographical distance that must be covered to deliver goods or people to their end-destinations. Last mile is typically seen as a complex but expensive activity that recently demands much attention due to rising urbanization and the resulting congestion due to traffic problems or limitation of parking.

Since 2018, German Federal authorities began recognizing the value of electric or e-scooters and their viability for last-mile transport. The result of which was the grant of permission and relaxation of regulation in allowing for the public and private use of e-scooters. The simplicity of the usage such that the vehicle can be easily unlocked and subsequently driven for a comparably small amount of money via an app; various providers entered the market, resulting in more than 30,000 scooters being available in major German cities.

The providers undercut each other with low prices and tried forcing out competitors from the market. So far, no provider has been able to maintain its position as a market leader, which is why no market consolidation has taken place yet. The current leading providers are Lime, Tier, Circ, Voi, and Bird. Since July 2019, local authorities regulate the market with licenses and permissions for different service providers.

The use of scooters varies from region to region; while in Ingolstadt, a scooter is used about five times a day, the providers in Potsdam have only 1.5 uses/scooter/day. The e-scooters are regarded as last-mile means of transport, as the average distance traveled is less than 2 km, and therefore, longer distances are usually covered in combination with other modes of transport. However, usage data indicates that e-scooters are preferably used in leisure time or by tourists and thus not represent an alternative or competition to established means of transport. Notwithstanding these, the time horizon of the market participation is still too short to present conclusive statements. The following business model canvas will elucidate the service provider Lime.

Lime: Business Model Canvas

Lime Bike, part of Neutron Holdings Inc., is a San Francisco-based e-scooter provider operating in 15 German cities. Since the local authorities decide on granting the providers' licensing, they can be regarded as key partners that make or break the business. In order to further develop e-scooters as a product such as to increase battery life, Lime is working actively with innovation hubs.

The scooters need to be recharged, which is performed by so-called hunter communities, i.e., private individuals who register with the providers and charge the scooters in their private households and then distribute them in the city. In the case of Lime, these hunter communities are also called juicers and represent valuable partners. In order to cover liabilities, damages, and accidents, Lime partnered with Allianz to cover the most relevant insurances. Therefore, key activities of Lime include platform management as well as the control, management, and distribution of the scooters. Besides, Lime must coordinate the juicers and provide customer service.

The main value proposition is generated via high availability and comparably low prices. Lime charges a 1 Euro unlock fee + 25 cents/min usage fee but as well offers subscription and corporate offers. The app enables easy monitoring and usage of the service. As the scooters can be parked nearly everywhere, there are neither prescribed parking spaces nor locational dependencies. Due to a speed of 20 km/h, the ride is much faster than walking and comparable with a bike, applicable for short-range routes. As a result of vandalism and other damages of the e-scooter, customers can be asked to take a picture of the scooter at the end of their ride. Furthermore, Lime, as well as the other e-scooter providers, is dependent on the customers'










Key partners  <ul style="list-style-type: none"> - Public authorities - Innovation / technology hubs - Hunter / Juicer - Allianz insurance 	Key activities  <ul style="list-style-type: none"> - IT / Platform management - Customer service - Fleet management - Juicer management 	Value proposition  <ul style="list-style-type: none"> - High availability - Low prices - Easy monitoring of app and scooter - Locational independence / No prescribed parking spaces - Speed 	Customer rel.  <ul style="list-style-type: none"> - Vandals and subsequently stricter control - Dependency on adequate behavior 	Customer segments  <ul style="list-style-type: none"> - People with targets that are not closely connected to public transport - Tourists - People with short-medium ranged routes - (Environmentally aware people) 	
Key resources  <ul style="list-style-type: none"> - Cooperation network - IT platform - Fleet - Juicer 			Channels  <ul style="list-style-type: none"> - Smartphone app - Website 		
Cost structure  <ul style="list-style-type: none"> - Administrative costs - Fleet costs - Juicer fees 			Revenue streams  <ul style="list-style-type: none"> - Unlock fee - Fee per minute - Subscription fees 		

Fig. 5.7 Own illustration Lime business model canvas

adequate traffic behavior; otherwise, public authorities could revoke the licenses of the mobility services, resulting in a complicated customer relationship.

Lime solely offers its services via app and website. The scooters are mainly used for routes in which the target location is sub-optimally linked to public transport modes, as well as for short-range trips. E-scooters are as well frequently used by tourists to discover the cities in a comforting way. Even though e-scooters are comparably environmentally friendly, as for all electric battery-driven modes, there is still room for improvement. Along with the administrative costs, Lime has to cover upcoming fleet costs. In addition, juicers get paid a certain amount per scooter charged. Revenues are generated via the mentioned unlocking and driving fees, as well as through subscriptions and business offers. The relevant facts are presented in the BMC template below (Fig. 5.7).

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Chapter 6

Customer Outlook on Mobility: Survey Design



6.1 Research Gaps in Mobility Literature

Diverse studies on mobility in the EU show that more than 70% of its citizens live in urban areas and that 80% of the EU's gross domestic product can be directly attributed to urbanization. As GDP, i.e., economic activities, grow, the importance of mobility has increased manifold such that all stakeholders in the sector realize the need for efficient and effective solutions. Local and EU studies point to the fact that traditional preferences such that the dependence on private mobility options aggravate economic inefficiency by creating traffic congestion and delays, the costs of which are estimated to be 100 billion Euros per annum (European Commission, 2021). Likewise, the EU also points out that urban mobility, especially, road transportation, alone accounts for 40% of carbon dioxide emissions and up to 70% of other pollutants that contaminate the air quality.

Literature on mobility thus far concentrates on the broader challenges of urban mobility and sustainability from a macro as well as regulatory perspective. These studies are relevant to understand the economic growth and welfare frameworks that build the mobility industry, the emergence of new products and processes, the impact of innovation, as well as the evolution of business models. While these fulfil the necessary conditions, without an understanding of customer perspective, these studies alone are insufficient to achieve an overall comprehension of the current mobility industry in Germany. In order to provide a holistic overview, this book proceeds to undertake a survey analysis that will provide a deeper understanding of customer attitudes, needs, and motivational factors that influence his/her behavior on mobility in Germany. Here below are the objectives of the survey.

6.2 Empirical Tool: Survey Objectives

The following empirical study aims to verify the discussion of customer needs described so far and to supplement the analysis with original results from mobility consumers. The survey objectives presented as three broader boxes below are aimed: to provide insights on the intensity of mobility usage across different age groups, the level of knowledge of the customer on established and new mobility options, and how he or she uses this in mobility decision-making and how prepared is the customer for changes in the mobility industry. It also aims to analyze how the customer perceives the changes taking place in the industry and how does the customer behavior change with the increasing options in mobility.

Objective 1: Customer Mobility Usage, Awareness, and Willingness

What is the status quo of usage of the available private and public mobility options?

Are customers aware of the new mobility options, and how far are these integrated into customers' daily usage?

How willing is the customer to switch between traditional and new business models? What is his or her general tendency of mobility consumption?

How strong is the customer resonance for the denomination as a target group for pointedly offering services via new business models?

Objective 2: Customers' Decision-Making Behavior and Success Factors

What factors are important to the customer when making a decision for and against a mobility provider, irrespective of traditional or a new mobility option?

Which of these identified factors most significantly influence customer behavior?

Which of these factors can be filtered out as those that contribute to the success of a mobility provider in Germany?

Objective 3: Megatrend Influence on Customer Perception

Is the customer familiar with megatrends influencing his or her mobility usage?

What role does the customer's knowledge of megatrends impact or influence his or her usage?

How could customer behavior change in the future?

6.3 Survey Design, Administration, and Content

As discussed above, the survey aims to provide a generic market overview as well as draw specific inferences from the customer's point of view and experience on mobility. The survey is designed to attain quantifiable results and to generate the highest possible number of opinions. In order to ensure the comparability of the different answers, closed sets of questions were presented. To enable a targeted and comparable evaluation, nominal scales were used to represent or capture multiple aspects of the question.

To generate additional insight into the market conditions and to understand how the perception of the change in the mobility industries especially to evaluate the status quo, open answer fields were provided. The aim was to enable answering on an optional basis to expound detailed and in-depth insights into customers' market experience. However, as a by-product, unqualified and defamatory comments relating to certain mobility providers were also received that had to be excluded from the evaluation.

The survey was carried out as a digital questionnaire on the platform named umfrageonline.com, which has the advantages of (1) rapid distribution through different media, (2) automatic storage, and user-friendly evaluation. Additionally, surveyors or participants enjoy the flexibility of filling out the survey at a time and place of their choice. Online tools allow filter questions that appear or can be answered only if detailed answers have been submitted previously to selected questions. The survey was available online between the fifth and 20th of July 2020. To motivate intensive and extensive survey participation, during the announcement or introductory request of the survey, participants were notified that a voucher would be raffled among all participants completing the survey. Participants were assured of anonymity and data protection. In addition, the topic of the survey was briefly elucidated, and an approximate processing time of 5 min was indicated.

The survey began with preliminary questions to find out the strength of the influence and the use of alternative mobility providers, such as the ownership of a car or a subsidized public short-range transportation card. This was accompanied by questions on the use of the German railways and followed up questions on general conditions for the use of providers, such as the possession of an Internet-capable smartphone. Following this, the use of the established models, as well as the market knowledge of the participants, was examined before the main factors were assigned to the market participants and assessed in terms of importance. Finally, demographic data were collected for a target group analysis. After the survey was completed, an expression of thanks was presented, and all participants were able to enter their email addresses so as to participate in the raffle. The survey results and discussion in the next chapter provide all information on survey questions along with corresponding answers. The survey was distributed via social media notably Instagram and LinkedIn.

6.4 Sample Description

A total of 120 people participated in the survey, of these persons 109, representing 91% completed the survey. As correlation among answers plays a significant role, the book considers only the completed surveys to get the desired holistic view. In terms of age structure, the participants in the group were relatively homogeneous such that the majority of around 90% of the participants were between 18 and 25 years old. This tends to provide a detailed analysis of younger market participants, who are mainly known for the use of alternative services that we have studied above as the new business models or new mobility providers—therefore, the participants represent the **first movers** in these services. The gender structure can also be presented as balanced, with 43% female and 57% male participants, as illustrated in Fig. 6.1.

Answers, however, include those from all income groups, while the majority, more than 55%, live on a net income of less than 1000€ per month. Answers from people with a net income of more than 3000€ or 5000€ are also included in the analysis; however, these are fewer as compared to the majority of the participants (Fig. 6.2).

There are strong regional focuses as 44 of the 103 participants who answered this question resided habitually in Hamburg, Germany’s second-largest city. A total of 37 participants were residential in North Rhine-Westphalia. Lower Saxony was represented by nine participants, Schleswig-Holstein by four, and Berlin and Hessen by three and two participants, respectively. Residents of large cities dominated the field, as nearly 50% of the interviewees live in cities with more than one million inhabitants. The remaining 47 participants were distributed over the scale, which allows an analysis of the connection between local differences and the use of the

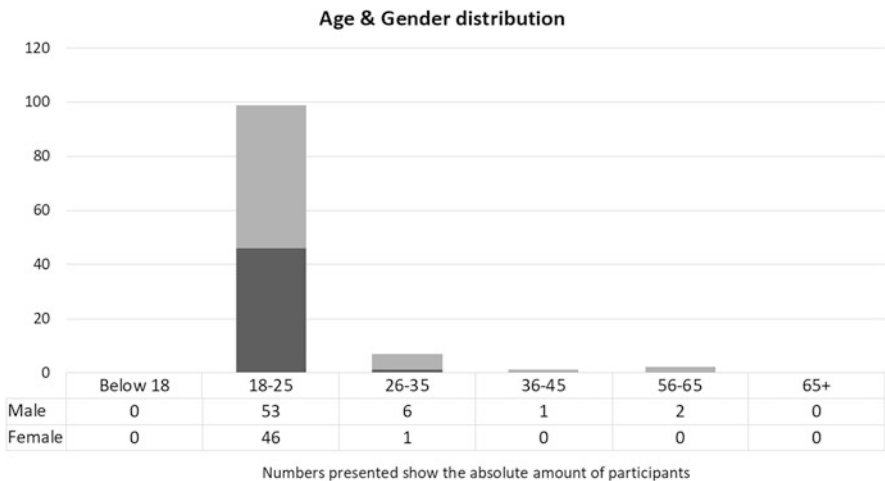


Fig. 6.1 Own illustration age and gender distribution

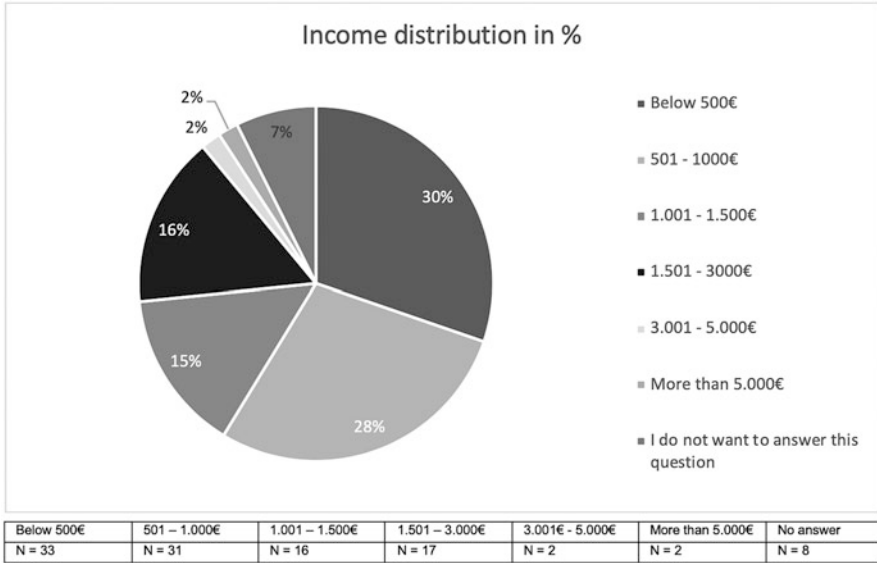


Fig. 6.2 Own illustration of in the income distribution of survey respondents

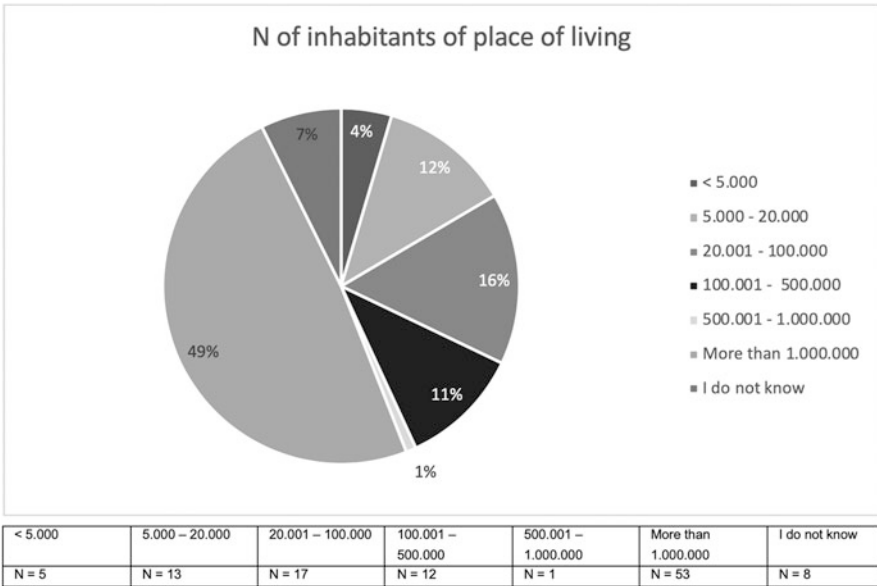


Fig. 6.3 Own illustration of N of inhabitants of place of living

providers. Eight participants did not provide any data. As the book covers the German mobility market, only participants with their usual residence in Germany were surveyed (Fig. 6.3).

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Chapter 7

Customer Outlook on Mobility: Survey Results



7.1 Customer Mobility Usage and Intensity

In order to assess the reasons for choosing different mobility options, the survey requested information on existing options of transport and mobility. Accordingly, the survey results showed that access to cars, motorcycles, or subsidized tickets for public transportation played a vital role in the overall usage of alternative transport modes. Of the 109 participants, 49% owned a car or a motorcycle, while roughly 13% had unlimited access to the same, thus representing the group that would use owned or leased options of private transportation. Totally, around 62% are independent in their choice of transport and tend to use private against public means of mobility. Just under 23% of all respondents had limited access to a car or motorcycle, while around 15% had no access to individual private transport means.

Interestingly, the survey showed that unlimited access to private transport is somewhat directly related to the use of public transportation services. Specifically, the survey results point to 50% of respondents that had full access to cars or motorcycles ended up using public transport, while only a small percentage of 7.5% never used the same. The usage of the ÖPNV was significantly higher among those respondents who possessed a subsidized ticket for local public transportation; hence, over 91% of the frequent users use subsidized services as compared to 53% without these tickets who also used the public transport system infrequently.

Approximately 76% of those respondents with limited access and 88% of those without any access used public transportation regularly. Of the frequent users of short-range public services without any access to private transportation, 80% own a subsidized ticket, whereas 73% of the surveyed with restricted access regularly using the services had some form of price concession that motivated their usage. The significance of this aspect requires further support because similarities in behavior could be found even with those respondents, which is 83% that were infrequent users who also enjoyed benefits such as price concessions. The number of people without

access to individual private transport using public transportation is too low to elaborate a representative answer.

A strong dependence on access to private transport and subsidized tickets connected with the use of public transport was a key observation in the survey. This information was gathered by asking all respondents with supported tickets how their usage patterns would change if the ticket were discontinued. Out of the 79 respondents, 68% would reduce their usage regularity, whereas 14% would completely stop using the transport offer. Merely 18% would continue usage in the same frequency, while around 29% of those are only infrequent customers of the public providers.

Although the main focus of the survey is on everyday means of transport, the participants were also asked about their usage behavior for journeys with Deutsche Bahn. Only about 10% of the respondents stated that they travel with the offered trains at least once a week. None of them used the offers on a daily basis. The vast majority traveled less frequently than every 4 weeks on Deutsche Bahn trains, while 13% did not use the services at all. This confirms that the Deutsche Bahn is viewed by many as a primarily long-distance service provider making it only an occasional option of mobility in the case of our sample. In the analysis, no correlation between access to individual transport and the use of the DB could be identified.

7.2 Customer Awareness of Diverse Mobility Options

The state of knowledge of the industry of established and alternative providers constitutes an important aspect of the survey. To get information on this, survey questions sought to find information from respondents that could give an assessment of their knowledge and awareness level of the newest mobility options and the mobility structures that are emerging in the overall market. Since mobility terminology may not be commonly used among respondents, the survey referred them to more commonly known names of new mobility providers to aid respondents to understand and answer the questions. The questions sought to distinguish between people that (1) either knew the service, (2) or have used it before, or (3) neither of the two.

Of all the options provided, the highest usage rates were recorded for long-distance bus services and e-scooters, with 58 and 62 of the 109 people surveyed, respectively, having used the offers before. These groups had in fact the highest market awareness of the new mobility options. In contrast, less than 3% and 5%, respectively, of those who used long-distance bus services and e-scooters were not conversant with diverse mobility options neither in the form of services nor of business names.

The least numbers in terms of usage were generated by station-based carsharing, which also turned out to be the least known or the business model with the lowest public awareness such that more than 60% of the services did not know this service at all. The overall awareness of competitors to Deutsch Bahn in long-distance train

	I do know this service (1)		I did use this service before (2)		I do not know this service and have not used it yet (3)	
	Σ	%	Σ	%	Σ	%
Free- floating Carsharing , ppm	56x	51,38	40x	36,70	13x	11,93
Free- floating Carsharing , ppk	57x	52,29	18x	16,51	34x	31,19
Station-based Carsharing	36x	33,03	7x	6,42	66x	60,55
Local Ridepooling	28x	25,69	41x	37,61	40x	36,70
Long-distance Ridepooling	70x	64,22	29x	26,61	10x	9,17
Ride hailing	29x	26,61	35x	32,11	45x	41,28
Long-distance Bus Services	44x	40,37	62x	56,88	3x	2,75
Long-distance Train Services	66x	60,55	30x	27,52	13x	11,93
E-Scooter	46x	42,20	58x	53,21	5x	4,59

Fig. 7.1 Own illustration of service awareness and usage

services was high despite not having used the services before; nonetheless, the comparably low usage rate of 27.5% was evidence that consumers switched easily to competitors such as bus operators when an alternative to Deutsche Bahn was desired.

The survey made apparent previously unknown differences in the area of free-floating carsharing providers. Although the familiarity of nonusers of the different payment approaches, pay per minute (ppm) and pay per kilometer (ppk), is nearly the same ($n = 56$ to $n = 57$), there are disparities in terms of usage. Hence, the pay-per-minute approach can exhibit a 20% higher usage rate beyond those surveyed. Apart from the bus providers and e-scooters, the only services that have been utilized by the majority of people who know them are local ridepooling and ride hailing. Simultaneously, it could be noted that there were also a high number of people in the survey who were not familiar with these models ($n = 40$; $n = 45$). While the principle of long-distance ridepooling is familiar to the majority of the noncustomer respondents ($n = 70$), only a comparatively small proportion have used this service yet ($n = 29$), as illustrated in Fig. 7.1.

In order to be able to present the use of different providers more precisely, the participants were asked about accurate usage behavior. The frequency was categorized as daily (1), multiple times a week (2), multiple times a month (3), less frequently (4), and never (5). The numbers indicated were added to perform a statistical analysis of the listed variables.

As illustrated in Fig. 7.2, individual transportation can count twice as many daily users as public transportation ($n = 28$ to 14). More than 30% of those surveyed stated multiple usages of individual and public transportation per week. The numbers of occasional usage, less frequently than multiple times per month, are higher for the short-range public transportation. Both options evince low percentages in

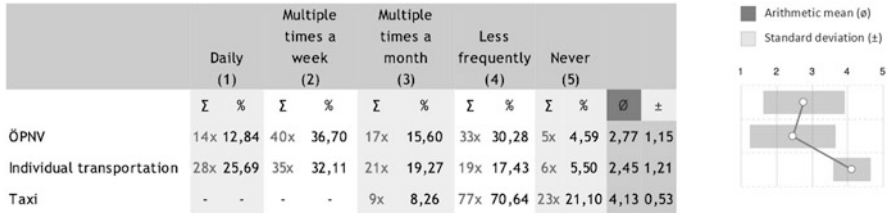


Fig. 7.2 Own illustration of usage rates of established business models

nonusers. Therefore, the arithmetic means of both options Ø2.77 and Ø2.45 are almost identical. However, the standard deviations of ±1.15 and ±1.21 show a discrepancy between the respondents. In contrast, a similar response pattern was observed for taxi services with a standard deviation of only about ±0.53. Taxi services cannot register any daily or multiple times a week per user, while the vast majority of more than 70% ($n = 77$) use taxi services less frequently than multiple times a month. A fifth of the total stated that they never use taxis, resulting in an overall arithmetic mean of Ø4.13, which is equivalent to an infrequent and only occasional usage rate.

Therefore, it can be concluded that the respondents only use taxis for special occasions, while public and individual transportation are day-to-day modes. There were barely any differences between the income classes, only the use of private transport for individuals with a net income of 1500 Euros and higher recorded arithmetic mean of Ø2.14, which represents a slightly more frequent use compared to the overall group. Female participants tend to use public transportation less frequently than the male interviewees, with an arithmetic mean of Ø2.89 in comparison to Ø2.68. Given the weaker infrastructural connection to local public transport, the rate of use of these services is much lower in areas with less than 100,000 inhabitants, with a mean value of Ø3.23, while the use of private transport is significantly higher, represented by a mean value of Ø1.94. The standard deviation is unremarkable as compared to the overall values. Figure 7.2 presents these results.

7.3 Customer Usage Intensity of New Mobility Options

To assess the overall usage of alternative mobility options, the same range of answers was provided concerning the frequency of transport with newly developed mobility options. As shown in Fig. 7.3, the arithmetic mean stands at Ø3.71, with a standard distribution of ±0.80. This implies a relatively high homogeneity between the participants, which, in combination with the infrequency of usage given by the mean, demonstrates that alternative transport modes or new mobility options are not fully established on the market yet. Especially, the comparison with the significantly lower means of individual and public transport indicates that the newly developed

Participants: 109

- 2 (1.8%): Daily
- 4 (3.7%): Multiple times a week
- 32 (29.4%): Multiple times per month
- 57 (52.3%): Less frequently
- 14 (12.8%): Never

Arithmetic mean: $\emptyset 3,71$
 Standard deviation: $\pm 0,80$

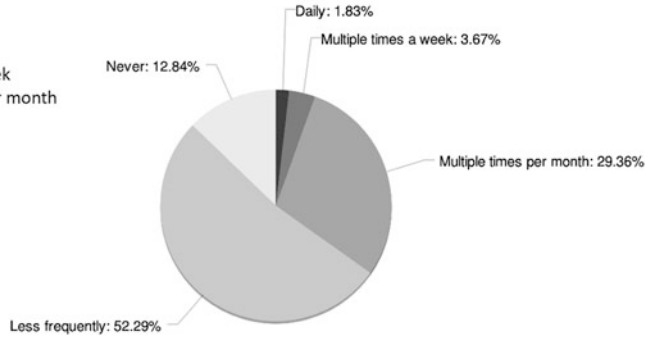


Fig. 7.3 Own illustration of the overall use rates of alternative transportation modes

Participants: 35

- (0.0%): Daily
- (0.0%): Multiple times a week
- 4 (11.4%): Multiple times per month
- 24 (68.6%): Less frequently
- 7 (20.0%): Never

Arithmetic mean: $\emptyset 4,09$
 Standard deviation: $\pm 0,55$

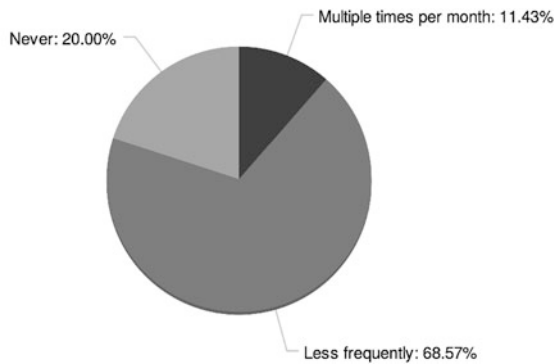


Fig. 7.4 Own illustration of usage rates of alternatives modes in areas with less than 100,000 inhabitants

services are only occasionally used and do not represent a genuine alternative solution for everyday transportation yet.

Preeminently in areas and cities with less than 100,000 inhabitants, the overall usage rates of alternative providers are particularly low. None of the 35 participants in this group reported the offers as alternatives daily or several times a week’s movement. The answer distribution of this interviewee group is presented in Fig. 7.4.

Due to the higher density and therefore higher availability of new mobility options in cities and municipalities with more than 100,000 inhabitants, the usage frequencies of these alternative transport models are higher as demonstrated by the arithmetic mean of $\emptyset 3.5$ as in Fig. 7.5. However, the participants’ opinions differ to a greater extent, with a standard deviation of ± 0.86 , resulting in a wider range of usage frequencies.

With the contemplation of the data to the individual providers, a more precise analysis of the users can be determined. In addition, it can be observed whether there are correlations between the usage behavior of individual services and the affiliation of certain groups according to the area of living, income, and other factors. The

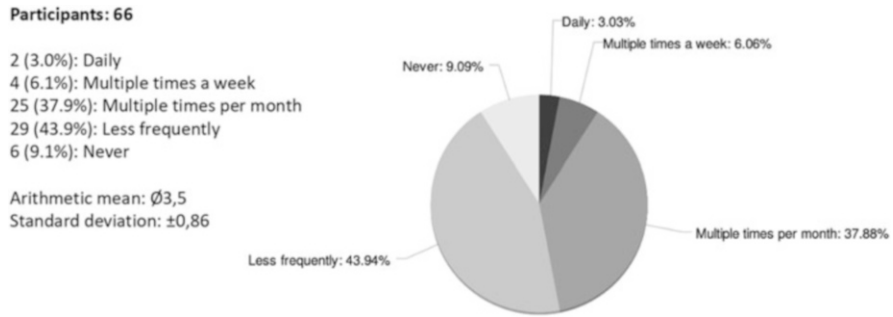


Fig. 7.5 Own illustration of the usage rates of alternative modes in areas with more than 100,000 inhabitants

individual analysis presented in Fig. 7.6 confirms the modest usage rates, which were illustrated earlier. Moreover, the frequency of utilization of people that have used the offers before is considerably low as demonstrated by the overall arithmetic mean of $\emptyset 4.21$ that applies to all participants that have not used new mobility services before.

The e-scooter was the mobility option receiving the highest score since it was used on rare occasions. None of the services reached a customer basis with a high usage frequency. With all standard deviations being lower than ± 0.9 , there is a relatively high homogeneity among the answers and, thus, among user behavior. Subsequent to adding up the numbers of all services, it was inferred that only 14 cumulative responses indicated daily or multiple weekly usage. The total number of responses to this question amounted to 981 of which 109 answers provided for each of the nine services, which correspond to a total value of 1.4% of all services being used in a high frequency. Station-based carsharing scored the lowest mean of $\emptyset 4.89$. The low standard deviation of ± 0.39 generally implies moderate attention and popularity of this segment.

Figure 7.7 shows the results of the respondents who previously stated that they had used diverse mobility options. It is to be noted that if respondents state “never” in this scenario, it refers to their usage behavior after their first usage experience. Accordingly, the survey results show that local ridepooling and e-scooters have made the best impression and achieved the best reusage rates. However, with arithmetic means of $\emptyset 3.59$ and $\emptyset 3.66$, respectively, the customers still do not consider the offers as a daily means of transport.

The low standard deviations of all providers reflect a comparatively clear and homogeneous opinion of all respondents. Long-distance ridepooling achieved the lowest results such that out of 27 people who used this provider, none used it regularly. However, it is important to note with respect to this group that long-distance trips are, by their nature, less frequent than short-distance trips. Even in the case of at least one-time users, the quota of users who use one or more providers at least several times a week was low. Only 10 of 320 possible answers, thus only about 3%, belong to this category.

	Daily (1)		Multiple times a week (2)		Multiple times a month (3)		Less frequently (4)		Never (5)		Σ	%	Σ	%	∅	±
	Σ	%	Σ	%	Σ	%	Σ	%	Σ	%						
Free-floating Carsharing , ppm	1x	0,92	4x	3,67	12x	11,01	31x	28,44	61x	55,96	4,35	0,89				
Free-floating Carsharing , ppk	1x	0,92	-	-	3x	2,75	21x	19,27	84x	77,06	4,72	0,61				
Station-based Carsharing	-	-	1x	0,92	-	-	9x	8,26	99x	90,83	4,89	0,39				
Local Ridepooling	-	-	-	-	21x	19,27	27x	24,77	61x	55,96	4,37	0,79				
Long-distance Ridepooling	-	-	-	-	-	-	35x	32,11	74x	67,89	4,68	0,47				
Ride hailing	-	-	-	-	11x	10,09	47x	43,12	51x	46,79	4,37	0,66				
Long-distance Bus Services	-	-	-	-	2x	1,83	64x	58,72	43x	39,45	4,38	0,52				
Long-distance Train Services	-	-	3x	2,75	2x	1,83	39x	35,78	65x	59,63	4,52	0,67				
E-Scooter	1x	0,92	3x	2,75	15x	13,76	43x	39,45	47x	43,12	4,21	0,85				

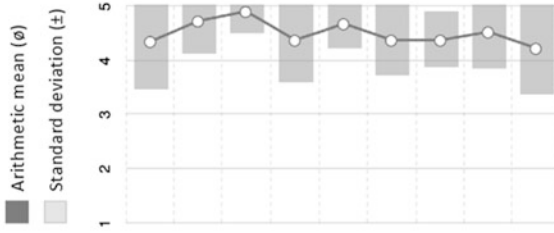


Fig. 7.6 Own illustration of the overall use rates of the individual alternative transportation modes

Service	Number of Respondents	Daily (1)		Multiple times a week (2)		Multiple times a month (3)		Less frequently (4)		Never (5)		σ	±
		Σ	%	Σ	%	Σ	%	Σ	%	Σ	%		
Free-floating Carsharing, ppm	40x	-	-	3x	7,50	11x	27,50	22x	55,00	4x	10,00	3,68	0,76
Free-floating Carsharing, ppk	18x	-	-	-	-	3x	16,67	13x	72,22	2x	11,11	3,94	0,54
Station-based Carsharing	7x	-	-	1x	14,29	-	-	5x	71,43	1x	14,29	3,86	0,90
Local Ridepooling	41x	-	-	-	-	20x	48,78	18x	43,90	3x	7,32	3,59	0,63
Long-distance Ridepooling	29x	-	-	-	-	-	-	26x	89,66	3x	10,34	4,10	0,31
Ride Hailing/ Taxi Services	35x	-	-	-	-	6x	17,14	25x	71,43	4x	11,43	3,94	0,54
Long-distance Bus Services	62x	-	-	-	-	2x	3,23	57x	91,94	3x	4,84	4,02	0,29
Long-distance Train Services	30x	-	-	2x	6,67	-	-	27x	90,00	1x	3,33	3,90	0,55
E-Scooter	58x	1x	1,72	3x	5,17	13x	22,41	39x	67,24	2x	3,45	3,66	0,71

Fig. 7.7 Own illustration of the frequency of usage of the predetermined customers

The survey results in this category lead to the conclusion that the mobility industry in Germany continues to heavily depend on the already established traditional models, primarily individual transport and public transport, of which the latter is driven entirely by the provision of subsidized tickets. Even in the cases of respondents who displayed high levels of awareness of new mobility options, the usage patterns of the various newly developed models were comparably modest. Thus, it can be concluded that none of the alternative modes or the new mobility models has successfully established itself as a daily mode of transport for a major part of the sample.

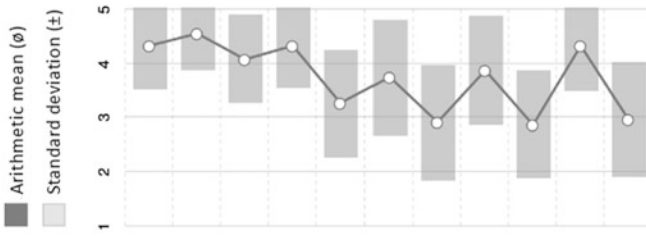
Long-distance bus services and e-scooters display the highest market awareness among respondents such that most have tried them at least once. The services with the least awareness are station-based carsharing, which is used the least alongside ride-hailing services. A notable difference between the different ages, income, and gender groups in their customer awareness or usage behavior could not be identified. Only a limited correlation between the frequency of use and awareness in connection with the size of the place of living could be established.

7.4 Customer Convenience as a Business Success Factor

This section filters out the factors identified via the survey that are pointed out as important by respondents and associated with established or new mobility models. In other words, those factors that represent a precise value to the customer are identified here so as to segregate those factors that will contribute to the success of any mobility model in Germany. The survey questions further seek to identify those factors that dissuade potential customers from using the services. In effect, this section examines the most critical success factors for mobility providers in Germany.

All 109 participants were asked to classify different factors impacting passenger transport according to their importance and the following categories were offered: Unimportant (1), rather unimportant (2), neutral (3), rather important (4), and important (5). Figure 7.8 demonstrates that customers invariably valued the short-term availability of mobility means. With a mean of 04.55 and a standard deviation of ± 0.67 , this aspect was of high importance to almost all participants. These results suggest that a short waiting time could contribute crucially to the success of mobility providers.

Subsequent to this, the price of mobility services provided played a decisive role, thus scoring an arithmetic mean of 04.31. In this regard, the study showed a deviation in respondents with a net income of more than 1500 Euros/month. In this subgroup, the price was only the sixth most important factor, with a mean of 03.86, while likewise, availability stands out as the most important aspect with a mean of 04.71. Usability was rated as more important in this subgroup as compared to the reference group that had an income below 1500 Euros, with means ranging between 04.19 and 03.79.



	Unimportant		Rather unimportant		Neutral		Rather important		Important		ø	±
	Σ	%	Σ	%	Σ	%	Σ	%	Σ	%		
Low Price	1x	0,92	1x	0,92	14x	12,84	40x	36,70	53x	48,62	4,31	0,80
High Availability	1x	0,92	-	-	5x	4,59	35x	32,11	68x	62,39	4,55	0,67
High Speed of Transport	-	-	3x	2,75	22x	20,18	47x	43,12	37x	33,94	4,08	0,81
Reliability	-	-	2x	1,83	14x	12,84	41x	37,61	52x	47,71	4,31	0,77
High Comfort	3x	2,75	20x	18,35	46x	42,20	26x	23,85	14x	12,84	3,26	0,99
Environmentally friendly	5x	4,59	9x	8,26	22x	20,18	46x	42,20	27x	24,77	3,74	1,07
Privacy / Individuality	12x	11,01	25x	22,94	40x	36,70	26x	23,85	6x	5,50	2,90	1,06
Usability	2x	1,83	11x	10,09	17x	15,60	48x	44,04	31x	28,44	3,87	1,00
Luggage Transport	9x	8,26	30x	27,52	41x	37,61	24x	22,02	5x	4,59	2,87	1,00
Safety	-	-	5x	4,59	10x	9,17	40x	36,70	54x	49,54	4,31	0,82
Option of doing other activities while transport	10x	9,17	26x	23,85	37x	33,94	30x	27,52	6x	5,50	2,96	1,05

Fig. 7.8 Own illustration of the critical factors influencing the choice of mobility

Thirdly, the reliability of mobility services was identified as an important factor by the subgroup in relation to the reference group with the respective means of $\text{Ø}4.52$ and $\text{Ø}4.21$. The respondents also valued the option of being able to carry out other activities while driving. In contrast, lower-income participants attributed higher importance to environmentally friendly mobility options as inferred from the average values of $\text{Ø}3.89$ – $\text{Ø}3.38$. It is significant to note that this aspect represented the largest disagreement among the respondents resulting from an overall standard deviation of ± 1.07 .

These relatively small deviations indicate a homogeneity that reflects public interest adequately. Privacy, luggage transport options, and high comfort ranked as the least important aspects. The characteristic of safety was considered particularly important among female participants scoring a 4.64 as compared to male participants resulting in an overall mean of $\text{Ø}4.31$. No further relevant disparities between the answers of different genders could be identified. Figure 7.9 summarizes the important factors for selecting mobility options.

7.5 Customers' Needs and Mobility Perception

The survey aimed to establish the core elements of a mobility service as desired by customers so that these can be integrated into new business models to make them successful argued on the lines that customers pay for those services that they value highly. Many such factors were identified and provided to customers to enable them to produce a ranking of these factors. Respondents were therefore required to identify the three most crucial factors that they deem important in mobility services.

Approximately 70% of all persons considered price, and over 60% referred to the availability of the service, while 40% noted reliability of the provider to be the three most important factors that determine their mobility needs and drivers of choice. These are closely followed by the high speed of transport and safety. In particular, luggage transport options and the possibility of carrying out other activities during the journey are considered to be relatively redundant. This sample shows that comfort nor privacy appear to characterize critical factors in customer perception nor decision-making. Figure 7.10 illustrates these aspects that determine customer need and mobility perception.

Approximately 74% of the respondents with an income less than 1500 Euros deemed price as the most important factor for choosing a mobility service. In higher-income groups, 52% of respondents referred to the availability of the service as the key factor, indicating that price played a secondary role. While environmentally friendly mobility services were not highly ranked (14%) in the higher-income groups, around 24% of the lower-income group desired this factor. Safety was consistently ranked as more important by female respondents.

To determine customer usage patterns, respondents were required to assign aspects or characteristics valuable in different mobility options. This was done with the objective of these questions which was to compare the relevance of

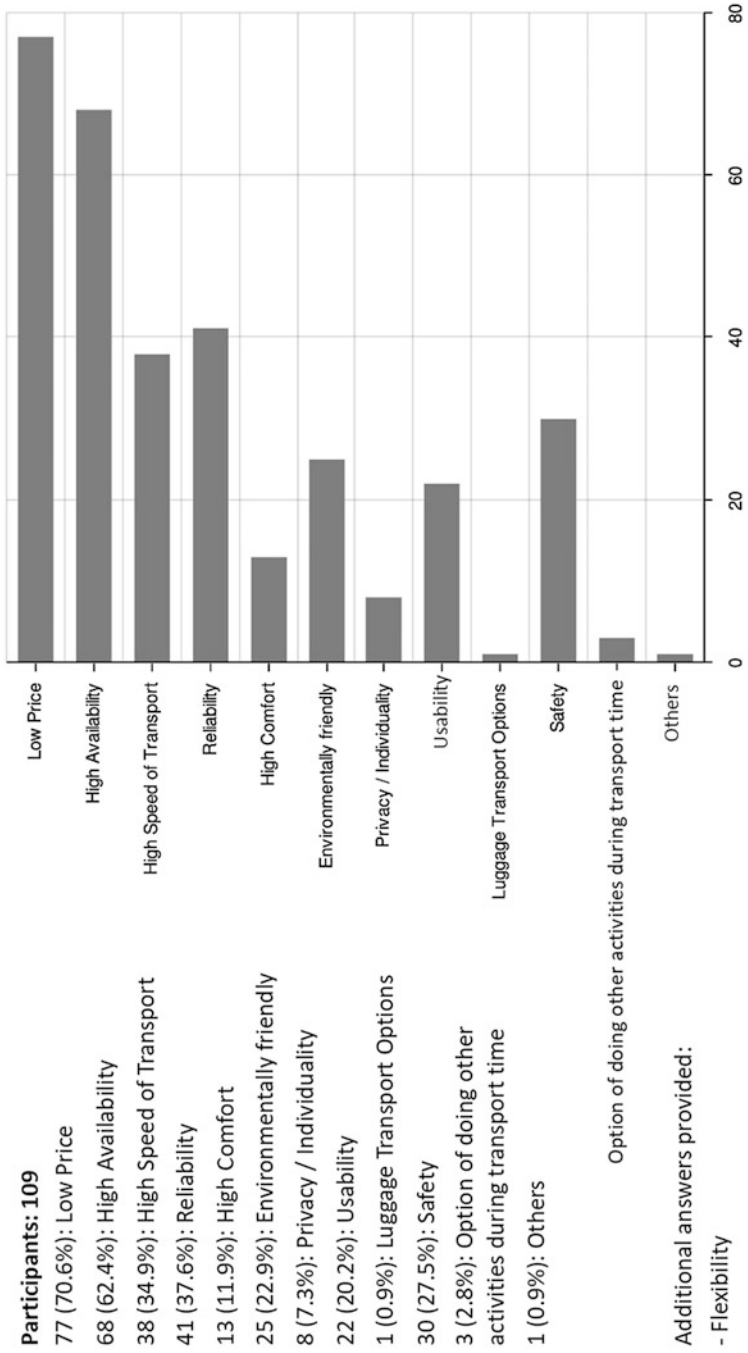


Fig. 7.9 Own illustration of the importance of factors choosing mobility options

	Individual transportation		Public transportation		Taxi		Ride hailing		Carsharing		Ridepooling		E-Scooter	
	Σ	%	Σ	%	Σ	%	Σ	%	Σ	%	Σ	%	Σ	%
Low Price	30x	27,52	76x	69,72	6x	5,50	22x	20,18	37x	33,94	49x	44,95	41x	37,61
High Availability	62x	56,88	74x	67,89	68x	62,39	25x	22,94	24x	22,02	16x	14,68	63x	57,80
High Speed of Transport	87x	79,82	30x	27,52	72x	66,06	28x	25,69	27x	24,77	8x	7,34	17x	15,60
Reliability	87x	79,82	26x	23,85	70x	64,22	28x	25,69	16x	14,68	17x	15,60	30x	27,52
High Comfort	89x	81,65	3x	2,75	80x	73,39	29x	26,61	22x	20,18	30x	27,52	5x	4,59
Environmentally friendly	7x	6,42	93x	85,32	5x	4,59	17x	15,60	42x	38,53	57x	52,29	50x	45,87
Privacy / Individuality	100x	91,74	4x	3,67	52x	47,71	23x	21,10	23x	21,10	7x	6,42	28x	25,69
Usability	36x	33,03	67x	61,47	46x	42,20	54x	49,54	53x	48,62	66x	60,55	77x	70,64
Luggage Transport Options	86x	78,90	26x	23,85	95x	87,16	39x	35,78	43x	39,45	29x	26,61	3x	2,75
Safety	87x	79,82	66x	60,55	71x	65,14	38x	34,86	35x	32,11	32x	29,36	9x	8,26

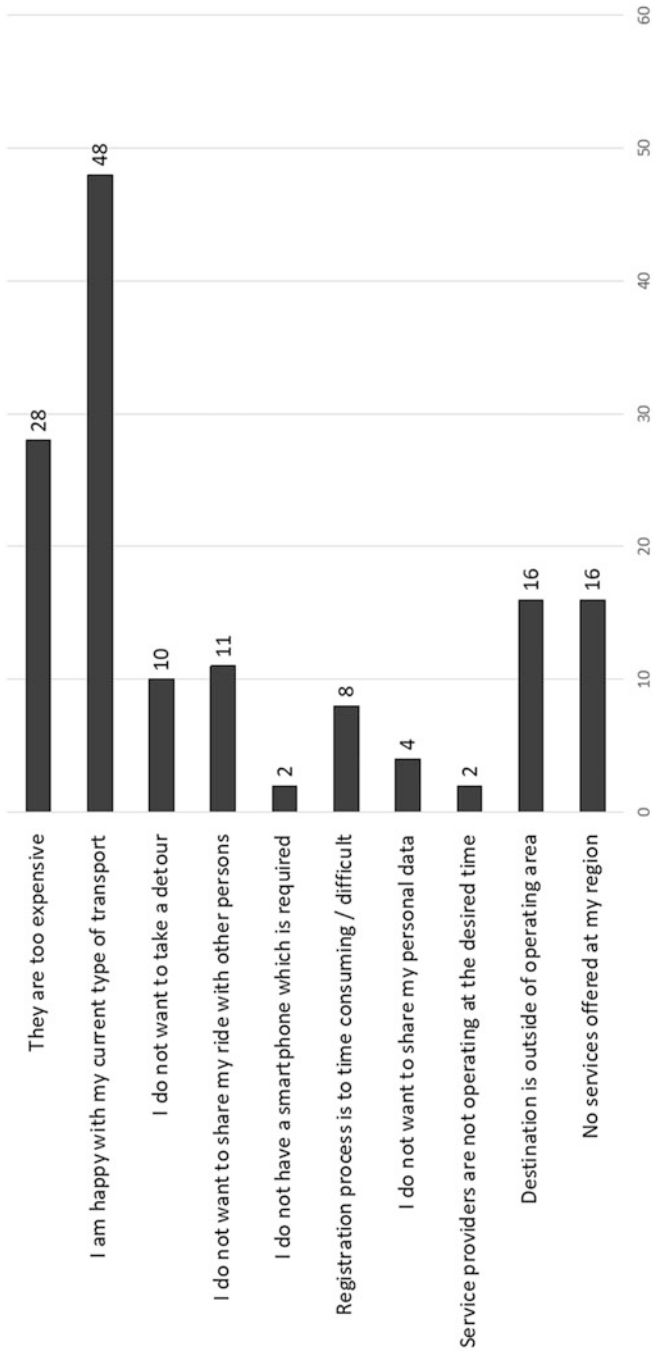
Fig. 7.10 Own illustration of perception of business models

established business models with those of the emergent mobility options. The survey results established that 76% of the respondents who identified the five most important criterion for customers, namely, price, availability, reliability, speed of travel, and safety, associated these factors primarily with public transportation. The same group commented that public transportation in Germany offered the most attractive price, in other words, the lowest price. They indicated that ridepooling and e-scooters were affordable too. This group deemed taxis to be unaffordable due to their higher price. Except for e-scooters, all other new mobility options such as carsharing, ride hailing, or ridepooling scored low on availability. Simultaneously, established options scored highest in terms of availability and reliability. Respondents' feedback seemed to suggest that new mobility options compared poorer to the performance of established business models as verified in Fig. 7.11.

In order to find out whether the low usage rates of new mobility options were only related to the comparatively better perception of the established mobility providers, respondents who indicated "irregular" or "never used" alternative models were asked about the reasons for this condition. They were requested to identify the factors that influenced this behavior of continued usage or clear preference for established mobility models. The vast majority, 48 out of 71, stated that they were satisfied with their current type of transport, and did not have credible reasons for changing to alternative services. In other words, there was no desire for seeking substitute services.

As elucidated before, the critical factor price performs a vital role in influencing customer perception. The survey indicated that respondents perceived alternative mobility options, old or new, to be more expensive than their preferred mode of public transportation. Particularly for people residing outside major cities, the services were perceived to be unavailable that restricted their usage. Almost all respondents had access to the booking of new mobility options since at least 98% possessed a smartphone. Operation times and data security issues of new mobility providers did not represent an obstacle or valid criterion to avoid usage for most of the respondents. A small percentage of respondents found the long-drawn registration processes as complicated and time-consuming, while others did not want to take a detour or preferred not to share their journey. Figure 7.11 shows the reasons for not using alternative options.

In conclusion, the critical success factors are clearly identified. Apart from the price, which is slightly less important for people with higher incomes, availability is, in particular, a decisive factor. Furthermore, the high speed of transport and safety, which is of utmost importance for the female respondents, are among the critical success factors. Privacy, baggage transport facilities, and comfort can largely be regarded as redundant. Especially, the most influential factors for success are not associated with the new alternative possibilities by the respondents. In this regard, the established models, above all individual and public transport, continue to dominate the market. Since the established models fulfill the most critical factors, following which consumers are content with their current transport mode, most people perceive no reason to switch to the alternatives. Furthermore, capacities in rural areas need to be expanded in order to achieve a higher use rate. Apart from a



Numbers shown provide the absolute amount of answers; Multiple answers possible (n of participants = 71)

Fig. 7.11 Own illustration of the reasons against new mobility models

minimal number of differences, there were small or no discrepancies in the assessment of success factors between the different genders and income groups, which indicates a comparably high level of homogeneity in terms of criteria for success in the German mobility market.

7.6 Influence of Megatrends

The megatrends urbanization, digitalization, sustainability, and the social changes taking place were examined in detail in Chap. 3 of this book. The objective of this section is to check whether the theoretically known influences also match customer behaviors in practice. By questioning respondents on megatrends, this section seeks to confirm or disprove mobility hypotheses which form the basis of multiple new mobility models. As demonstrated in previous sections, the size of the place of residence has a significant correlation with the used modes of transport. Especially alternative services, which are supposed to induce the change in the mobility industry, are almost exclusively found in larger cities. Consequently, the impact of urbanization on the development of the mobility market can be confirmed.

Digitalization also has a major impact on the use of various mobility options. All of the business models investigated above, with the exception of FlixBus, require booking via an Internet-enabled smartphone. Only 2 out of 109 persons stated that they do not own an Internet-enabled smartphone; however, as these persons indicated that they had used smartphone-requiring services before, it can be assumed that the first information was incorrect and therefore all participants meet the basic digital requirements. As all newly developed mobility models are highly digitalized products or services such that some form of a digital device is required to operate them, it can be concluded that digitalization is a significant aspect that impacts the mobility market in Germany.

The influence and importance of sustainability could be assessed in various manners, in addition to the impact already discussed in Chap. 3. As for service providers, more new companies are turning to all-electric vehicles, including e-scooters. The ridepooling provider MOIA points to the trend of providers adopting environmentally friendly transport modes, even though this concept is neither adequately efficient nor monetarily sustainable. From the customers' perspective, the importance of the environmental friendliness of a service provider was directly addressed. The majority of respondents to the survey rated environmental friendliness as comparably important, but this aspect is not yet seen as crucial for decision-making. Furthermore, only 22.9% of all respondents rated sustainability as one of the three most important factors. As a result, sustainability can be observed to influence the German mobility market; however, it is as influential as the factors price and the availability of the mobility service to customers.

The social changes prevalent in Germany are dominated by the trend of the sharing economy, the impact of which was investigated in the survey. Privacy was

one of the least important factors for the respondents with regard to transport. Also, only a few participants indicated that they are unwilling to share their journey. Overall, this shows a high level of willingness to participate in the sharing economy, which is already a fundamental aspect of most new mobility providers. However, the complete potential of the sharing economy in the mobility sector has yet to be used or exhausted. Altogether, it can be concluded based on the survey results elaboration that the transformation of the German mobility market is strongly affected by the emergence and the daily influence of the megatrends—urbanization, digital transformation, and sustainability—and that these will continuously shape the future of the market.

7.7 Critical Review

In this section, the applied methodology and the obtained results are critically reviewed. The main components of this work consist of the examination of mobility literature and data on the spectrum of service providers in the German market to examine the current market situation from the supply and demand side, identify the influence of megatrends, and assess the market entry of new mobility providers that combine megatrends with market gaps to offer mobility options that are highly valued by customers in the mobility market in Germany.

The survey administered and the results presented above represent a sample of 109 respondents, of which most lived in the bigger city area of Hamburg, which is Germany's second-largest city and a port city that serves as a hub in the north. While clear trends could be established on user value, continuous and rapid changes in the mobility market demonstrated that the survey questions fulfil the necessary condition of argumentation but are not sufficient to provide an in-depth detailed picture of the intricacies of changes impacting the German mobility market. Some of these numerous factors that influence and cause continuous transformation are changes in legislation, new market entrants, diverse local players, and changing customer needs, among others. Therefore, the market situation remains very dynamic or fluid that restricts the survey results to provide a momentary or static view that serves as a good indication of the current scenario and point to future development. In other words, the survey's predictive strength is limited to the sample set.

Another challenge that the survey could not fairly address could be attributed to the newness of the alternative mobility providers in the market such that many respondents were not always familiar with the company names nor had a clear idea of services provided by them. This aspect did limit the effectiveness of surveying as a tool used here. Nevertheless, the survey did enable deriving important insights from those respondents who had had personal experience with all offers. Therefore, a larger sample in the future may help overcome this issue.

As the new mobility models were not listed on the stock exchange, public business figures of the providers were unavailable for analysis so as to be to supplement or complement the findings of the survey. For these reasons, the

mentioned limitations allowed for a surface-level examination of the providers and their behaviors in the German mobility market. Many of the gaps are addressed by the business model canvas adopted in Chap. 4. To sum up, the survey methodology with 109 participants can be considered exploratory and not representative of the larger German mobility market. Neither the age distribution nor the income reflects the average of the total market, which is why the study can be positioned to represent a market analysis of the younger, lower-earning segment. It should be noted that the respondents live in Germany and may not be fluent in the English language, in which the survey was conducted, which may have led to possible misunderstandings.

Chapter 8

Business Recommendations and Future Trends



Mobility forms the backbone of economic growth and development in Germany. The mobility sector is part of the infrastructure industry that provides a network of travel routes and mobility options for moving people and goods between destinations for work, studies, or leisure. While mobility is a human need, the mobility industry in Germany comprising railways, roadways, flight routes, and onshore networks together continues to be a young and dynamic sector. Although the geographic expansion continues in the flight sector, the intensity of use has expanded dramatically in mobility routes dominant on-road. This book aims to cover the changes taking place in the road-based mobility industry in Germany, especially given the rapid and regular changes triggered by market changes, megatrends, and evolving perceptions and needs of the customer. The overall objective of the book is to provide a holistic view of the driving factors in the mobility industry to enable mobility professionals, policy makers, investors, and business leaders to get a crisp indication of underlying factors creating transformation in the mobility landscape.

At the beginning of the book, the mobility market is analyzed from the macro-environment framework, specifically using the tool of a PEST analysis to organize and evaluate the most influencing factors—external factors impacting the environment of the mobility industry in Germany. The analyses showed that on the political side, the uncertain legal situation and the market fragmentation into numerous federal, state, and municipality-based regulatory areas, which severely restrict free market participation, continue to dominate. This condition allows established business models that have incumbent knowledge of the regulatory opportunities or loopholes to preserve their dominant position as compared to innovative or technology forerunners who may have robust business models but may stand to lose due to the lack of first-hand knowledge.

On the social side, the modal split substantiated by the economic analysis projects that fewer people will depend less on private transport in the future as against the status quo now. As a result, numerous new providers are expected to adjust their business models to provide mobility services that pitch the market towards the dominance of shared, data-driven, and technology-intensive services. From the

technological perspective, significant changes are imminent that will mainly bring electric and autonomous vehicles to the fore. However, there are still outstanding barriers, such as ethical and moral issues that require legal clarification. These hinder market testing and customer readiness in consumption.

Following the external macro-environment analyses, the book gave special attention to the sweeping changes taking place in economies and societies in the name of megatrends. As a first step, in order to obtain an understanding of the significant stakeholders referred to here, the established or traditional business models were examined with the aim of evaluating their successful market positioning. It was found that particularly in individual transport, car manufacturers were on the threshold of a structural change, driven by the forecast of a decreasing market share through car sales. Therefore, car ownership is expected to play a diminished role in the overall mobility market in Germany, which is also deemed a historical change in customer sentiment regarding cars. Embracing the market transformation, major parts of the domestic OEMs had already founded their own alternative mobility startups and, in some cases, overtaken these market segments as innovative leaders or pioneers.

Local public transport continues to be one of the leading participants or service providers in the mobility market that enjoys severe regulatory interventions by German authorities that protect this provider from new market entrants. Medium- and long-range rail transport is dominated by the Deutsche Bahn, which holds a monopoly on railway infrastructure in Germany. As of 2018, Deutsche Bahn AG had a market share of 74% in the percentage of passenger-kilometers. In long-distance passenger trains, Deutsche Bahn AG has maintained a steady 99% market share since 2005. More than 2 million passengers used Deutsche Bahn in 2018 (Statista, 2018). State subsidies provide an added support or protection to the profitability of this business model. As a consequence, there is hardly any competition in rail passenger transport.

Taxi services were available in Germany in the nineteenth century with the first route operating between Dessau to Wörlitz and Aken. Over time, taxis emerged to be indispensable local substitutes for those customers seeking quick availability, privacy, and luggage transport. Given the nature of the development, taxis became state-subsidized services to promote bind small business with efficient solutions for local citizens. For these reasons, the taxi business remains strongly impacted by strict regulations that are both a boon and bane—more a bane, since taxi providers barely have any flexibility to uphold their market share in rapidly changing consumer need market. Notwithstanding these, there were roughly 2.9 billion recorded passenger-kilometers accounted for by taxis and car rentals in 2018, suggesting a steady and predictable trend in the taxi-rental market (Statista, 2018). Pricing and branding may play key roles in transforming this mobility segment, which at the moment presents a stagnant trend.

Following the discussion of the growth trends of established business models, the impact of megatrends on the German mobility market were analyzed. Especially the survey method provided valuable insights that helped confirm the propositions made based on market observations. Accordingly, with the help of the survey, it could be

showed that digitalization is the foundation for the change in the mobility industry and the development of new business models. The megatrend urbanization also is dramatically impacting mobility options and behaviors. Urbanization leads to traffic and environmental constraints in cities, which created market gaps for new mobility providers to enter the German market with alternative business models intending to solve urbanization's negative by-products.

In the course of the survey, a high correlation between the size of the living area and the availability and use of the new mobility modes was established. The survey also revealed a high degree of user appreciation for mobility sharing systems, which indicates a transformation in social values. On the basis of this result, it could be highlighted that ownership in mobility is not seen as a constructive behavior, especially among younger consumers. However, the survey indicated a lower significance of sustainability and general environmental friendliness than elaborated in the previous secondary-data based analysis. Thus, this aspect could not be determined as a primary megatrend influencing or transforming the mobility sector.

Subsequently, the individual newly developed business models were presented, were evaluated on a case-by-case basis via the application of the business model canvas approach. It was inferred that individual providers pursue differing strategies, although they are all significantly based on digital platforms or motivated by the availability of technology options such as online booking and geo-routing, among others. Almost all providers served a wide range of private and business customers and possessed at least one strategic partner network. Overall, it could be inferred that all new business models are still in the preliminary stage of growth since most survey respondents were not familiar with the brands nor services. In the future, it is recommended that these companies use marketing budgets to create more awareness among customers while offering attractive prices to achieve market penetration.

Lastly, the book aims to explain the level of success of new business models and established business models by drawing in the mobility customer or user as the pivotal stakeholder who might drive future changes in the German market. For this purpose, a survey was administered to evaluate the current customer usage pattern as well as filter out average mobility behavior. The survey results showed that in the eyes of the customer, three factors were central in their decision-making. These were the price, availability, and reliability of the service. Among female customers, safety played an important role. All other factors, except for speedy transport, played a negligible role in customer decision-making. New business providers and established service providers need to move towards these principal factors if they want to keep pace with the quickly transforming mobility market.

Finally, it can be noted that the market is only at the beginning of a long period of change. Numerous innovations and reforms will change the German mobility market, which will be increasingly driven by alternative business models in the future. Old and new mobility providers and policy makers need to keep in mind the exponential changes created by megatrends that are radically transforming customer needs. Therefore, centering business models on customer value would be at the heart of the ideal recipe for market success and societal satisfaction of new-age mobility in Germany.

Reference

Statista. (2018). Deutsche Bahn in Germany (2018).