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Towards Customer-Centric Business Models in the Automotive Industry

A review of the current state using data from Crunchbase

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Abstract

The digitalization and the servitization are influencing the industries immensely. Hence, customer-centric models are becoming a global trend and thereby replace products with services. This trend has reached the automotive market leading to shifting demands from ownership to usership. Digital platform providers, such as Uber, recognized the upcoming transformation and are now offering such customer-centric business models. The present study aimed to investigate the status quo of the mobility market with a focus on car-centered transportation modes in the OECD founder states. For this purpose, we retrieved a snapshot from the Crunchbase database and evaluated customer-centered business models that entered the automotive industry within the past ten years. This method provided an overview of the current state in this branch. The data analysis showed that driver services, in particular ride-hailing, were the most registered businesses between 2010 and 2020. Additionally, Carsharing appeared to be the most popular among the rental services. Although mobility services were predominant, ownership focused businesses are still entering the market. However, in recent years a decline was observed. Lastly, it was revealed that OEMs are directly and indirectly implementing mobility services into their portfolio. This indicates the great impact of the digitalization and the shift towards usership. In contrast to other studies, which are usually focused on the North American market, our findings are also valid for the European market. However, the present study focused on car-centered business models, and therefore, further research, including other transportation modes (e.g., public transport, micro-mobility), is recommended.

***Keywords**: Automotive Industry; Customer-Centric; Mobility Services; Ownership; Business Model Innovation; Servitization; Usership; OEMs; Digitalization; Shared Mobility*

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1 Introduction

For decades car ownership is a sign of prosperity and wealth (Zhao & Zhao, 2018). Thus, the automobile industry has become a well-respected and profitable business. However, with new technologies, new transportation modes arise, and car ownership becomes less appealing. Since cars were introduced to private households, not much has changed. However, within the last decade, a tremendous transformation in automobile consumption was observed. Concepts that do not require the purchase of a car, but merely enable temporal access to one, are on the rise (Kuhnert, Stürmer, & Koster, 2018). Following this line of evidence, this paper will present current trends in mobility services and discuss its implication.

1.1 Research Context

The digitization and the trend towards servitization are affecting industries tremendously. As early as the 1970s, a salesman reported that customers would rather pay for a product's result or function than for the product itself (Levitt, 1969). Today, the trend to focus on the service rather than on the product is a major global trend. A prominent example of servitization is the "Total Care program" from Rolls-Royce. Instead of selling the airplane engines to their customers, they introduced a pay-per-use pricing model that includes maintenance costs and guarantees the best-possible reliability (Rolls-Royce, n.d.). Digitization further boosts the trend to develop more customer-centric business models that rely on offering the service instead of the product (Rachinger, Rauter, Müller, Vorraber, & Schirgi, 2019). Some business models even go beyond and entirely replace the product to offer only the service as streaming platforms such as Netflix and Spotify show. However, the product of the automotive industry is mobility and will always rely on a physical product. Nonetheless, digitization serves as an enabler for new business models such as Carsharing or ride-hailing that shift the focus away from ownership to usership (Coreynen, Matthyssens, & Van Bockhaven, 2017).

Furthermore, literature shows that millennials rely less on car ownership than previous generations before them (Klein & Smart, 2017). Their changing lifestyle and preferences towards urbanization, combined with an increasing demand for mobility services, lead to a high interest for shared mobility solutions. Accordingly, the FAST 2030 study predicts a market growth for individual mobility services of 95 to 115% for Germany and the USA (Wyman, 2018).

Together, these changes challenge the traditional sales-based business models within the automotive industry. Thus, established business models require a redefinition of their business concepts as new mobility players enter the market at the customer interface (Wyman, 2018). Digital platform providers, such as Uber (ride-hailing) or Whim (Mobility-as-a-Service), take up the changing customer behavior and offer non-ownership mobility services on a pay-per-use basis without the burdens of ownership. Therefore, Original Equipment Manufacturers (OEMs) need to move along with the arising trend, reconsider their business model, and adapt to the changing environment (Arbib & Seba, 2017). In fact, it is apparent that established OEMs followed the current trend, such as Daimler and BMW, with their Carsharing service ShareNow (ShareNow, n.d.). However, today's fast-moving environment makes it necessary to reevaluate the status quo regularly. Therefore, our thesis focuses on evaluating emerging business models in the automotive industry within the last decade.

1.2 Purpose and Research Question

As mentioned above, a significant trend is noticeable regarding consumer travel behavior and car ownership. Over the past decade, an increase in travel alternatives was observed, challenging the automotive industry's traditional sales-based model (Wyman, 2018). However, so far, no distinct research has been done on this topic, in particular for car-centered business models taking both the European and North American markets into account.

Therefore, the present research aimed to provide a status quo of the mobility market to get an estimate of the rate of the development of new customer-centric business models. Based on existing literature and a recent snapshot of the Crunchbase database, we portrayed the trend of the last decade. Furthermore, we analyzed relevant organizations that focus on offering customers access to vehicles with and without ownership and contrast them. As a result, we present the current state and discuss newly emerging mobility concepts where applicable.

This research will have several implications for research and business. First, researchers, prospect, and incumbent businesses can overview the market and take action based on the provided results. Second, OEMs can classify their largest competitive business models and, from a sociologist perspective, the extent of changing consumer behavior on social structures and consumer relationships can be evaluated.

Hence, our research aimed to answer the following question:

What is the current state of customer-centric business models in the automotive industry?

Additionally, we focused on two sub-questions:

1. What is the prevalence of the identified business models?

2. What are the key differences between the identified business models?

1.3 Delimitation

First, this thesis focuses on car-centered mobility solutions that are available to everyone. This excludes, for example, micro-mobility solutions, public transport, and services that are not targeted at the general public (e.g., ride-pooling for kids). Furthermore, we limited our analysis to organizations with business models that provide mobility directly to the consumer, and that can be described as business-to-consumer (B2C) or peer-to-peer oriented. Consequently, automotive suppliers, infrastructure providers, or mobility software developers will not be considered in our research.

Lastly, to reduce the amount of data to be analyzed to a manageable size, we further focused on the European and North American markets, considering only organizations that have been founded in one of the OECD founder states and within the last ten years.

1.4 Structure of the thesis

The first chapter of this thesis presents the introduction to the research context, the research questions, and the delimitation of our research. In the second chapter, the theoretical framework relevant to the topic is covered, based on existing literature. The value chain model is used to describe the past and potential future changes in the automotive industry. Furthermore, an understanding of the business model concept and business model innovation, which leads to the servitization concept, is provided. Then, the focus of the automotive industry is narrowed by referring to surveys to illustrate the demand for mobility solutions. Additionally, an overview of existing mobility trends in the automotive industry is presented. Next, the third chapter presents the research methodology, especially the pre-processing, sampling, and coding of the Crunchbase dataset is described precisely. Afterward, the findings are presented in the fourth chapter and analyzed in detail in the descriptive analysis in Chapter 5. Thereafter, the findings are thoroughly discussed using the theoretical background, followed by the limitations in Chapter 7, and a summary of our contribution in Chapter 8. Finally, Chapter 9 concludes with the most important findings of the research and answers the research questions.

2 Theoretical Framework

This chapter provides a general understanding of the topic and its relevance by explaining existing concepts and potential challenges for the automotive industry. Hence, the value chain model will be presented, followed by the Business Model and Business Model Innovation, leading to the servitization concept. Furthermore, this chapter presents facts and numbers regarding car ownership and identifies the mobility trends prevalent mobility trends in the automotive industry.

2.1 Value Chain Model

First, the value chain model will be presented. This section aims to cover the progression of the automotive industry and potential changes within the value chain. Thus, the three revolutions in the automotive industry will be described after the value chain model was defined.

2.1.1 Definition

The concept of a value chain was first introduced in 1985 by Michael Porter. It defines a set of discrete activities a firm performs to deliver a valuable product (i.e., good or service). Porter states that looking at a firm as a whole does not reveal its competitive advantage. Instead, examining all activities a firm performs can reveal its unique differentiation, and Porter presents the value chain as a tool to do so (Porter, 1998).

In addition, to fully understand the competitive advantage of a firm, the broader stream of activities around the value chain termed the value system (see Figure 1), needs to be examined. The value system extends the value chain concept by the value chains of a firm's suppliers (upstream value), the channel value chains that products pass through to the buyer's (downstream value), and the buyer's value chain (Porter, 1998).

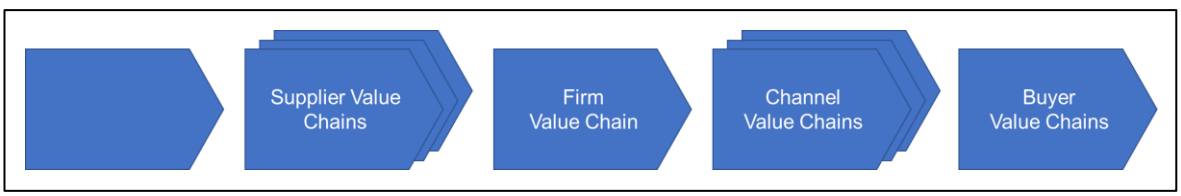

Figure 1: The generic value chain. Own illustration based on (Porter, 1998).

Vertical links between the value chains (e.g., between a single firm's chain, the chains of its suppliers, and channels) affect both the cost and performance of a firm's activities

(Porter, 1998). Understanding the entire value system is crucial to identify potential sources of differentiation and, consequently, locate a firm's competitive advantage.

Value chains compromise nine generic sets of activities (see Figure 2). All activities are linked together while they are physically and technologically distinct from each other. According to Porter, value is "the amount buyers are willing to pay for what the firm provides them" (Porter, 1998, p. 38), and hence, a firm's value chain displays the total value by merging the value activities and the margin.

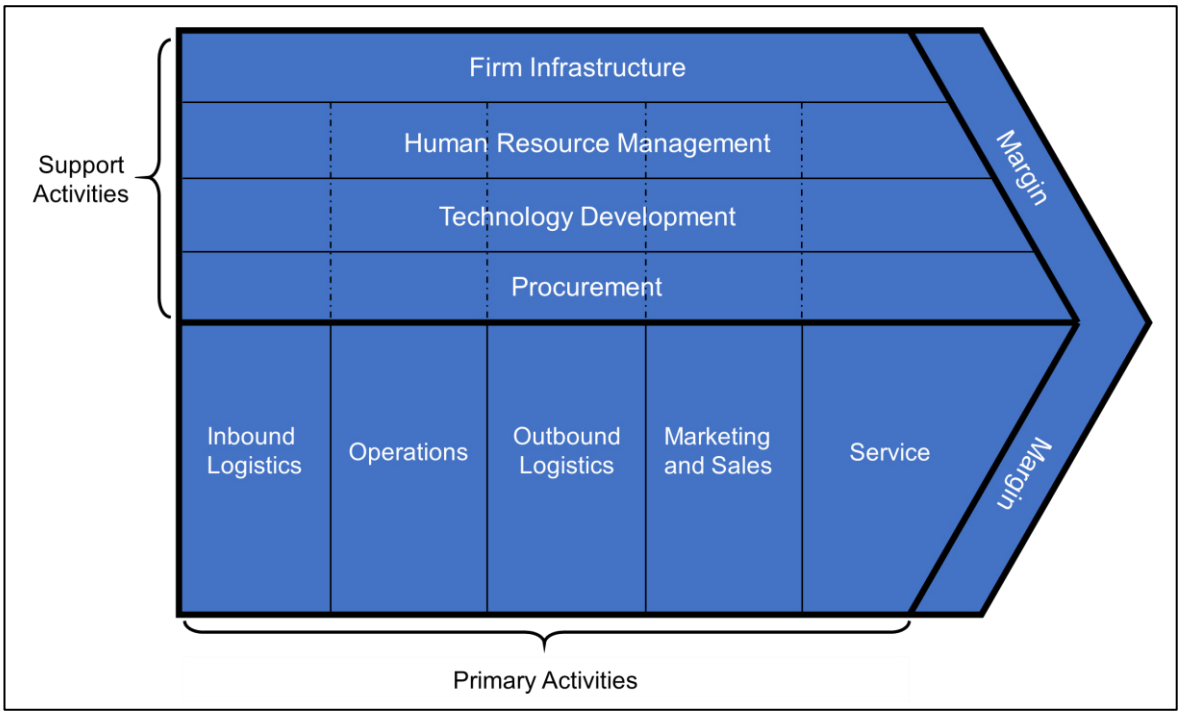

Figure 2. The generic value chain. Own illustration based on (Porter, 1998).

According to Porter, value activities can be divided into primary and support activities (see Figure 2). Primary activities are involved in the physical creation, sale, and transfer of goods or services to the buyer. In contrast, support activities sustain the primary activities and each other on all stages (Porter, 1998).

Within the primary activity set, the value creation process starts with inbound logistics such as receiving, storing, and forwarding product inputs to the operations activity in which the inputs are transformed into the final product (e. g. assembly, packaging). In the next step, the outbound logistics, finalized goods are physically distributed to the buyers. Marketing and sales activities deal with promotion and (distribution) channel selection for the products, and at last, service activities are associated with tasks such as installation and maintenance (Porter, 1998).

Support activities refer to activities needed throughout the primary activities. Purchasing the inputs such as raw materials, but also consumable items and necessary equipment represents the procurement. Technology development refers to tasks known as Research and Development and describes activities that are, for example, creating know-how or essential research to improve procedures. Human resource management is linked to tasks such as hiring and development of the workforce, and lastly, firm infrastructure describes activities such as general management, accounting, and quality management. Beyond that, while procurement, technology development, and human resource management directly support specific primary activities, firm infrastructure usually supports the entire value chain instead of focusing on an individual activity (Porter, 1998).

To identify the competitive advantage or the distinctiveness of a firm, Porter highlighted the necessity to start with the generic value chain and define the individual value activities. Next, embedding the individual firm's value chain into the value system might further reveal linkages between suppliers or channels value chains that provide opportunities to enhance a firm's competitive advantage further (Porter, 1998).

2.1.2 Value chain in the automotive industry – 1st and 2nd revolution

The value chain can also be applied in the context of the automotive industry, where it was affected by two significant changes in the past century, according to Hüttenrauch and Baum (2008). They identified two revolutions that significantly affected the supply and production chain, contributing to the upstream of the car (Hüttenrauch & Baum, 2008). Those two revolutions are referred to as *Fordism* and *Toyotism* (Nieuwenhuis & Wells, 2015).

Fordism describes the first revolution when Henry Ford I. introduced mass production in the automotive industry in 1913 (Nieuwenhuis & Wells, 2015). Until then, owning a car was seen as a luxury and predicted to be a niche. However, mass production allowed Ford to produce larger quantities and consequently reduce production costs many times over. Beyond that, automation ensured a consistently high-quality standard. Another key was standardization and the fit accuracy of the components, which led to shifts in the value chain. Since other suppliers could not guarantee the same high standards, Ford took over most of the upstream value chains in a vertical integration strategy. Even the extraction of raw materials like ore and rubber was integrated (Womack, Jones, & Roos, 1992). As a result, Ford controlled almost the whole value chain from producing the raw materials, refinement, manufacturing up to the distribution to the customer.

The second revolution, also called Toyotism, goes back to E. Toyoda and T. Ohno from Toyota and has been described as "lean management" since 1990 (Womack, Jones, & Roos, 1992). Today, the most crucial driver of the second revolution is a standard of business administration: the optimal allocation of resources to reduce inventories (Wöhe & Döring, 2010). While in Fordism, the highest priority had been to keep the production running and inventories full to ensure that no bottlenecks occur, in Lean Management, the focus lied on just-in-time production and the associated cost savings in warehousing. Further, as the vehicles became more and more sophisticated from a technical point of view, suppliers became increasingly important. Thus, Toyota abandoned the guiding principle of vertical integration and included suppliers as equal partners in the value creation process. This led to an entirely new positioning of suppliers within the automotive industry and ultimately to the value chain (Figure 3) that remains valid until today (Lind, Pirttilä, Viskari, Schupp, & Kärri, 2012).

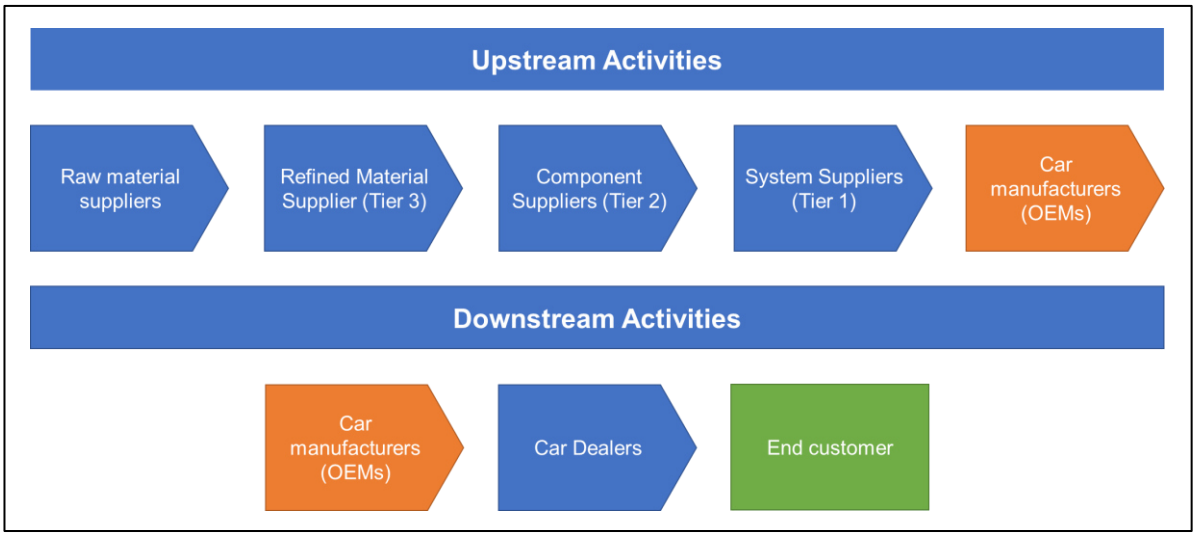

Figure 3. Up- and downstream activities in the value chain of the automotive industry. Own illustration based on (Lind, Pirttilä, Viskari, Schupp, & Kärri, 2012).

2.1.3 Value chain in the automotive industry – 3rd revolution

The third revolution in the automotive industry is imminent, or it has already begun, but it is undoubtedly inevitable (Hüttenrauch & Baum, 2008). Regarding the value chain, the FAST 2015 study (Mercer Management Consulting, 2004) predicted that OEMs would set their focus on the downstream activities (e.g., sales, service, customer relationships), leaving even more room for suppliers to take over the production in the upstream activities. These predictions have been confirmed by two follow-up studies and extended by further predictions until 2030 (Wyman, 2012; Wyman, 2018).

The primary trend, as predicted in 2004 (Mercer Management Consulting, 2004), is still ongoing. Figure 4 shows that the value-added share of OEMs decreased in all areas of the car production process between 2002 and 2012. Moreover, except for the electric drive, the share decreased further until 2017 and is then predicted to diminish even more till 2030 (Wyman, 2018).

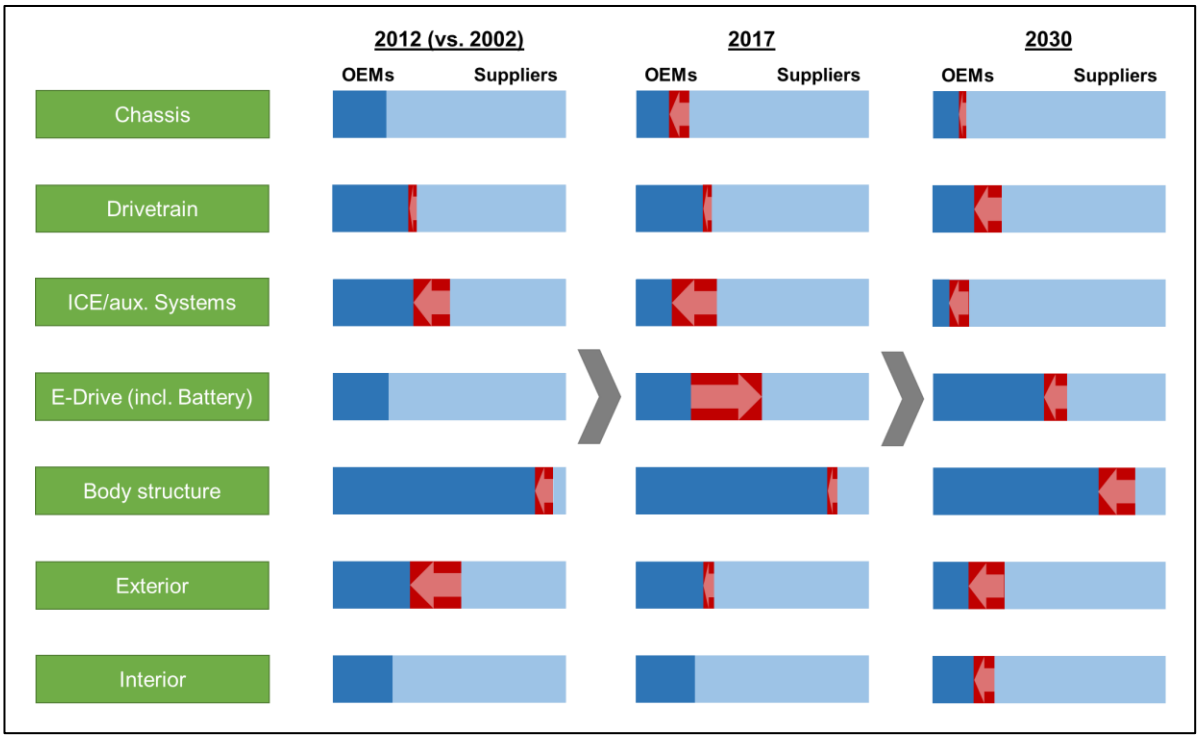

Figure 4. Shares of value creation in the automotive supply chain (2012, 2017, 2030). Own illustration based on (Wyman, 2018).

Furthermore, the FAST 2030 study reveals that most likely, not only the value-added shares are going to shift, but also the role of a digital integrator might enter the value chain. The digital integrator will be responsible for the integration of software and the digitization of products and take over the spot of a so-called tier-0.5 supplier between the OEMs and the premium tier-1 suppliers (Wyman, 2018).

With regard to the downstream activities, new mobility players, such as Uber or Lyft, will push into the value chain and start to replace individual vehicle buyers continuously. OEMs are forecasted to set their focus on brand management and to increase their investment in mobility services such as ride-hailing and car-sharing. Moreover, it can be assumed that OEMs will try to increase their direct sales to end customers, which puts pressure on the classic dealership model (Winkelhake, 2019). Altogether, the changes in the value chain are most significant in downstream activities. Incumbent firms move

their focus closer to the consumer, and new competitors push into the market, which is a fertile situation for business model innovation.

2.2 Business model

Business model research can be broadly divided into two directions: First, the identification and description of the components that make up a business model and second, the identification of different types of business models (Hedman & Kalling, 2003). The following section discusses the definition of the term business model and describes one approach of classifying business models to identify different business model types.

2.2.1 Definition

As a consequence of new technological developments in the field of Information and Computer Technologies (ICT) and the emergence of Internet companies, the term "business model" has become more and more present in the last three decades. Nowadays, the term "business model" is ubiquitous and is widely used by professionals and economists in various fields, such as marketing, management, and ICT (Dasilva & Trkman, 2014), to visualize and explain how a company works and how it generates profits. Nevertheless, it has not yet been possible to agree on a uniform, broadly accepted definition of the term "business model" (Markides, 2008). Therefore, some definitions are presented and explained below.

Magretta understands a business model as "stories that explain how enterprises work" (Magretta, 2002) and thus follows the definition of Drucker (1954). According to Drucker (1954), a good business model answers the following questions:

1. What is the company's business?
2. Who are the current and potential future customers? How can they be reached?
3. What do the customers value?
4. How does the business make money? How does the business deliver value to customers at a reasonable cost?

Magretta and Drucker thus focus primarily on how a company manages to generate added value for its customers and, during this process, to keep parts of the added value as profit in the company (Drucker, 1954; Magretta, 2002).

In the e-business area, Amit and Zott (2001) have considered several theories, such as "Virtual Markets," "Value Chain Analysis," "Dynamic Capabilities" or "Transaction Cost

Economics" and conclude that each of these theories can explain parts of the business model. However, none of them can explain a business model entirely. After a subsequent analysis of 59 e-businesses, they define the term "business model" more narrowly and precisely as follows: "A business model depicts the content, structure, and governance of transactions designed to create value through the exploitation of business opportunities" (Amit & Zott, 2001, p. 511). The content of the transaction refers to the goods and information, as well as the resources and skills needed. The structure identifies the different actors and their connections to each other, and governance describes how actors influence the flow of goods, resources, and information and how control can affect it, as well as their motivation (Amit & Zott, 2001).

DaSilva and Trkman (2014) have considered these and other definitions of the term "business model," distinguished them from similar terms that are often used in the same context (e. g. strategy), and finally provided them with a time perspective in a framework (see Figure 5). This framework enables the representation of the company's entire horizon from the actual state to the company vision.

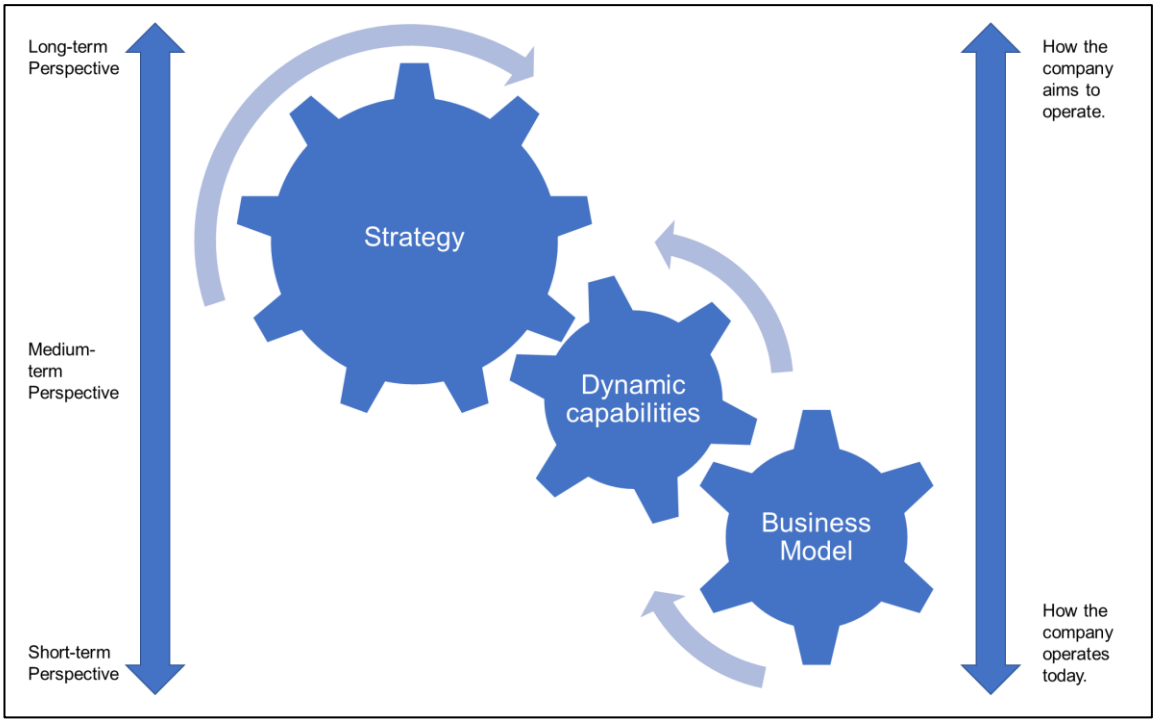

Figure 5. Generic framework of the relationship between Strategy, Dynamic Capabilities, and the Business Model. Own illustration based on (Dasilva & Trkman, 2014).

The core of a business model is defined by DaSilva and Trkman "as a combination of resources which, through transactions, generate value for the company and its

customers" (Dasilva & Trkman, 2014, p. 383). Furthermore, they argue that "strategy (a long-term perspective) sets up dynamic capabilities (a medium-term perspective) which then constrain possible business models (present or short-term perspective) to face either upcoming or existing contingencies" (Dasilva & Trkman, 2014, p. 383) and thus clearly delimit the terms from one another.

To conclude, the process of value creation, as presented in section 2.1.1, is at least a part of all presented definitions of the business model (Amit & Zott, 2001; Drucker, 1954) (Dasilva & Trkman, 2014). Compared to the value chain model, the business model seeks to answer further questions about the reason of the organization for creating and capturing value by offering products/services (value propositions) to their existing and future customers (Teece, 2018). Amit and Zott (2001) further state that Porter's value chain analysis draws more focus on the processes (e.g., activity chains) from creation to sale. In contrast, the business model sets the focus on the steps that are performed to complete transactions.

2.2.2 Business model types

To classify business models in business model types, many approaches might be useful depending on the desired granularity. The following section is based on Remane et al.'s comprehensive review of existing (digital) business model types as a part of their study on discovering new digital business models in the mobility sector (Remane, Hildebrandt, Hanelt, & Kolbe, 2016).

Remane et al. (2016) selected studies based on Veit et al. (2014)'s definition of a digital business model, who define a business model as digital "if changes in digital technologies trigger fundamental changes in the way business is carried out, and revenues are generated" (Veit, et al., 2014, p. 48). According to this definition, Remane et al. (2016) revealed a total of 12 relevant studies. Other studies that did not conform to the definition or were more focused on general business model types (e. g., Gassmann, Frankenberger, & Csik, 2014) were sorted out.

The remaining studies all describe different ways of classifying business models. Differences can be seen in the degree of granularity in which the business models are classified. Some authors present a few generic business model types (e.g., 4C-Net and 4S-Net Business Model by Wirtz, 2019) while instead, other authors describe the business model types very finely in detail (e.g., 41 business model types by Rappa, 2001). The 12 studies found by Remane et al. (2016) define 163 business model types

that partly overlap. Remane et al. (2016) cite as an example the business model manufacturer direct sales, which is already known in the existing literature as “manufacturer direct model” (Rappa, 2001, p. 1), “direct distribution” (Strauss & Frost, 2014, p. 58) or “direct to customer” (Weill & Vitale, 2001, p. 21).

However, Remane et al. (2016) found that none of the studies revealed during their comprehensive review was capable as a coding scheme for their data analysis. As a requirement, the business model typology should be mutually exclusive and collectively exhaustive. Therefore, they have used the approach of Weill et al. (2006) as a coding scheme that has already proven its usefulness in testing the performance of the business models from the top 1,000 companies in the United States. Furthermore, Weill et al.’s approach proved very useful in the study of Remane et al. (2016) because it immediately reveals two essential aspects of business models: the two dimensions of rights being sold and the type of asset involved.

The first dimension, the *rights being sold*, describes what a business sells and is referred to as “the heart of any business” (Weill, et al., 2006, p. 5). According to Weill et al., companies can sell three different kinds of rights: ownership, usage (e.g., hotel room), and matching with potential buyers and sellers (e.g., real estate Broker). Consequently, they define four basic asset rights models:

1. A *Creator* sells products to buyers that have been produced or assembled by the transformation of components or raw materials delivered by suppliers. Furthermore, the product has been designed by the Creator.
2. A *Distributor* buys products and resells the same product to someone else without fundamentally changing its characteristics. Usually, a Distributor provides additional value through product service, transport, or repackaging.
3. A *Landlord* sells the right to use a product for a specific time period instead of the product itself.
4. A *Broker* matches potential buyers with sellers and usually charges some commission for their service.

The second dimension, the *type of asset involved*, contains four different asset types: physical, financial, intangible, and human. Physical assets are defined as either durable items (e.g., houses, computers, and machine tools) or non-durable items (e.g., food, clothing, and paper). Financial assets contain cash and other assets such as stocks and bonds that enable their owner with rights to potential future cash flows. Intangible assets cover legally protected intellectual property (e.g., patents, copyrights, trademarks, and

trade secrets) and other intangible assets (e.g., knowledge, brand image). Lastly, human assets include people's time, effort, or knowledge, which can be rented out for consideration.

Combining those two dimensions, each with four characteristics, the whole framework provides 16 possible combinations or rather business model types, which Weill et al. (2006) have named and defined in detail (see Table 1).

Rights being sold	*Type of asset involved*			
	Financial	**Physical**	**Intangible**	**Human**
Creator	Entrepreneur: Creating and selling their firms (e.g., Caufield & Byers)	Manufacturer: Creating and selling physical assets (e.g., General Motors)	Inventor: Creates and sells intangible assets such as patents and copyrights (e.g., Lucent's Bell Labs)	Human Creator: Creates and sells humans (illegal but included for logical completeness)
Distributor	Financial Trader: Buying or selling financial assets without significantly transforming them (e.g., banks, investment firms)	Wholesaler/Retailer: Buys and sells physical assets (e.g., Amazon)	Intellectual Property (IP) Trader: Buys and sells intangible assets (e.g., copyrights)	Human Distributor: Buys and sells human assets (illegal but included for logical completeness)
Landlord	Financial Landlord: Provides financial assets under certain conditions (e.g., lenders, insurers)	Physical Landlord: Sells the right to use a physical product	Intellectual Landlord: Sells the right to use intangible assets (e.g., Microsoft, Google)	Contractor: Sells a service provided by humans (e.g., consulting, package delivery)
Broker	Financial Broker: Matches buyers and sellers of financial assets (e.g., e-trade)	Physical Broker: Matches buyers and sellers of physical assets (e.g., eBay)	Intellectual Property (IP) broker: Matches buyers and sellers of intangible assets (e.g., Valassis)	Human Resources (HR) broker: Matches buyers and sellers of human services (e.g., Robert Half)

Table 1. Business model types. Own illustration based on (Weill, et al., 2006).

2.3 Business model innovation

This research focuses on new emerging mobility services, hence new business models. Therefore, this section will provide a common understanding of what business model innovation is, the motivation behind it, and the occurring challenges during the development and implementation of new business models.

2.3.1 Definition

In line with the definitions of the term business model, there is no uniform definition for the concept of business model innovation (Andreini & Bettinelli, 2017; Schallmo, 2013). Further, business model innovation is also referred to through the use of different terms

in literature such as Business Model Transformation and Business Model Change (Andreini & Bettinelli, 2017).

Based on a comprehensive review of ten different definitions of business model innovation, Schallmo (2013) defines the business model innovation concept in detail through the use of five components: aim, process, innovation object, degree of innovation, and reference unit.

The aim of business model innovation is referred to as the combination of business model elements in such a way to create and capture value for a company's customers and stakeholders. It is further crucial to differentiate from competitors to establish customer relationships and create a competitive advantage that is difficult to imitate. Process describes the sequence of necessary tasks and decisions in a logical and chronological order to drive development, implementation, and change of the business model. Innovation objects can be single business model elements such as customer segments or services, but also the entire business model. The degree of innovation defines the extent of the business model innovation, either incremental (slightly) or radical (fundamental). Lastly, the reference unit determines the novelty of the business model innovation and is usually the customer (Schallmo, 2013).

2.3.2 Motivation

Business Model Innovation usually occurs when industries are exposed to a disruptive change that forces companies to rethink the way they create and deliver value to their customers (Markides, 2008). Johnson et al. (2008) highlight the importance of companies recognizing when business model innovation is necessary. Furthermore, they address five strategic circumstances that often require innovation:

1. **Disruptive innovations** enable opportunities to simplify or offer existing solutions at a cheaper rate to reach large groups of potential customers that have been excluded from the market before.
1. New **technology** enables opportunities to profit from creating new business models around it or bringing new technology to an entirely new market.
2. **Being more efficient** refers to opportunities to fill a gap in the market. For example, redefining the industry's profitability by focusing on speed and reliability instead of low prices.
3. Need to fend **threats from low-end disrupters**.

4. Demand to **respond to a shifting basis of competition** based on changing customer attitudes and needs (Johnson, Christensen, & Kagermann, 2008).

One of the most prominent examples that forced competitors to adapt their business models was the introduction of Apple's iPhone to the market in the year 2007 (Hacklin, Björkdahl, & Wallin, 2017). The iPhone disrupted the mobile phone market fundamentally by shifting the focus of mobile phones from hardware towards software. Competitors (e.g., Nokia, Blackberry) business models at that time were based on selling devices, voice minutes, and text messages. In contrast, Apple created an ecosystem for applications and mobile services to create value (Hacklin, Björkdahl, & Wallin, 2017).

Even though the reasons to consider reinventing a business model may be a result of varying circumstances, the common understanding in literature is that business model innovation is crucial to ensure a firm's success (Desyllas & Sako, 2013). However, established companies should only undertake business model innovation when the business model is game-changing to the industry or market, disrupts their competitors, and when the company is able to handle all potentially harmful effects to the core business model (Johnson, Christensen, & Kagermann, 2008).

2.3.3 Challenges

Business models are dynamic concepts and, consequently, never complete (Wrigley, Bucolo, & Straker, 2016). Nevertheless, business model innovation is complex and prone to error (Pauwels & Weiss, 2008) due to the interdependent components of a business model (Baden-Fuller & Mangematin, 2012; Klang, Wallnöfer, & Hacklin, 2014). Still, all components should be considered to design an effective business model, which increases the potential impacts that need to be taken into account (Gavetti & Levinthal, 2000).

In established organizations, it is ambitious to design and implement new business models, especially because they might challenge or eventually compete with the existing business model (Chesbrough & Rosenbloom, 2002; Mezger, 2014; Osterwalder & Pigneur, 2010). Therefore, one critical decision to either integrate the new business model into the established organization or spin it off (Markides & Sosa, 2013; Osterwalder & Pigneur, 2010). This choice is affected by strategic similarity and risk, whereby risk refers, for example, to the expected effects on the brand image, earnings, and legal liability (Markides & Sosa, 2013). However, in the case business model innovation is done right, synergies between the existing and the new business model

can lead to an even more significant sustainable competitive advantage (Berends, Smits, Reymen, & Podoynitsyna, 2016).

Markides (2013) further highlights the importance of the organizational context (e.g., culture, vision, people) for the success of business model innovation. Firstly, management plays a critical role in overcoming the dominant logic within the organization's industry (Wrigley, Bucolo, & Straker, 2016). The dominant logic is a set of heuristic rules, norms, and beliefs that managers create to guide their actions (Prahalad & Bettis, 1986). Ideas and behaviors that do not correspond to this logic are often filtered out. As a result, organizations miss critical opportunities and lose their competitive advantage over time (Chesbrough & Rosenbloom, 2002). Moreover, business model innovation needs a management team willing to rethink and redefine the established business model and take over the necessary risks (Doz & Kosonen, 2010).

When the management overcomes the dominant logic and takes over the risks of business model innovation, organizational structures, and processes must be flexible enough to support business model change (Teece, 2010). Furthermore, organizational culture plays an essential role in the success of business model innovation. It can influence overall innovativeness and positively impact strategic flexibility (Teece, 2010). In line with Björkdahl and Holmen (2013), who state the problem of organizations having no one responsible for business model innovation nor any routines for it, Markides (2013) proposes that organizations should consider creating autonomous, independent units with a focus on business model innovation (Björkdahl & Holmén, 2013). Moreover, organizations should endorse an "entrepreneurial spirit" required to succeed (Markides, 2013).

Finally, the business model concept involves a multitude of components. Consequently, the organization has to create value for a variety of stakeholders (Amit & Zott, 2001) (Teece, 2010). Therefore, stakeholder management is a crucial component of business model innovation to succeed and create maximum impact (Adner & Kapoor, 2010). However, business model innovation is still an explorative, iterative process that develops through experimentation. It might not be successful in its first attempt (Sosna, Trevinyo-Rodriguez, & Velamuri, 2010). Nevertheless, it remains crucial to sustaining a competitive advantage. Hence, Osterwalder and Pigneur (2010) propose that organizations should find a way of having parallel business models, where they can implement innovative business models while maintaining established models.

2.4 Servitization

Since the basic knowledge of business models and business model innovation is provided at this point, this section will go more into the specifics and explain the Servitization model. The observed phenomenon is based on this model and thus needs a brief elaboration on its features, motivation, and challenges.

2.4.1 Definition

The meaning behind the term “Servitization” can be traced back to the 1970s (Lay, 2014). Levitt (1969) reported from a salesman who highlighted the customer’s interest in quarter-inch holes, not primarily in quarter-inch drills (Levitt, 1969). This example shows that customers need the functionalities of manufactured products rather than the products themselves. “Servitization” as a label has first been coined by Vandermerwe and Rada (1988) as a synonym for packages or bundles containing a product and service. Services can include support, self-service, and knowledge, but above all, services played the leading role (Vandermerwe & Rada, 1988). Since then, several research communities of different views and disciplines have noted the tendency of manufacturers moving towards services, and consequently, different terminology is used within the field (e.g., integrated solutions, product-service systems) (Lay, 2014).

For example, Kowalkowski et al. (2017) define Servitization as the “transformational processes whereby a company shifts from a product-centric to a service-centric business model and logic” (Kowalkowski, Gebauer, Kamp, & Parry, 2017, p. 8). Organizations offering a combination of products and services are referred to as product-service systems (PSS) in the literature (Phillips, Maull, & Ng, 2014) (Tukker, 2004). Tukker (2004) further presents a typology of three categories of PSSs with eight sub-categories (see Figure 6).

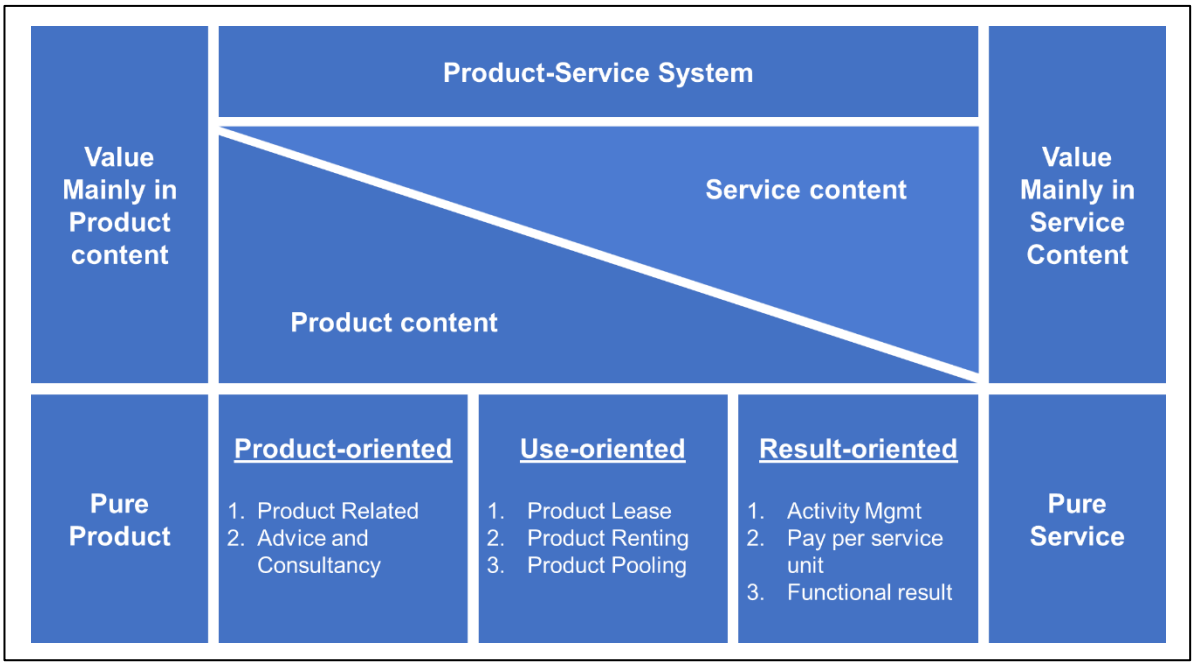

Figure 6. Main- and subcategories of a product-service system (PSS). Own illustration based on (Tukker, 2004).

By definition, Tukker's (2004) typology describes PSS types within the spectrum between pure product and pure services offerings. The first category, product-oriented, represents the traditional approach to offering services as a manufacturing organization (e.g., consulting, maintaining). The second category, use-oriented, describes services whereby the product remains in the ownership of the manufacturer (e.g., leasing, renting, pooling). In the third category, result-orientated, customers pay for the result of using a product (e.g., pay-per-use pricing models) instead of the usage of the product. Moreover, Chesbrough (2011) adds that moving towards services from a manufacturing perspective can be seen as a business model innovation.

2.4.2 Motivation

The main arguments for integrating services into the core product offerings are according to the hierarchy of Servitization rationales of Lay (2014), growth, profit, and innovation.

Growth, with product-oriented services, is realized through the stimulation of product sales and the sales of additional services (Lay, 2014). Competitive advantages with services and differentiation in mature markets increase the effect of sales significantly (Oliva & Kallenberg, 2003; Vandermerwe & Rada, 1988). However, organizations must set market entry barriers for competitors and protect themselves against imitation (Lay, 2014). As services are less visible and consequently harder to imitate, Olivia and

Kallenberg (2003) propose to increase the number of services offered to generate a sustainable competitive advantage.

Profit is discussed in the literature as the financial driver of Servitization (Baines, Lightfoot, Benedettini, & Kay, 2009). In particular, offering services results in higher margins (Karlsson, Avlonitis, Frandsen, & Mikkola, 2014; Oliva & Kallenberg, 2003) due to increased capacity utilization and less price competition (Lay, 2014). Further, services can generate more stable revenues (Oliva & Kallenberg, 2003), as the demand for products and services is countercyclical (Lay, 2014).

The innovation rationale is only scarcely discussed in the literature (Lay, 2014). It includes the opportunity to enable closer customer relations through offering services (Karlsson, Avlonitis, Frandsen, & Mikkola, 2014) and hence, increases the knowledge about customer demands (Lay, 2014). In addition, product-related services can serve as an important information source for the manufacturer's product development (Brax & Jonsson, 2009).

2.4.3 Challenges

In the early literature, it was assumed that Servitization offers only advantages to manufacturers, but meanwhile, many challenges have been discussed (Lay, 2014). According to Oliva and Kallenberg (2003), moving from a manufacturing perspective to a service perspective is a major managerial challenge with many hurdles to overcome. Often organizations fail in identifying the economic potential of Servitization at all, consider services outside their scope of competencies or lack in implementing a successful service strategy (Oliva & Kallenberg, 2003). To succeed in Servitization, Lay (2004) highlights the importance of a specific company culture, new organizational principles and structures, adequate services, and personnel qualifications that differ from the product-centric perspective. Changing an organization's focus and creating the necessary capabilities are the main challenges to tackle in Servitization (Karlsson, Avlonitis, Frandsen, & Mikkola, 2014), and the absence of those often results in the so-called "service-paradox."

The service-paradox was coined by Gebauer et al. and describes situations in which investments into the service offering were made but resulted in a decline in overall firm performance (Gebauer, Fleisch, & Friedli, 2005). This is often due to the complex implementation challenges, but pre-existing structures also play a crucial role (Fang, Palmatier, & Steenkamp, 2008). A successful transition into the service business is

further tied to synergetic potential with the core business and reaching a critical mass in the service business (Fang, Palmatier, & Steenkamp, 2008).

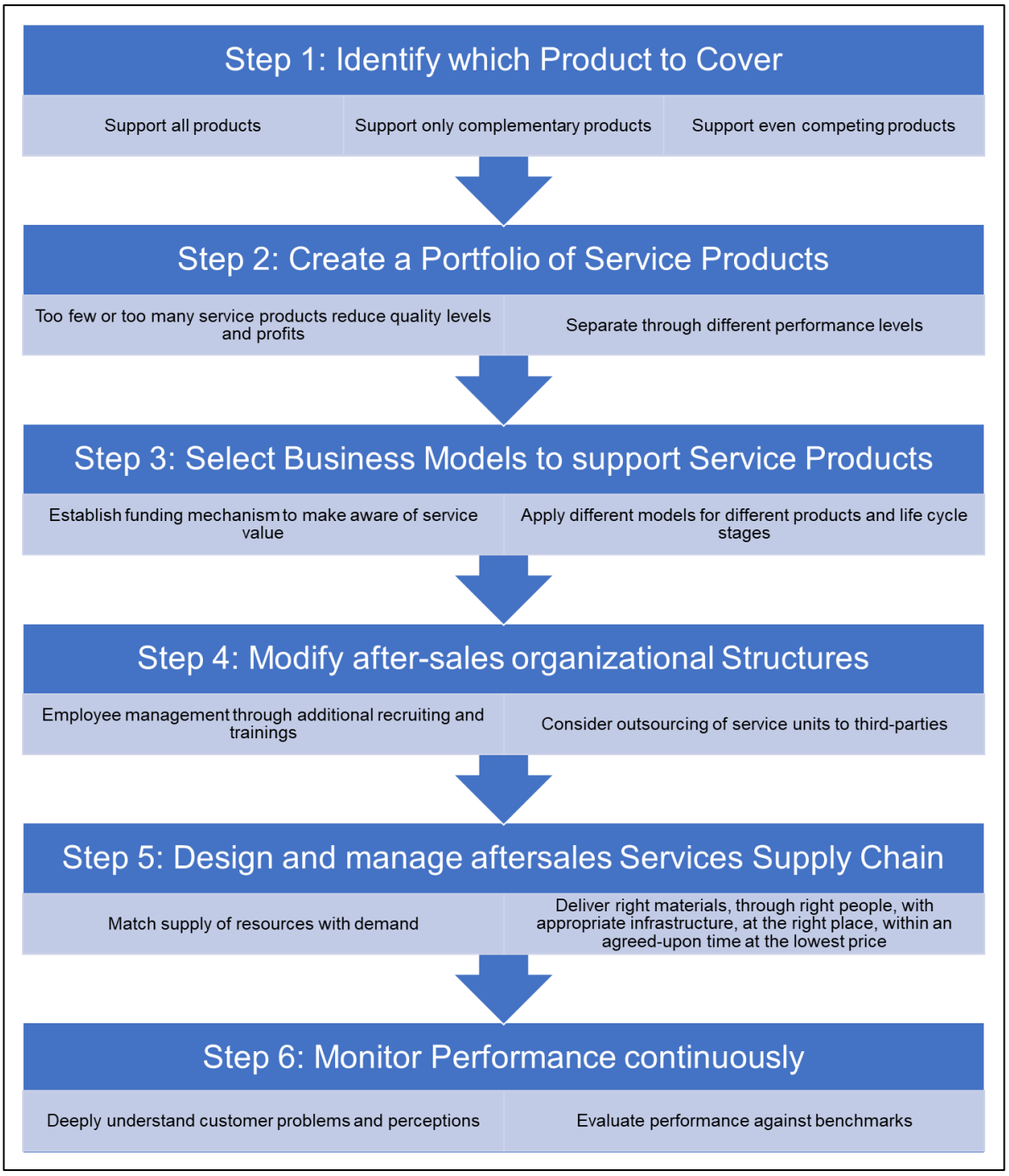

Figure 7. Six-step framework to succeed in the service business. Own illustration based on (Kryvinska, Kaczor, Strauss, & Greguš, 2015).

To sum up, the critical levers for success in Servitization are “setting the strategic direction, developing service design and delivery capabilities, adjusting organizational design and establishing a service culture” (Karlsson, Avlonitis, Frandsen, & Mikkola,

2014, p. 18). Based on previous literature, Kryvinska et al. (2015) further present a six-step framework with actions to undertake to succeed in a service business (see Figure 7).

2.5 Digitization and digital transformation

Digitalization has become a buzzword in our society. Generally speaking, digitalization, from a technical perspective, means that analog information will be converted into digital values, to save them and enable editing (Loebbecke, 2006). Nowadays, digitalization, along with the "digital revolution" and "digital transformation," is understood as a change in society and business, triggered by the data transformation. Smart automation is created when people, machines, and things are connected by using information- and communication technologies (BMWi, 2015). This leads to new combinations and the creation of business models in single industries and triggers changes within the supply chains (Hilbert & López, 2011). The digitalization is no novel event; it has existed for over 75 years, yet, it has risen exponentially within the past 30 years. It is estimated that we have now digitized 95% of our information, compared to only 3% in 1993, and a critical mass was reached. Hilbert and Lopez (2011) argue that there is no differentiation between on- and offline anymore due to the digitalization of the physical world.

The digital transformation is also influencing the automotive industry. Hanelt et al. (2015) investigated how the digital movement affects business models of the automotive industry. They identified four types emerging due to the shift from analog to digital: extension, revision, termination, and creation (see Table 2).

Type	Definition	Factors
Extension	adding digital assets to established BMs, minimal change to the core logic	Interaction; Connectivity
Revision	digitizing established BMs	Self-driving; Mobility Services
Termination	physical parts of BMs are removed	Virtualization
Creation	new digital BMs are created	New Driver-Service; New Data-Service

Table 2. Emerging types from digital movement. Own illustration based on (Hanelt, Piccinini, Gregory, Hildebrandt, & Kolbe, 2015).

Extension: The type extension is based on the two factors interaction and connectivity. For the first, social media plays an essential role. It allows manufacturers to interact with their customers, fans, and prospects via social media platforms. This is not only enabling

OEMs to increase their reach by sharing information and market their products, but it also encourages users to participate in conversations and share their opinion about certain products, services, or decisions. Especially the younger, tech-affine generation is demanding more interaction with and more information from companies (Lucas, Agarwal, Clemons, El Sawy, & Weber, 2013). Additionally, by having a higher interaction with its customers, manufacturers can identify customer needs better and act faster (Füller, Mühlbacher, Matzler, & Jawecki, 2009). The factor connectivity is based on mobile technologies, in particular mobile devices such as smartphones. Manufacturers enable the compatibility of these devices with the automobile to increase personalization and ensure customer's reachability. Some automobile manufacturers extended their business model by a tech team responsible for developing mobile applications to add a digital dimension to the physical driving experience (Hanelt, Piccinini, Gregory, Hildebrandt, & Kolbe, 2015).

Revision: Revision focuses on self-driving and mobility services. Self-driving cars are referring to the automation that digitalization brings along. This presents a new experience to the customer, driving a car and the car as a physical good are not the focus anymore. According to Hanelt et al. (2015), "some engineering competencies, formerly competitive advantages, will decline in importance" (p. 1321).

As with self-driving cars, mobility services will contribute to the shift away from the importance of the physical good and rather emphasize on services such as multi-modal solutions managed over a mobile device. This will lead to a change in the cost structure and revenue model, as pay-per-use payment plans will become more appropriate. Moreover, urbanization is threatening automotive manufacturers in the way of depriving them of the car as a status symbol. Particularly in dense areas, car ownership becomes more inconvenient and tiresome due to a lack of parking space and high traffic. Thus, mobility services such as carsharing (see section 2.7.3.1) are handy alternatives for owning a car (Hanelt, Piccinini, Gregory, Hildebrandt, & Kolbe, 2015).

Creation: This part focuses on digital trends which were adopted to create new business models. One of them is the new driver-services. As in the previous part mentioned, mobile devices and connectivity are crucial for the younger generation, bringing new opportunities for automobile manufacturers. Product-based services are creating new revenue streams. Thus, expanding the framework and operations of IT departments to tasks such as app development is critical.

Moreover, not only driver-services but also new data services are evolving. Due to connectivity, enormous amounts of data are produced, revealing information about driver behavior and usage. This can be used for analyzing patterns of customer's behavior to better understand their needs (Hanelt, Piccinini, Gregory, Hildebrandt, & Kolbe, 2015).

Termination: The digital transformation can also eliminate business models or their physical components of it. A big part is attributed to the visualization. Within the design phase and the sales process, it is a useful tool for saving time and costs. Prototypes are built digitally before production, and customers are experiencing their future cars in virtual showrooms. The former is especially causing the shift from the importance of engineering ability to digital abilities (Corciolani, Borghini, & Scarpi, 2018).

2.6 Ownership versus Usership

The industry trend Servitization is omnipresent and drives the evolution from offering products to services (see section 2.4). In between, organizations offer product-service systems (PSSs), often resulting in non-ownership modes (Demyttenaere, Ivo, & Jacoby, 2016). This shift from ownership to usership means that the customer is no longer the product's legal owner.

Usership, instead of ownership, has been identified as a trend in the literature (Benoit (née Moeller) & Wittkowski, 2010; Demyttenaere, Ivo, & Jacoby, 2016; Wyman, 2018). In particular, with regard to everyday consumer goods, customers are changing their consumption patterns and demanding more non-ownership modes of consumption, such as rental (Benoit (née Moeller) & Wittkowski, 2010; Demyttenaere, Ivo, & Jacoby, 2016). Reasons are found by Trendbüro (2008) within a rising demand for premium products, the desire for "experiences," and increasing awareness for sustainability. Moreover, usership allows customers to take over the product without taking over the risks attached to it (Trendbüro, 2008). Berry and Maricle (1973) identify the risk of product alteration and/or obsolescence, the risk of making an incorrect product selection, the responsibility for product maintenance, and the full cost for products a customer does not necessarily need frequently as *the burdens of ownership* (Berry & Maricle, 1973). Hence, usership is a way of reducing or avoiding these burdens.

According to the FAST 2030 study, the prominent trends that affect the shift from ownership to usership are urbanization, sustainability, and economics (Wyman, 2018). Furthermore, digitalization can be understood as an enabler providing new technologies and connectivity for on-demand services. The following section provides an

understanding of the status quo in car ownership, the role of millennials for the shift, and a prediction about the future of car ownership.

2.6.1 Car production and registrations

On the one hand, technology and connectivity raise the question of whether it is still important to own a car (Gao, Hensley, & Zielke, 2014). On the other hand, the demand for public transport and emerging alternatives such as ride-hailing or ride-sharing increased over the last years and is projected to grow three-fold between 2015 and 2050 worldwide (EC, 2018; ITF, 2019).

The FAST 2030 study reported a compound annual growth rate of 3% between 2010 and 2017 for the global light vehicle production and predicted ongoing growth for the next few years (Wyman, 2018). However, the European Automobile Manufacturers Association (ACEA) identifies a decline in the world passenger car production after eight years of continuous growth between 2009 and 2017. In 2018, the production dropped by 1%, and in 2019, another by another 6.3% (ACEA, 2020). Even though the FAST 2030 study includes commercial vehicles, whereas the ACEA excludes them, the ACEA also reports a decline in the world commercial vehicle production for 2019. To conclude, the global passenger car production is decreasing.

In terms of passenger car registration, the EU still experienced a slight increase between 2018 and 2019. However, the numbers decreased by 4% in America and by 7.3% in Asia, accounting for a global decrease in passenger car registrations by 4.9% (ACEA, 2020). Concerning the USA, the Organization for Economic Co-operation and Development reports an ongoing decline in passenger car registrations (including vehicles registered to the authorities) since 2015 between 2.5% and 11.1% per year (OECD, 2020).

To sum up, whereas Wyman (2018) predicted an ongoing growth in light vehicle production, the ACEA (2020) identified a decline in the last two years. Moreover, both the ACEA (2020) and OECD (2020) report declines in passenger car registrations globally, for the OECD member states, and the USA. In addition, the impact of the COVID-19 virus on the automotive industry is not foreseeable as the ACEA already reported a production loss of 13% for the manufacturing of motor vehicles in the European Union in 2020 (ACEA, 2020).

2.6.2 The role of millennials and shared mobility

Since the mid-2000s, and after six decades of constant growth, car usage and driver licensing are declining in the USA and peer countries, and millennials (born between 1981 and 1996) (Dimock, 2019) lead the trend (Klein & Smart, 2017; Zhong & Lee, 2017). According to Klein and Smart (2017), millennials own fewer cars, drive less, and are less likely to own a driver's license than previous generations. This premise is further supported by the USA's demographical data, which shows an increasing average age for new-car purchasers by seven years between 2000 and 2015 (Kurz, Li, & Vine, 2016). Likewise, the share of new car buyers decreased by 6% for the 16- to 34-year old age group and by an even-larger 9% within the 35- to 49-year old age group in the same period (Kurz, Li, & Vine, 2016).

Gao et al. (2014) suppose that car ownership plays a less important role to millennials in comparison to previous generations. Three potential explanations are changing mobility and location preferences towards urbanization, delayed life events (e.g., employment, marriage) due to a changing lifestyle, and rising costs that make driving less affordable (Zhong & Lee, 2017). Moreover, millennials are more open to shared mobility services (e.g., ride-sharing and car-sharing), strengthening the trend from ownership to usership (Gao, Hensley, & Zielke, 2014).

Accordingly, the FAST 2030 study predicts the growth of individual mobility services such as carsharing, car rental, and ride-hailing by 95% in Germany, 114% in the USA, and 358% in China between 2015 and 2040 (Wyman, 2018). Given the predicted trend, the U.S. car rental market, including ride-sharing and car-sharing services, increased its total revenue seven years in a row and reached a new record in 2017 (Cox Automotive, 2018). Furthermore, in line with an analysis of business travel expenses, ride-hailing services (e.g., Uber, Lyft) accounted for 52% of ground transportation transactions in 2016, increasing by 6%. On the contrary, traditional car rentals accounted for 36%, and taxis made up 12% of transactions (Certify, 2016).

A more traditional form of usership, the vehicle leasing market, has also increased. Within seven years, between 2009 and 2016, the number of leased vehicles increased by about 3.5 million to 4.4 million units (Cox Automotive, 2017). However, in 2017, Gareffa published an article about the Edmunds Lease Market report elaborating on the USA's leasing market. He concluded that leasing made up almost a third of new vehicle sales in 2017 (31.1%); however, this was already a drop of 4.4% from the previous year after having steady growth. Edmunds executive director argues that the leasing market

is soon saturated. Nevertheless, leasing will continue being an appealing tool to obtain the vehicle of choice with relatively low payments (Gareffa, 2017).

Nonetheless, the results of a survey by The Zebra (2020) about the necessity of car ownership in the United States show that still, 63% of the surveyed people find it relevant to have their own car. In contrast, only 14% say that public transport is a more comfortable and cheaper option. People argued that public transport is inconvenient, time-consuming, and lacks independence. Other options, such as ride-hailing services, seem to have safety issues (The Zebra, 2020).

To conclude, millennials are leading the trend from car ownership to car usership, and recent studies and surveys show early signs of the trend such as decreasing car purchases in the younger age groups (Kurz, Li, & Vine, 2016) or increasing revenues in usership transport modes (Certify, 2016; Cox Automotive, 2018). Nevertheless, the survey conducted by The Zebra (2020) shows that car ownership is still essential to the majority of the population in 2020.

2.6.3 Predictions for private car ownership

By 2050, the global demand for passenger transport is expected to grow three-fold (ITF, 2019). The highest increase is predicted to be seen in urban areas (Deloitte, 2020; Gao, Kaas, Mohr, & Wee, 2016; ITF, 2019; Kuhnert, Stürmer, & Koster, 2018). According to the ITF (2020), global urban passenger transport will more than double by 2050 (see Figure 8). Furthermore, non-OECD countries will experience the highest increase (ITF, 2019).

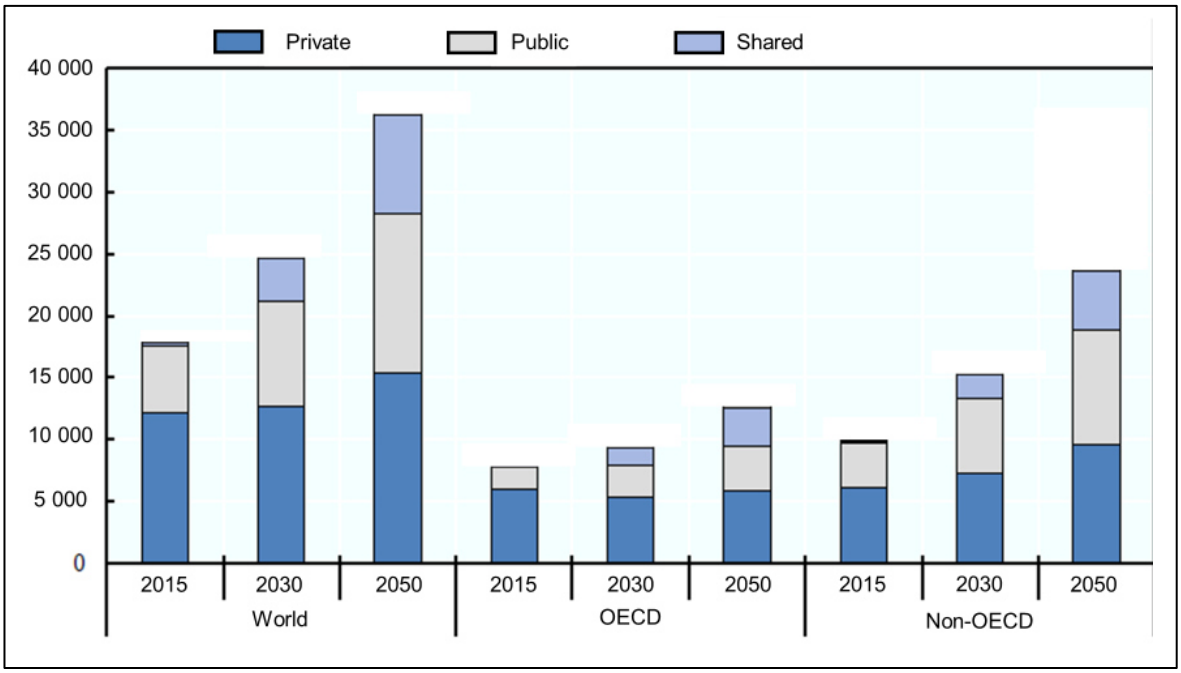

Figure 8. Urban travel by mode group – current demand pathway in billion passenger-kilometers. Own illustration based on (ITF, 2019).

Today, private cars are the most common transportation mode for urban passengers and account for almost 75% of the distance traveled in OECD countries and over 60% in non-OECD countries (ITF, 2019). However, even though the global passenger transport is predicted to be increasing, the shares are expected to decline to 46% in OECD countries and 39% in non-OECD countries (ITF, 2019). Reasons are found within an increasing adoption of shared mobility services and public transport, as Figure 8 shows.

Consequently, car ownership in urban areas is likely to shift from individuals to fleet operators that offer mobility services such as ride-hailing or car-sharing (Deloitte, 2020; Gao, Kaas, Mohr, & Wee, 2016; ITF, 2019; Kuhnert, Stürmer, & Koster, 2018). On top of that, the level of urbanization is rising and expected to hit 89% in the United States by 2050, and on average, 84% in the Euro5 countries (Germany, France, United Kingdom, Spain, and Italy) (Deloitte, 2020). In rural areas, private car ownership is expected to remain the most common form in the future due to insufficient infrastructure for long-distance travel (ITF, 2019; Kuhnert, Stürmer, & Koster, 2018). Other reasons to prefer car ownership are comfort, status, and flexibility (Kuhnert, Stürmer, & Koster, 2018).

Further research on the evolution of mobility by Cox Automotive (2019) summarizes four predictions for the future of mobility and car ownership:

1. Consumers will rely significantly less on personally owned vehicles.

2. Affordability increases consumer consideration of mobility alternatives.
3. Generation Z and Millennials will be the first to adopt alternative ownership models.
4. A car subscription will be the leader for alternative ownership models.

2.7 Business Models in the automotive industry

The automotive industry is affected by ongoing trends such as digitalization and urbanization. Besides, these trends serve as enablers and drivers for business model innovation, and Servitization leads the way to more customer-centric business models.

The following section provides an overview of the generic roles organizations can take over in the automotive industry and defines the most important current mobility trends for our research.

2.7.1 Overview

The wide variety of different business model typologies and business model overviews has already been discussed in section 2.2.2. Remane et al. (2016) analyzed around 500 startups from the mobility sector in their study on digital business models. They identified 27 different business model types (see Appendix 1) based on the approach of Weill et al. (2005).

Another approach is presented by Riasanow et al. (2017), who define a set of generic roles in the automotive industry based on a structured content analysis of Crunchbase data. These generic roles are on a more abstract level than the business model types of Remane et al. (2016) and combine business models with similar value streams. In total, Riasanow et al. (2017) define 15 generic roles in the automotive industry, including the consumer (see Table 3).

Generic Role	Description	Example
OEM	The original equipment manufacturer (OEM) is, in the automotive industry, used as a synonym for vehicle manufacturers. This generic role assumes that OEMs produce traditional combustion engines as well as electric vehicles (EVs). OEMs value proposition includes direct sales, R&D, after-sales, and services (Kang, Mahoney, & Tan, 2009)	Ferrari,Tesla, Cadillac, BMW, Daimler, Bolt Motorbikes
Consumer	The consumer role requests mobility (e.g., driving an own carsharing a car, using public transport). Consumers pay with money, data, or a combination of both.	
Tier 1-3 Supplier	Tier 1-3 Suppliers build the upstream activities to the OEMs, which includes activities such as system development (tier 1), component development (tier 2), and supplying refined materials (tier 3).	Bosch, Continental, ABC Group
Public Transportation Provider	Public Transportation Providers include traditional public transport (e.g., busses, trains)	New York MTA, citibike
Car Rental Provider	Car Rental Providers offer a range of options for renting a car.	Sixt, Hertz
Car (parts) Dealer	Car (parts) Dealers represent the physical dealerships that offer cars or car parts to the consumers and online platforms that sell spare parts.	LUEG, Amazon (Fiat), carparts.com
Disruptive Technology Provider	Disruptive Technology Providers enter the supply chain to the OEM and offer disruptive innovations (e.g., hardware and software needed for assisted driving)	Savari, Intel, Mobileye
Mobility Service Platform	Mobility Service Platforms include P2P and B2C carsharing, P2P-Lending, and service platforms from OEMs.	Uber, VRide, DriveNow, Tesloop, Taxify, Car2Go
Mobility Service Aggregator	Mobility Service Aggregators combine a variety of different mobility services (e.g., public transport, and car-sharing)	Moovel, Flare
Intelligent Infrastructure Provider	Intelligent Infrastructure refers to a combination of physical and digital infrastructure (e.g., electric vehicle charging stations).	ChargeNow, CarCharging, Chargerlin
Cloud Infrastructure Provider	Cloud Infrastructure Provider (IaaS) offer on-demand internet-based computing resources (e.g., servers, storage, applications, services)	Amazon Elastic Compute Cloud (Amazon EC2)
Cloud Platform Provider	Cloud Platform Providers (PaaS) offer digital marketplaces (Broker) for a variety of cloud infrastructure services.	Google Cloud Platform, Microsoft Azure
Value Added Service Provider	Value Added Service Providers offer products or services that can be accessed before, during, or after transportation (e.g., technical information about the vehicle, entertainment, or concierge services)	Spotify, Data Crossover, Autolinked, ParkNow, BMW Connected Drive
Car Service Provider	Car Service Providers offer traditional vehicle-related services (e.g., maintenance, insurance)	Washtec
E-Payment Provider	E-Payment Providers offer payment services that work primarily for mobile devices or vehicles.	MercedesPay

Table 3. Generic Roles in the Automotive Industry. Own illustration based on (Riasanow, Galic, & Böhm, 2017).

2.7.2 Leasing and rental

Leasing and rental are both classic models of gaining access to a vehicle. Leasing is a financing tool that allows customers to have a car for a period of usually 2 - 4 years by acquiring the right to use the vehicle. By doing so, the lessee avoids “making large initial cash outlays" (Tahtah & Spek, 2010, p. 3). Instead, he/she pays a monthly fee, which is composed of the depreciation, fees, and interest, throughout the leasing period with an initial down payment. Unfortunately, the lessee is contractually bound to the leasing period and cannot shorten it. Moreover, he must stay in the limits agreed in the contract, such as driven miles and maintenance. Otherwise, the lessee must pay additional fees. Since leasing is a form of renting, the car must be returned after the contract term. However, in some cases, the lessee has the opportunity to acquire ownership over the vehicle by buying out the car (Vincent, 2019).

As just mentioned, leasing is a different form of rental. The difference here lies in the duration of having access to an asset. A typical car rental is usually more casual and for a short term from a few hours to a few days or weeks with the option of extension. In contrast, a lease is stricter in its contract lines and goes at least for a year up to 10 or 20 years, depending on the good rented (Glen, n.d.; Vickers, 2019).

2.7.3 Shared mobility

Shared Mobility is one component of the sharing economy model and is also known as collaborative consumption or access-based consumption (Corciolani, Borghini, & Scarpi, 2018). Shared mobility is changing travel patterns among consumers by giving users short-term access to vehicles, bicycles, and other transportations modes such as E-Scooters. Different service models are offered to travelers to cover a variety of needs (Cohen & Shaheen, 2016). There are six main concepts, namely car-sharing, ride-hailing, ride-sharing, ride-pooling, mobility-as-a-service, and micro-mobility (i.e., e-scooters and bike sharing). The latter will not be covered in this paper due to our focus on car-centered mobility solutions.

2.7.3.1 Carsharing

Carsharing describes a form of short-term car rental, which includes the cost of fuel and insurance within a pay-per-use pricing model (Spulber, Dennis, Wallace, & Schultz, 2016). Pricing is usually based on the driving distance or the rental period with minute, hourly, or daily rates available (Khare, Stewart, & Schatz, 2016). Furthermore, usage of carsharing is predicted to save costs but still stay mobile, and hence, carsharing can

contribute to a higher probability of reducing car ownership (Cohen & Shaheen, 2016; Santos, 2018).

The literature differentiates between three common car-sharing models: round-trip (or station-based) car-sharing, one-way (or free-floating) car-sharing, and peer-to-peer car-sharing (Hurrelmann & Albrecht, 2014; Shaheen, Chan, Bansal, & Cohen, 2015; Spulber, Dennis, Wallace, & Schultz, 2016). Round-trip (or station-based) car-sharing is the traditional form of car-sharing. Customers pick up their booked vehicles at predefined car-sharing stations and must return them at the same spot. Consequently, one-way rides are not possible for customers, and the suburbs of cities are usually poorly covered due to insufficient demand (Hurrelmann & Albrecht, 2014). In contrast, one-way (or free-floating) car-sharing vehicles can be flexibly picked up and dropped off at designated parking areas around the city (Khare, Stewart, & Schatz, 2016). According to Hurrelmann and Albrecht (2014), free-floating car-sharing is predominantly used for short, inner-urban trips. In contrast, station-based car-sharing serves the demand for long-term trips or greater distances. Hence, free-floating car-sharing is almost solely found in cities with populations above 500,000 inhabitants, while station-based car-sharing is also found in smaller cities and rural areas (Hurrelmann & Albrecht, 2014).

Peer-to-peer car-sharing differentiates from round-trip and one-way carsharing through the ownership of the shared vehicles. All vehicles within this model are privately owned and are provided for a limited time for shared use. The business is mostly facilitated by a third-party company, which enables the connection between renter and rentee by offering an online platform, i.e., a website to communicate and make transactions, while the company keeps a percentage of the renting fee (Shaheen, Martin, & Bansal, 2018). Beyond that, all peer-to-peer car-sharing platforms require a membership (Cohen K. , 2019).

2.7.3.2 Ride-hailing

Ride-hailing (or eHailing) services describe the act of requesting a ride by using a smartphone application that connects customers with drivers that offer mobility services using their private passenger vehicles (Spulber, Dennis, Wallace, & Schultz, 2016). The digital platforms are managed by so-called transportation network companies (TNC), such as Uber, Lyft, or DiDi (Contreras & Paz, 2017). Ultimately, these TNCs are the Brokers between the customer who requests the ride and the driver who offers drives using his/her private vehicle (Contreras & Paz, 2017). Furthermore, the TNCs handle all electronic charges and transaction fees (Spulber, Dennis, Wallace, & Schultz, 2016).

Even though ride-hailing companies offer similar services as the traditional taxicab industry, ride-hailing differs in three key areas (Conway, Salon, & King, 2018):

1. Ride-hailing services are both contracted and paid for using the platform of a TNC through a handheld device. In contrast, taxicab services are usually requested by phone calls to a company dispatcher or as street-hails.
2. Ride-hailing services are usually offered by drivers using their own, privately-held “regular” cars and vans.
3. Ride-hailing services are less heavily regulated than taxicabs.

In the United States, ride-hailing is the best-known type of shared mobility, whereas, in Europe, it is not as popular but yet on the rise. Due to a Deloitte study (Vitale & Giffi, 2020), only 38% of the study participants in the United States have never tried a ride-hailing service, whereas, in Europe, it is 61% on average. Despite the differences in usage between Europe and the U.S., both markets are growing and tend to attract, especially the younger generation (Vitale & Giffi, 2020). In addition, it was identified that there are differences between diverse communities. Citizens of urban areas are more likely to use mobility services than citizens of suburban or rural areas. Jiang explains that the gap is attributed to the lack of availability since suburban and rural areas are less attractive for potential drivers. There are usually fewer rides, but for longer distances (Jiang, 2019).

2.7.3.3 Ridesharing and ride-pooling

Ride-sharing and ride-pooling (or carpooling) generally describe the act of sharing a vehicle journey with others (Shaheen & Cohen, 2019). While both terms are used similarly in literature, we distinguish them by the motivation of offering the service: ridesharing with a profit motive, and ride-pooling as a non-profit offering. Consequently, ride-sharing services can be described as pre-arranged, on-demand services connecting providers with passengers for compensation (Shaheen & Cohen, 2019). Microtransit, the usage of shared commercial vehicles with flexible routes for lower fares, and taxi sharing are subtypes of ride-sharing (Shaheen & Cohen, 2019; Spulber, Dennis, Wallace, & Schultz, 2016).

Ride-Pooling, despite its similarity to ride-sharing, has a non-profit social motive. The service can be described by people with similar travel patterns, such as commuting to work, sharing a ride. Other intentions of ride-pooling are reducing the costs by splitting the expenses, sharing the driving responsibility, and reducing the pollution for the

environment (Shaheen & Cohen, 2019). Furthermore, ride-sharing or -pooling is usually cheaper than ride-hailing since passengers have to forfeit convenience and comfort (Cohen, 2019).

2.7.4 Mobility as a service

Mobility as a service (MaaS) is a model in its early stage, intending to connect multiple transportation modes over one platform. It enables customers to travel without requiring any ownership of the different forms of mobility, by subscribing to a mobility service package (Durand, Harms, Hoogendoorn-Lanser, & Zijlstra, 2018). This bundle of transportation modes integrates all possible transportation modes, including shared mobility modes and autonomous vehicles in the future (Jittrapirom, et al., 2017).

Planning, booking, and payments, besides other services, are made through an online platform, either website or mobile application. The MaaS model is allowing interactions between different parties and does not restrict it to public or private actors. Additionally, MaaS allows third parties to collaborate to ensure functionality and improve efficiency (i.e., payment services, data analysts, platform providers). Thereby, services can be modified according to the customer's individual preferences and requirements to provide each user with the best travel experience (Jittrapirom, et al., 2017).

By integrating all modes of transportation into one platform, MaaS shows the potential to trigger the shift from private ownership to access-based consumption (Jittrapirom, et al., 2017). Durand et al. (2018) analyzed different studies about MaaS and its potential for changing the private car ownership paradigm. They found that participants without a private car are more likely to postpone the purchase of a car or even relinquish car ownership if they have access to MaaS. Car owners, on the other hand, are more divided in their opinions. Car ownership often results in owners being attached to their cars, and hence abandoning their private car is rejected a priori. Additionally, car owners living in the countryside are also more dependent on their own vehicles, which enables more flexibility and freedom. Overall, Durand et al. (2018) found that it is more likely for urban households to decrease their car ownership, especially those with multiple private vehicles. Thus, it is more probable that consumers will get rid of their second car or use shared mobility instead of purchasing a second car (Durand, Harms, Hoogendoorn-Lanser, & Zijlstra, 2018).

3 Methodology

In this chapter, we will precisely describe the process of our project. We will elaborate on our research philosophy, approach, and strategy. Close attention is drawn on explaining the process of data preparation, which includes pre-processing, sampling, and coding of the dataset.

3.1 Research philosophy

Research philosophy refers to “a system of beliefs and assumptions about the development of knowledge” (Saunders, Lewis, Thornhill, & Bristow, 2016, p. 726) and describes how data should be gathered and analyzed.

This research is following the functionalist research paradigm, which combines the objectivist with the regulation perspective. This combination was chosen since this research seeks to rationally describe the status quo rather than changing the current state. Moreover, we believe that our findings within the automotive industry are, at least partly, generalizable to other industries that rely on the sales of physical products. Consequently, the objective perspective, which is considered to adopt natural sciences assumptions and generate law-like generalizations, is suitable. Additionally, the objectivist perspective embraces realism, which means that the researched reality is external and non-influential (Saunders, Lewis, Thornhill, & Bristow, 2016).

The functionalist paradigm is most commonly based on the positivists research philosophy (Saunders, Lewis, Thornhill, & Bristow, 2016). It is believed that the phenomenon is constant and uninfluential. Therefore, it is possible to examine and describe its reality objectively. This applies to our research since we worked with a measurable and partially quantifiable dataset. Thus, we neutrally handled our data without interfering with the reality nor influencing our results.

3.2 Research approach

The research approach can be divided into three types, deductive, inductive, and abductive (Saunders, Lewis, Thornhill, & Bristow, 2016). Deductive research approaches seek to test the validity of hypotheses on existing empirical data (Bryman & Bell, 2015). Depending on the outcome, the theory is adapted or revised. Further, the deductive approach aims to generalize the results. Inductive research approaches are used to generate theory and, consequently preferred when limited information from previous

research is available (Bryman & Bell, 2015; Saunders, Lewis, Thornhill, & Bristow, 2016). Abductive research approaches combine the deductive and inductive approach (Saunders, Lewis, Thornhill, & Bristow, 2016). In contrast to the deductive and inductive approaches, abductive research moves back and forth between testing theory on data (deductive) and generating theory based on data (inductive).

For this research project, the abductive approach was most suitable. This research is mainly deductive but also has the option of bringing in inductive elements. With that being said, the deductive part was applied by using the existent theory on present business models and implementing their identified features on our data retrieved from Crunchbase in order to test the theory. The inductive approach came in place by looking into particular findings to detect new business models or new features of existing business models (Saunders, Lewis, Thornhill, & Bristow, 2016).

This approach was suitable for our project since we conducted an exploratory study. With this, we expected to extend the current theory by our research.

3.3 Research design

Our research aimed to answer questions about the current state of customer-centric business models in the automotive industry, their prevalence, and key characteristics. Therefore, we decided to use the Crunchbase database (see section 3.4) as a starting position for our analysis. However, to analyze the data regarding our specific research question, we needed to sample (see section 3.4.2) and code (see section 3.4.3) the data points first.

Consequently, our research followed a mixed-methods sequential exploratory research approach as we expected to extend the current theory by our research. In general, exploratory research combines the qualitative and quantitative research approach to discover what is happening and to develop an understanding of a specific topic (Saunders, Lewis, Thornhill, & Bristow, 2016). We use the qualitative approach to assign a set of predefined categories to every data point within the coding process. Afterward, we quantitatively analyze our findings within a descriptive analysis to identify patterns in the data (see chapter 5). Furthermore, even though we were not specifically aiming to develop new theory, it is possible that the quantitative analysis reveals new findings and extends existing theory.

3.4 Crunchbase

Crunchbase is a commercial database with worldwide data on Small and Medium-sized Enterprises (SMEs) and high-tech startups (Marra, Antonelli, Dell'Anna, & Pozzi, 2015). The database is operated by Crunchbase Inc. and was first published in 2007. Since then, its scope and coverage has steadily increased and became frequently used by the venture capital industry but also with scholars and researchers (Dalle, den Besten, & Menon, 2017). Crunchbase is gathering and maintaining its data through two main channels: an extensive venture program network and community contributors. According to Crunchbase, more than 4,000 members in the venture program submit monthly portfolio updates to Crunchbase for free data access. Moreover, Crunchbase has an active community of over 600,000 executives, entrepreneurs, and investors who contribute to updating and maintaining 100,000 profiles per month, which adds to the database's completeness. Additionally, Crunchbase uses artificial intelligence and machine learning to scrape data from various news publications to validate their data daily (Crunchbase, n.d.).

Since Crunchbase is closely linked to the venture capital industry and assumes that entrepreneurs have a strong motivation to be registered on the website and keep their information updated for the same reason, Crunchbase is a good source for identifying new business models. Furthermore, increased research based on Crunchbase assures that the given information is of good quality (Block & Sandner, 2009; Marra, Antonelli, Dell'Anna, & Pozzi, 2015; Perotti & Yu, 2015; Spiegel, Abbassi, Fischbach, Putzke, & Schoder, 2011; Werth & Böert, 2011).

3.4.1 Data Pre-Processing

Crunchbase granted us full research access to the Crunchbase database, which includes access to the Daily CSV Export without coding against Crunchbase's REST API. The Daily CSV Export contains separate files for companies, people, funding rounds, acquisitions, and IPOs. For our research, the relevant data is found within the organizations.csv file, including all organization profiles available on the Crunchbase platform.

Organizations were saved with data describing the organization in general (e. g. name, description, business sector as a category) their location (i. a. country, city), their primary role (i. a., company, investor), their current status (operating, acquired, IPO, or closed), fundings (i. a., total funding in USD), founding date, employee count, references to their

homepages and social media accounts (i. a. Facebook, Twitter), and dates on which the record was created and updated. Table 4 summarizes the variables of the raw data obtained from Crunchbase.

Variable name	Description
uuid	Unique identifier
name	Name of the organization
type	Type of the record (only “organizations”)
permalink	Unique part to the Crunchbase profile URL
cb_url	URL of the organizations Crunchbase profile
rank	A dynamic ranking for all entities measuring the prominence of an entity
created_at	Date when the records is established
updated_at	Date when the record was last updated
legal_name	Legal name of the organization
roles	Roles of the organization (company, investor, school)
domain	Domain of the organization
homepage_url	URL to the organization's website
country_code	ISO Alpha-3 Country code
state_code	US State codes (if applicable)
region	US State Region abbreviations (if applicable)
city	Location of the company headquarters
address	
postal_code	
status	Status of the organization (operating, closed, acquired, IPO)
short_description	Top-level industry classification
category_list	Industry
category_groups	Sector
num_funding_rounds	Number of funding rounds
total_funding_usd	Total funding raised in USD
total_funding	Total funding in other currencies
total_funding_currency_code	ISO Currency code for the total funding
founded_on	Date when the firm is established
last_funding_on	Date when the firm received last funding
closed_on	Date when the firm was closed (if applicable)
employee_count	number of employees (1-10, 11-50, 51-100, 101-250, 251-500, 501-1000, 1001-5000, 5001-10000, 10000+)
email	Email address of the company
phone	Phone number of the company
facebook_url	URL of the Facebook profile of the organization
linkedin_url	URL of the LinkedIn profile of the organization
twitter_url	URL of the Twitter profile of the organization
logo_url	URL of the Logo of the organization saved on Crunchbase
primary_role	Primary role of the organization

Table 4. Variables of the raw Crunchbase dataset.

The version used during this research was exported on the 30th of March 2020 and initially contained 978,505 records. Inside the CSV-file, data was saved as one organization per row and all information to an organization in a single cell, separated by commas. Using Microsoft Excel's Text-to-Column feature with comma as a delimiter, the data has been separated into multiple columns, and a table has been created. Records missing relevant information (e. g. name, country, founded date) or with corrupt data (e. g. date as name, status other than operating, acquired, IPO, or closed) have been removed from the set. After cleaning the dataset, 613,156 records remained. Most records were removed due to missing country code (around 200,000). Before the data is further adapted to the research question in the course of sampling, the initial data set is briefly described below.

The current data set contains records that have been created since the Crunchbase database was established in 2007. Figure 9 shows an increasing number of creations since the founding year and, in particular, rising importance during the last seven years.

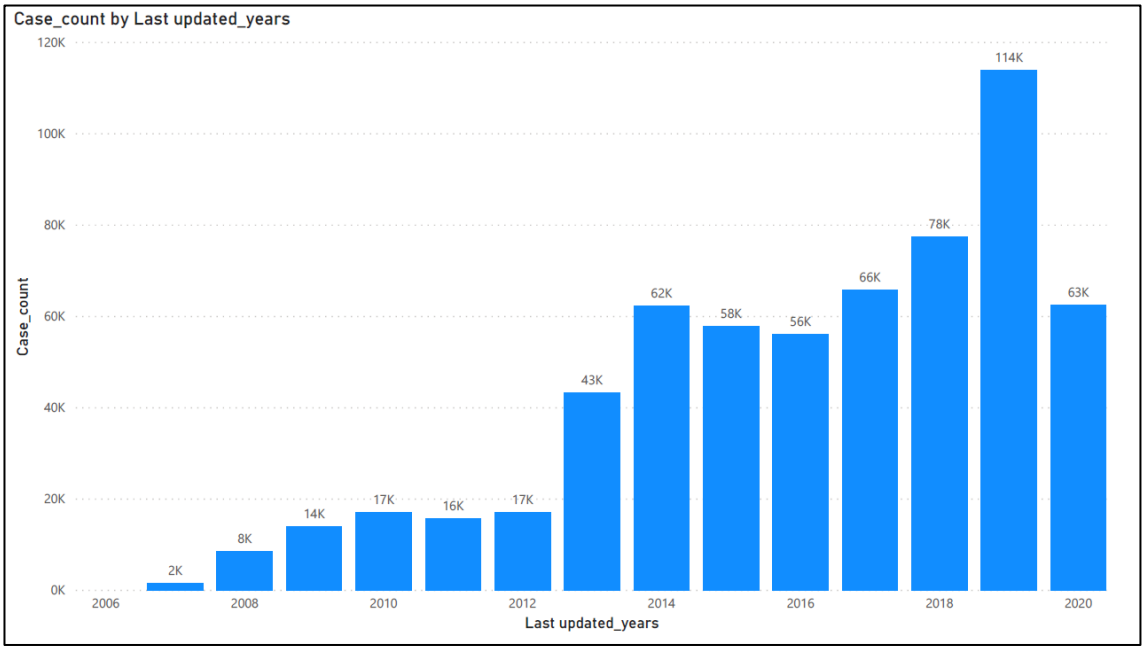

Figure 9. Number of newly created Crunchbase records from 2007 to 2020.

Information on the timeliness of the data is given in the column 'updated_at'. Most of the records (more than 70%) were updated within the last year; all remaining records were last updated in February 2018. Moreover, the Organizations listed in the data set originate from 209 countries with a strong focus on the USA (approx. 42%). The ten most

prominently represented countries are described in Figure 10 and account for over 75% of the total data.

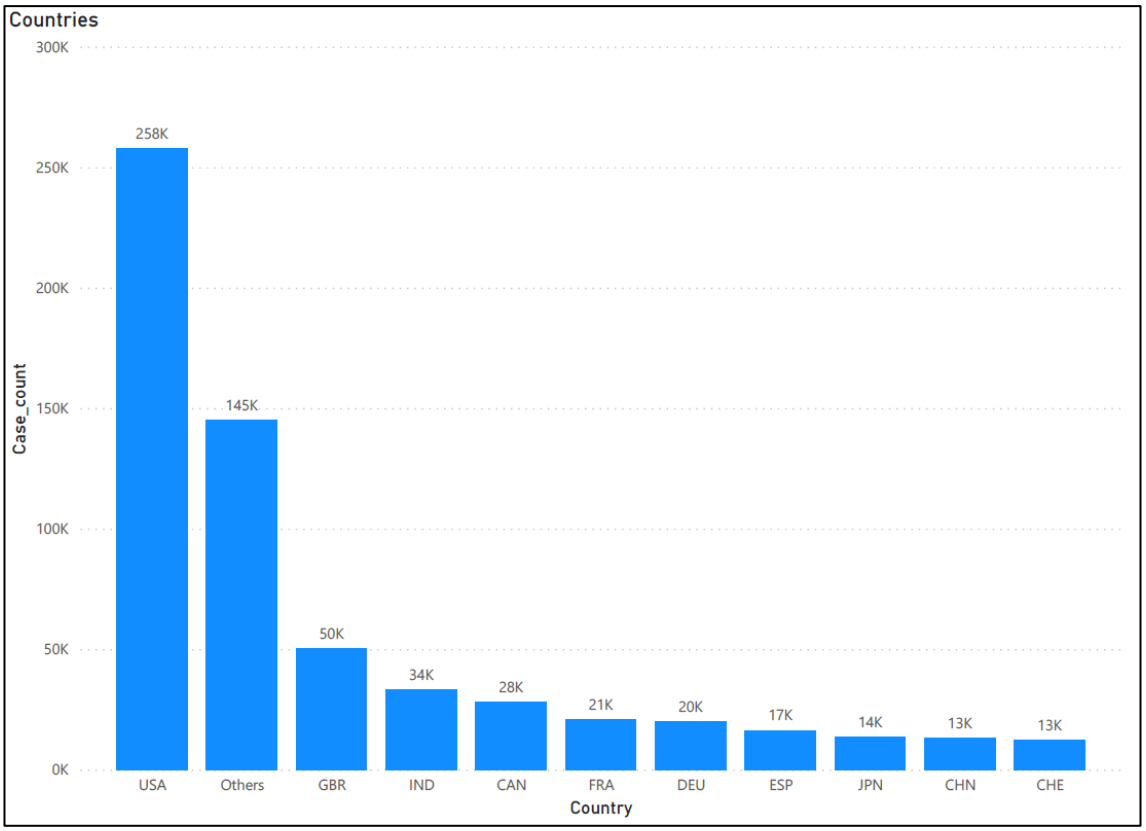

Figure 10. Shares of the ten countries with the highest number of records in the dataset.

Further, the focus of the database lies in young organizations. More than 70% were founded from 2000 onwards, almost 50% of the records within the last ten years (Figure 11).

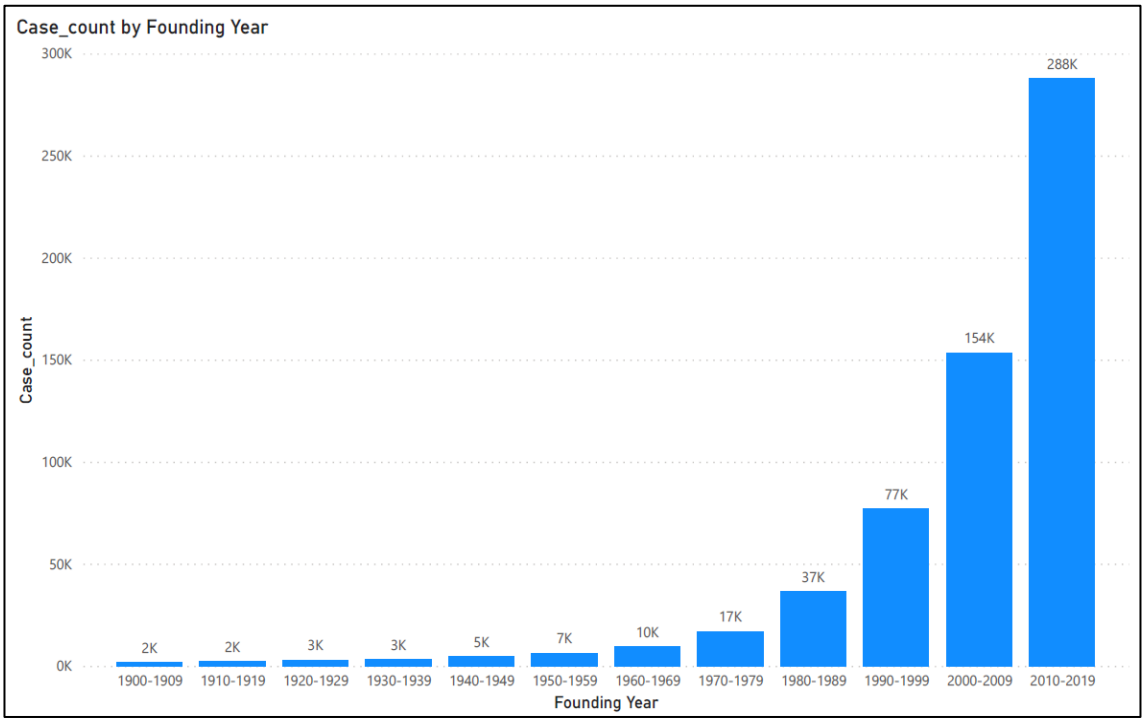

Figure 11. Number of organizations founded between 1900 and 2019 in the dataset.

Those findings correspond to Dalle, J., M. den Besten and C. Menon's review of the Crunchbase database from 2017. They identified the database to be dominated by young companies less than ten years old, with the majority of startups being located in the United States. Further, they elaborate that companies that operate in retail, data analytics, and the mobile app sector were overrepresented in 2017. To benchmark the coverage of the Crunchbase database, they compared it against the OECD Entrepreneurship Financing Database and found both to be comparable with Crunchbase reporting slightly more investment starting from the year 2010 (Dalle, den Besten, & Menon, 2017).

3.4.2 Sampling strategies

The sampling procedure is applied to the cleaned dataset. First, data out of the OECD founder states region scope has been removed. This includes all records with country codes other than AUT, BEL, CAN, CHE, DEU, DNK, ESP, FRA, GBR, GRC, IRL, ISL, ITA, LUX, NLD, NOR, PRT, SWE, TUR, and the USA. The remaining records (454,076

in total) account for over 74.06% of the cleaned dataset and reflect Crunchbase's focus on the USA.

Second, we removed 15,352 organizations that are not operating anymore and have been closed down. Crunchbase marks these records with the "closed" status and occasionally adds a closed date. Other statuses are "operating", "acquired", and "ipo". Even though acquired organizations might be inactive too, there is a chance they are still operating, which is why we kept them.

Third, we used Crunchbase's classification of records in industries and industry groups to filter for organizations that offer car-driven mobility to consumers either by offering the service directly or by operating a platform that connects mobility service providers with consumers. We further define cars as vehicles with three to six passenger seats available, and mobility services should be available to everyone. Consequently, exclusive services for people with physical disabilities, or ride-pooling for parents were exempted. Beyond that, no attention was drawn on mobility services for special occasions such as airport shuttles or party busses.

Generally, Crunchbase features 46 different industry groups which contain multiple industries (e. g., the industries "beauty", "comics", and "furniture" belong to the industry group "consumer goods") (Crunchbase, 2020a). Industries and industry groups are not mutually exclusive. For example, Uber (a company that operates a ride-sharing mobile application) is connected to the industries "mobile apps", "public transportation", "ridesharing", and "transportation" (Crunchbase, 2020b). As we expected all relevant organizations to be at least listed in the "transportation" industry group, we removed all records that did not include the "transportation" industry group. This led to a new sample with 18,905 records.

Next, we applied a bottom-up and a top-down approach to retrieve as much relevant data as possible. This ensured that we retrieve not only the records we were specifically aiming for, but also those we did not know that they would be relevant. The bottom-up approach focuses on extracting all potentially relevant data first. In contrast, the top-down approach then eliminates all potential, not relevant data. What remains is the potentially relevant data from both approaches.

Inside the bottom-up approach, we extracted all records with potentially relevant industries such as "mobile apps", "Carsharing", "ride sharing", and "last mile transportation". Further, we searched for buzzwords inside the organization's short description (e. g. "ride pooling", "ride-hailing") and extracted those records as well. All

buzzwords were also modified in spelling by, for example, looking for words with a hyphen instead of a space or no space (see Table 5).

Bottom-up sampling	
Industries	automotive, car sharing, carpooling, electric vehicle, last mile transportation, leasing, mobile apps, rental, ride sharing, taxi service
Buzzwords	automotive, car sharing, carpooling, electric vehicle, last mile transportation, leasing, manufacturing, mobile apps, rental, ride pooling, ride sharing, ride-hailing, taxi service

Table 5. Industries and buzzwords used to extract data within the bottom-up sampling approach.

After extracting the data from the bottom-up approach, we started to eliminate industries within the top-down approach. Even when all records are connected to the transportation industry group, some industries are still not relevant to our research question. Therefore, we went through the remaining entries searching for industry groups, industries, and combinations that have high potential in being irrelevant despite being connected to the "transportation" industry group. For example, "aerospace", "air transportation", "water purification", or "water transportation" and removed them as a batch. Comparable to the bottom-up approach, we also filtered the organization's short description for the buzzwords we found to be suitable during the process to eliminate even more records from the set (see Table 6). Records that have been found relevant during the bottom-up approach were not touched during the top-down approach.

Top-down sampling	
Industry groups	3d technology, advertising, agriculture, analytics, artificial intelligence, auto insurance, big data, business development, business intelligence, civil engineering, clean tech, cloud data services, cloud infrastructure, commercial, computer, courier service, CRM, crowdsourcing, database, digital media, education, enterprise software, field support, financial service, fintech, hardware, hospitality, industrial automation, insuretech, internet of things, IT management, legal, logistics, media and entertainment, mobile payments, navigation, procurement, productivity, project management, property, real estate, real time, RFID, security, smart city, telecommunications
Industries	aerospace, agriculture, air transportation, business intelligence, consulting, energy, fleet management, gaming, health care, infrastructure, insurance, logistics, medical, parking, real estate, truck, water purification, water transportation
Buzzwords	aftermarket, aftersale, agriculture, airline, alternator, armor, baggage, bicycle, bike, boat, cable, camper, caravan, cargo, clutch, component, consulting, courier, credit, cruise, document, energy, export, financial, forum, garage, government, home, import, insurance, jet, leather, licence, license, light, loan, logistic, medical, medical, metal, motorsport, moving, package, parcel, parking, plastic, protection, rail, real estate, recreational, recruitment, removal, repair, roadside, shipping, textile, tire, tow, tyre, warehouse, wash, wheelchair, wire

Table 6. Industry groups, industries, and buzzwords used to remove records from the dataset within the top-down sampling approach.

After that, we merged the results from the two approaches and started to go through the data more precisely, focusing on the descriptions to identify irrelevant records (e. g. no relationship to the automotive industry, or B2B-orientation). Ambiguous records were left in the dataset but marked to make a final decision about their relevance during the coding procedure. Furthermore, despite our decision to aim foremost at organizations that have been founded since 2010, we decided to leave them in the dataset for further research if needed. The coding was still only applied to the young organizations founded from 2010 onwards.

Finally, the dataset after the sampling contains 1,820 records in total. Detailed coding was then applied to the 738 organizations founded from 2010 onwards. However, since the sampling approach cannot guarantee that all remaining organizations in the sample

are relevant, further deletions, according to the research purpose, are made during the coding procedure.

3.4.3 Coding

To analyze qualitative data quantitatively, it was necessary to code and categorize the data using content analysis, which can be defined as “a research technique for the objective, systematic and quantitative description of the manifest content of communication” (Berelson, 1952, p. 18).

In the definition of Berelson (1952), “systematic” and “objective” refer to the necessity to define explicit rules for coding and categorizing the data. These codes and categories are usually defined before the research (Saunders, Lewis, Thornhill, & Bristow, 2016). However, to tailor the coding directly to our sample, we chose a combination of predefined classifications and categories derived directly from the sample data set.

The first category group is the “rights being sold” from Weill et al.’s (2005) business model framework (see section 2.2.2), which has already proven to be exhaustive and mutually exclusive. It divides organizations into four categories (Creator, Distributor, Landlord, and Broker), and therefore, can be efficiently assigned to the records in a short time. We further forwent the second dimension of Weill et al.’s framework because the “type of asset involved” needs to be reviewed more in detail. For example, our research must identify not only organizations that offer a service as a Landlord but especially the differences in the services Landlords are offering.

Therefore, we added the category group “business models” with 13 categories (see Table 7) to further define the form of the offered product or service. The manufacturer, Dealership, Leasing, and Rental business models represent the traditional business models in the automotive industry. Carsharing, ride-hailing, -sharing, and -pooling represent the emerging mobility trends as defined in section 2.7.3 with one minor adjustment. We included taxi services within the ride-hailing business model because of their similar service. Nevertheless, both services can still be distinguished through the rights being sold. For example, Uber is a Broker, and a traditional taxicab company, with ownership over their vehicles, so it was categorized as a Landlord.

Moreover, we defined a set of three Marketplaces for rental and leasing services and vehicle sales. This is necessary to distinguish between aggregation and/or comparison Broker business models, such as Vroomo, and Broker business models that are essential to the provided service, such as the digital platform provided by Uber. Beyond

that, we decided to add the Mixed category for business models that cannot be uniquely identified. Lastly, all records that did not fit into one of the defined categories were removed from the dataset.

Business Model	Description
Manufacturer	Create and sell physical assets directly to the customer, e.g., Tesla, Volkswagen)
Dealership	Buy and sell physical assets, e.g., Cazoo or physical car dealerships.
Leasing	Lease physical assets directly to the customer for a fixed period (usually between 1 to 4 years) with the option to return or purchase the vehicle in the end, e.g., Sixt, leasingmarkt.de.
Rental	Rent physical assets directly to the customer for a fixed period (usually between a few hours and a few weeks), e.g., Sixt, Hertz.
Carsharing	Rent physical assets directly to the customer for a flexible time period (usually between a few minutes and a few days), e.g., ShareNow, Flinkster.
Ride-Hailing	Connect passengers with drivers, often using a private vehicle, through a digital platform, e.g., Uber, Lyft.
Ride-sharing	Connect passengers with drivers through a digital platform. Drivers might choose a flexible route to offer their service to more than one customer at the same time, e.g., Moia, BlaBlaCar.
Ride-Pooling	Connect people with similar mobility habits (e.g., commuting to work) to split costs, e.g., Scoop Technologies, SAYM.
Marketplace Rental	Allows customers to compare rental offerings using a digital platform.
Marketplace Leasing	Allows customers to compare leasing offerings using a digital platform.
Vehicle Marketplace	Allows customers to compare (used) car offerings using a digital platform.
Mixed	Organizations with two or more business models from our coding scheme, e.g., GoMore.

Table 7. Coding scheme for the Business Model category group.

The third category group defines the business orientation of a company and finally completes our business model typology. Organizations can be either Business-to-consumer (B2C) or Peer-to-peer (P2P) oriented. This differentiation was made to clearly distinguish P2P business models, such as Lyft, or Ryde, from B2C models, such as

ShareNow, or Cazoo. In contrast to the rights being sold and the business model, the business-orientation can be empty if the information found is insufficient to assign a category.

The fourth and final category group is Pricing, which is mostly independent of the other category groups (see Table 8). However, Split fare occurred only in combination with the Ride-pooling business model. Furthermore, we clustered organizations with multiple pricing models in the Mixed category and organizations with pricing models that were not predefined in the Other category. The pricing model can also be empty if the relevant information was not available.

Pricing	Description
Full payment	Selling the vehicle, leading to ownership (includes financing and auction).
Leasing	Monthly rates for a fixed period with the option to return or buy the vehicle (applied to the leasing business model).
Subscription	Monthly rates with the option to change the car.
Rental	Fixed price for a fixed period (applied to the rental business model).
Daily Rate	Daily rates for a usually fixed period.
Pay-per-use	Pricing is based on the driving distance and/or the rental period in minutes (prepaid packages included).
Predefined	Fixed, pre-agreed price (applied to the ridesharing business model).
Split fare	Sharing of the costs for fuel and/or maintenance (applied to the pooling business model).
Mixed	Organizations that apply more than one pricing scheme to their business model.
Other	Other pricing schemes that were not predefined.

Table 8. Coding scheme for the Pricing category group.

The final coding was conducted by two raters independently to establish inter-coder reliability. To eliminate individual disparities, we discussed coding discrepancies until we reached a consensus. We assigned the categories to the organizations based on the short description provided in the dataset, the Crunchbase profile, and the organization's website or social media profiles. Furthermore, 380 organizations were removed during the coding because their business model did not match the ones defined in Table 7 (e.g., travel agencies, micro-mobility providers, parking services, B2B-orientation), or relevant information was not available.

3.5 Quality assurance

To ensure that the findings of our research are significant, this section will determine the reliability and validity. These are essential for the evaluation of the quality of the research. Firstly, we will elaborate on the reliability of the research. Reliability implies the ability of external researchers to replicate the research design and get the same results. This can be split into internal and external reliability. Internal reliability is taking into consideration consistency throughout the research project, whereas external reliability is referring to the replication of the data collection and analytical procedures in order to achieve the same results consistent with the results of this study (Saunders, Lewis, Thornhill, & Bristow, 2016).

For this research, internal reliability was ensured by having an ongoing conversation in order to build the research question based on the research and the researchers common understanding. For the coding, the earlier mentioned inter-coder reliability was ensured by conducting the data cleaning and coding independently. For the latter, the researchers compared their coding after having a section of the organizations coded. This was done to agree on a coding scheme and align the procedure. Finally, coders compared and discussed the coding of each organization. External reliability was achieved by documenting all steps of the data collection and the analytical procedures. Hence a replication of this study must lead to identical results.

The other factor for determining the quality of the research is validity. Validity mainly refers to the “appropriateness of the measures used, accuracy of the analysis of the results and the generalizability of the findings” (Saunders, Lewis, Thornhill, & Bristow, 2016, p. 203). As for reliability, validity can be divided into internal and external validity. Internal validity is achieved when a causal relationship between two variables can be proven and is most common in assessing quantitative research. External validity, on the other hand, refers to the generalizability of the research findings (Saunders, Lewis, Thornhill, & Bristow, 2016).

In the case of this research, the relationship we were seeking to prove is between digitization and business models. The presence of digitization is inevitable for the business models we were aiming to find. Any change in this matter would have also affected the sought business models. Thus, internal validity was considered to be achieved.

In regard to external validity, transferability is required (Saunders, Lewis, Thornhill, & Bristow, 2016). Our research philosophy advocates generalizability. Hence results of this research are applicable to other contexts to some extent. Industries aside from the automotive industry can make use of the general findings of this research since digitalization influences all industries and thus an impact on their business models.

4 Results

This chapter's purpose is to describe our findings obtained by the coding before the descriptive analysis elaborates on the results in the next chapter.

The final dataset after the coding contains 358 organizations that occurred to be relevant to our research. However, after a thorough check of the companies and their websites, it became apparent that 190 of the identified firms were insignificant. 37 of the 190 companies were already acquired by companies that were in our dataset. Keeping acquired firms would falsify our results by having duplicates and therefore misrepresent the actual state. 58 (incl. four acquired firms) of the 190 organizations were platforms identified as marketplaces. Marketplaces are understood to be comparison websites, displaying the existing, individual businesses on one platform. Hence, marketplaces were not considered relevant business models. They can be seen as an aggregation of business models, which would lead to the falsification of the data, such as the earlier mentioned acquired business models.

Further, out of 190 cases, 134 appeared to be insignificant since it was not possible to access their websites and retrieve detailed information from there (incl. 21 marketplaces and 14 acquired companies). By the lack of information about those companies, we would have relied entirely on the Crunchbase description. This was partially possible, yet it was not accurate enough to conduct a proper coding scheme since the pricing method was not assignable. Additionally, many of the domains were up for sale or have expired. Thus, this would not represent the current state of the researched phenomenon, which this paper aims to demonstrate.

Table 9 is listing the found combinations of the rights being sold, Business Model, and Payment Methods based on the cleaned dataset. Additionally, each business model has our interpretation of the concept described.

Rights being sold	Business Model	Description	Payment methods
Creator	Manufacturer	Produce and sell cars.	Full Payment
Distributor	Dealership	Buy and resell cars.	Full Payment
Landlord	B2C Carsharing	Platform for short time car rental, fully digitized using an app. Businesses own rental cars.	Daily Rate
			Pay-per-use
	B2C Rental	Business to provide access to a vehicle	Rental
			Subscription
	B2C Ride-Hailing	Platform to book a professional driver with a company car, only one passenger or group is transported.	Pay-per-use
			Subscription
	B2C Ride-Sharing	Platform to book a ride with a professional driver with a company car, where other passengers might join on the way.	Pay-per-use
	Leasing	Provide long term access to a car.	Leasing
Broker	B2C Ride-Hailing	Platform to hail a professional driver, only one passenger or group is transported.	Pay-per-use
	P2P Ride-Hailing	Platform to hail a private driver, only one passenger or group is transported.	Pay-per-use
	P2P Ride-sharing	Platform to share a ride with peers who have (partially) the same way, chances of sharing the ride with other peers (profit motive).	Pay-per-use
			Predefined
			Split Fare
	P2P Carsharing	Platform for renting or lending cars from peers.	Daily Rate
			Pay-per-use
	P2P Ride-Pooling	Platform to share a ride with peers who have the same commute, sharing costs (non-profit motive).	Split fare
	Leasing Marketplace	Platform for matching Lessor and Lessee, providing a comparison of Lessees	-
	Vehicle Marketplace	Platform for matching Dealer and Buyer, providing a comparison of Dealerships.	-
	Rental Marketplace	Platform for matching Renter and Rentee, providing comparison of Rentals	-

Table 9. Summary of all potential business model and pricing combinations within the cleaned dataset.

5 Descriptive Analysis

In this section, we will describe the characteristics of the final dataset. To create an overview of the features of our dataset, we have used Microsoft's visualization tool Power BI. First, we looked at the dataset as a whole. This results in a total of 358 identified companies relevant to our research paper. Thereof, 20 countries from North America and Europe were represented with an overall of 12 categories of different business models. Noticeable were the United States of America being represented with 161 companies, the majority of our data source. Additionally, ride-hailing appeared to be with the most popular business model within our 12 chosen categories leading with 63 identified cases, followed by car-sharing (53) and Dealership (49). Table 10 presents the overall results for business models by rights being sold.

Business Model	Broker	Creator	Distributor	Landlord	Total
Carsharing	39	-	-	14	**53**
Dealership	-	2	47	-	**49**
Leasing	-	-	-	7	**7**
Leasing Marketplace	7	-	-	-	**7**
Manufacturer	-	9	-	-	**9**
Mixed	5	-	2	3	**10**
Rental	-	-	2	39	**41**
Rental Marketplace	10	-	-	-	**10**
Ride-Hailing	38	-	-	25	**63**
Ride-Pooling	28	-	-	-	**28**
Ride-Sharing	39	-	-	1	**40**
Vehicle Marketplace	41	-	-	-	**41**
Total	**207**	**11**	**51**	**89**	**358**

Table 10. Overview of Business Models by Rights being sold

However, the unfiltered dataset also contained 37 acquired companies and 134 companies with defective websites, e.g., invalid domains or unsecured domains. Moreover, within the 12 business model categories, three were Marketplaces, which can be understood as an aggregation of single business models. After extracting the companies falling into these categories, the dataset reduced about 53%, containing a total of 168 companies from 18 countries.

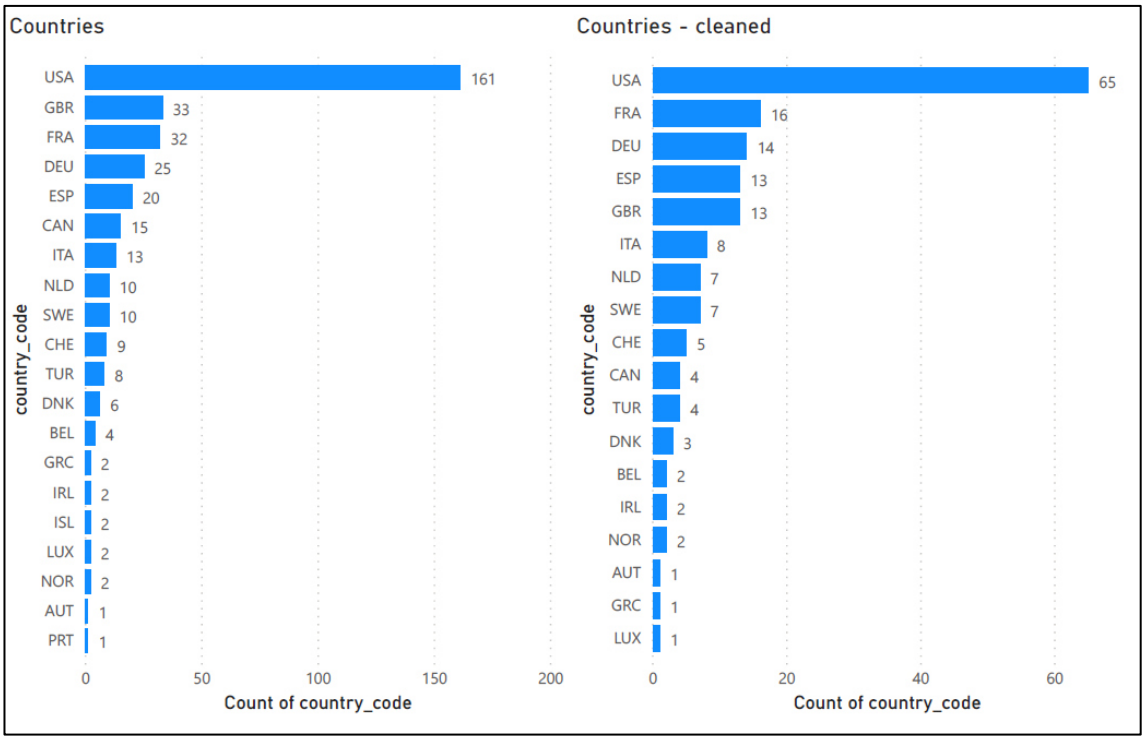

Figure 12. Count of countries. In comparison of full dataset and cleaned dataset.

Nevertheless, the United States are still leading in the number of cases with a total of 65 companies after scaling down from 161 cases, still being 49 cases ahead of France (16), which is the country with the second most registered firms. They are followed by Germany (14), Spain (13), and Great Britain (13), making a total of 56 cases, altogether representing the majority in Europe. The remaining 13 countries account for 47 companies. Nevertheless, by summing up the cases for the states of the European Union, excluding Canada (4), Turkey (4), and Great Britain (13), we found a majority of 82 businesses. It is also worth mentioning that the five biggest economies in Europe contain 64 business models (see Figure 12). A more distinct differentiation of business models by country is presented in Table 11.

Business Model	USA	FRA	DEU	ESP	GBR	ITA	NLD	SWE	CHE	CAN	TUR	DNK	BEL	IRL	NOR	AUT	GRC	LUX	Total
Carsharing	5	1	3	2	1	3	2	1	-	-	2	1	-	1	-	1	1	-	**24**
Dealership	22	-	1	1	2	-	2	3	-	2	-	-	2	-	-	-	-	-	**35**
Leasing	1	-	-	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	**4**
Manufacturer	1	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	1	**4**
Mixed	2	-	1	-	1	3	-	1	-	-	-	1	-	-	-	-	-	-	**9**
Rental	9	4	2	2	-	-	1	1	3	-	-	-	-	1	-	-	-	-	**23**
Ride-Hailing	11	9	2	4	8	2	2	-	-	-	2	1	-	-	-	-	-	-	**41**
Ride-Pooling	5	1	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**11**
Ride-sharing	9	1	1	2	-	-	-	-	-	2	-	-	-	-	2	-	-	-	**17**
Total	**65**	**16**	**14**	**13**	**13**	**8**	**7**	**7**	**5**	**4**	**4**	**3**	**2**	**2**	**2**	**1**	**1**	**1**	**168**

Table 11. Business Models by Countries – cleaned

Likewise, ride-hailing kept its position as the most common business model with 41 cases. Yet, the Dealership model is the second most common with 35 cases. Carsharing companies decreased to 24 from initially 53 cases, being by one point more favorable as Car Rental business models (23). Ride-sharing models went down from 40 to solely 17 cases, downscaling its number to over 50%. Ride-Pooling also decreased by more than half from 28 to 11 companies. The remaining Business Models consisted of mixed models (9), Leasing (4), and Manufacturer (4) (see Figure 13).

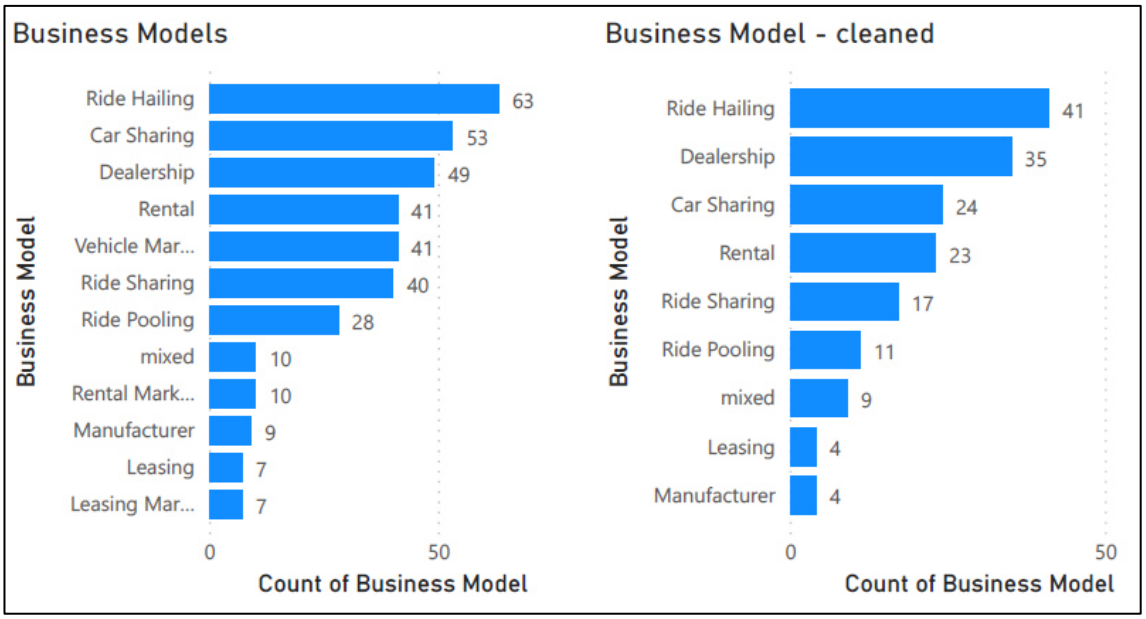

Figure 13. Count of Business Models. In comparison of full dataset and cleaned dataset.

In addition, we have visualized the dataset, including invalid websites, to see how many companies have registered over the past ten years impartial of their current company status. Figure 14 illustrates the ratio of the different rights sold. It can be seen that in both datasets, with and without filter, the Broker model is predominant, despite the drop of 135 cases, which makes 65% of a loss of data for the broker category. Landlord models dropped by 34 cases, which is 38% of the total Landlord businesses, but continue being still the second favorable model with 55 active cases, followed by the Distributor model with 37 experiencing a loss of 27% and the Creator represents four cases declining by 64%.

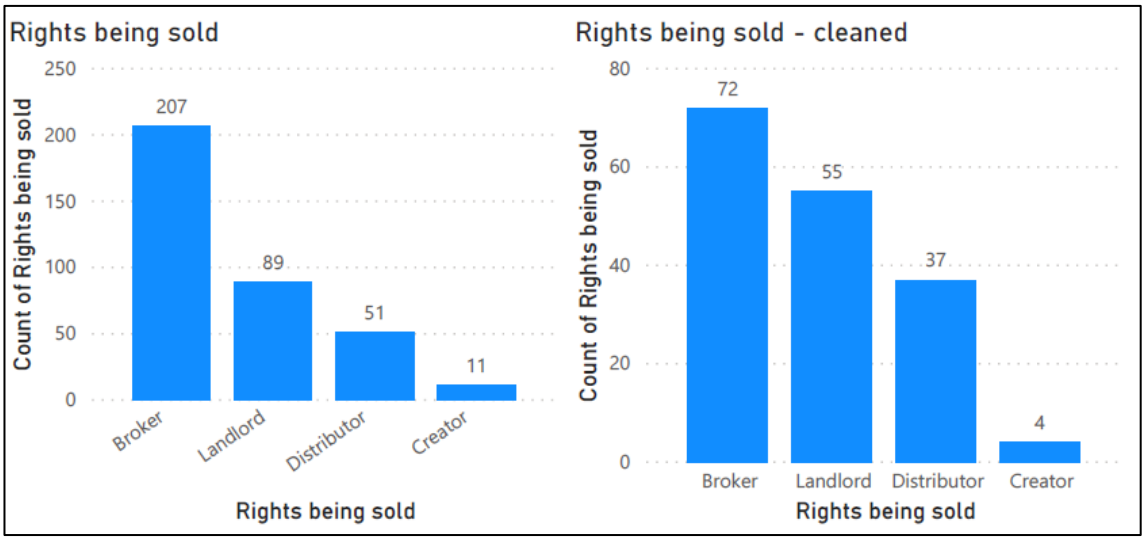

Figure 14. Count of Rights being sold. In comparison of full dataset and cleaned dataset.

Looking into the filtered dataset more thoroughly, we have split the rights sold models into the past ten years. Figure 15 shows that between 2010 and 2012, the Distributor model was the most favorable model. That shifted in 2013, shown by the fact that the number of Distributors decreased steadily. The Broker model followed as the most favorable model after 2012 and increased steadily until its peak in 2018. Overall, the graph shows an increase in registered companies between 2015 and 2017. After 2017 the number of new companies decreased. Similarly, as Brokers, the number of Landlords also increased after 2014 and stayed about steady until 2019. On the other hand, creators are underrepresented in our dataset. Thus, solely in two single years, new Creators entered the market, with one joining in 2015 and three in 2017. In 2020, only one registered company was found to be relevant.

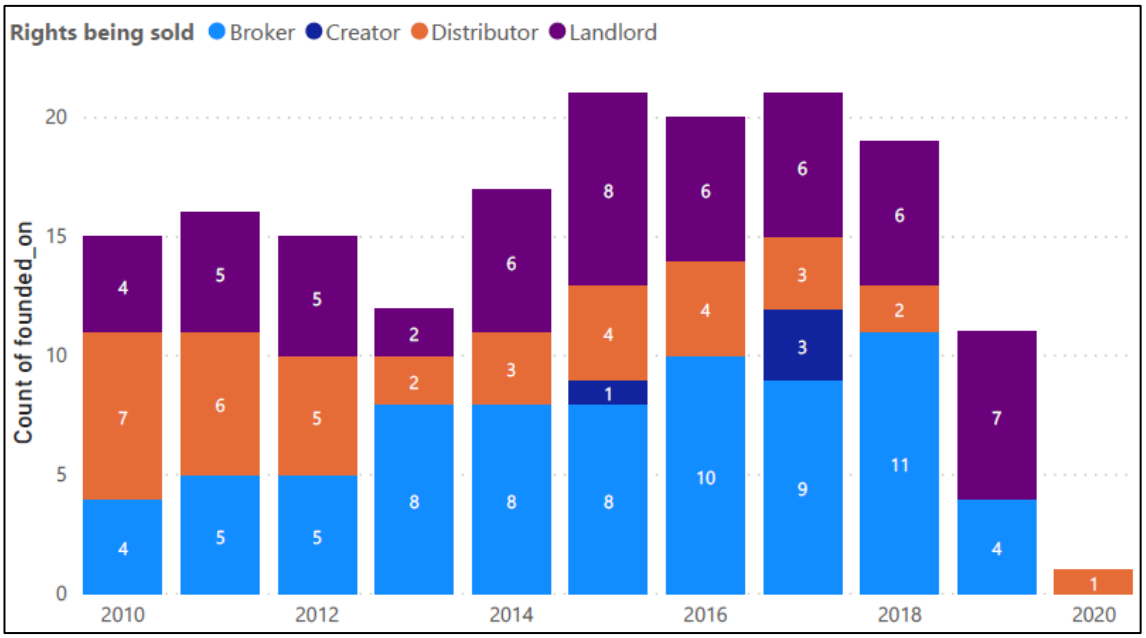

Figure 15. Rights being sold by founding year.

Next, we have analyzed the business models, as shown in Figure 16. BMs such as Manufacturer, Leasing, Dealerships, and Car Rental are merely B2Cs. Whereas Ride-pooling depends only on P2P, and ride-sharing is mainly P2P, other business models can be found as both B2Cs and P2Ps.

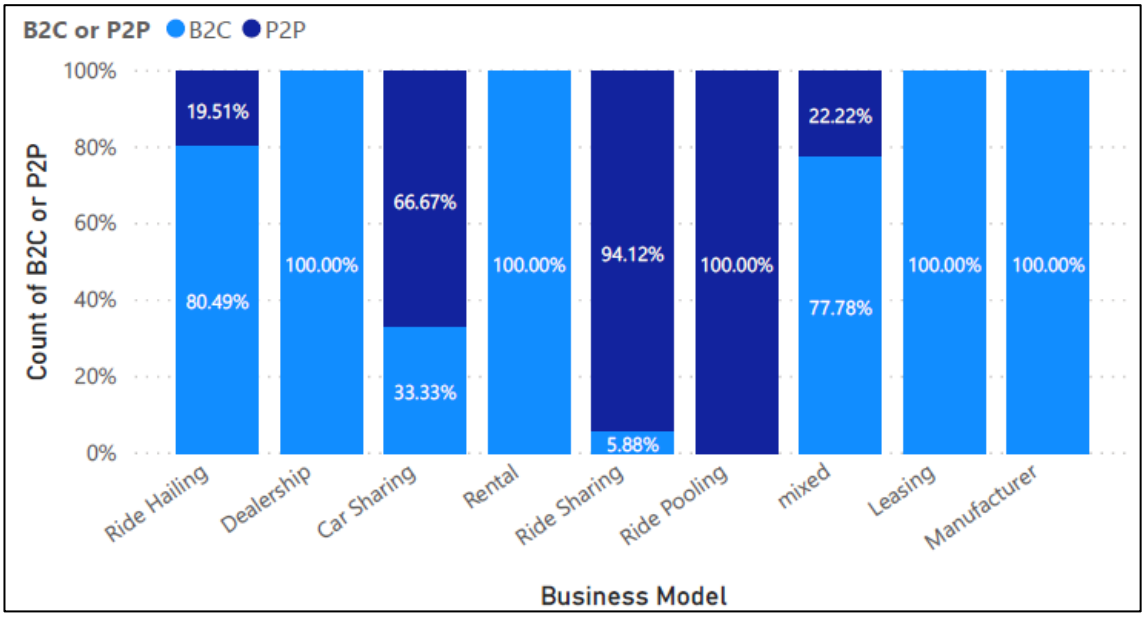

Figure 16. Business models by transaction type.

Additionally, we wanted to know the distribution of the rights sold within the business models. As seen in Figure 17, four business model types used only one right model.

These are Manufacturer (Creator), Ride-Pooling (Broker), Leasing (Landlord), and Dealership (Distributor). Overall, it comes to attention that the Broker and Landlord model are the most common types.

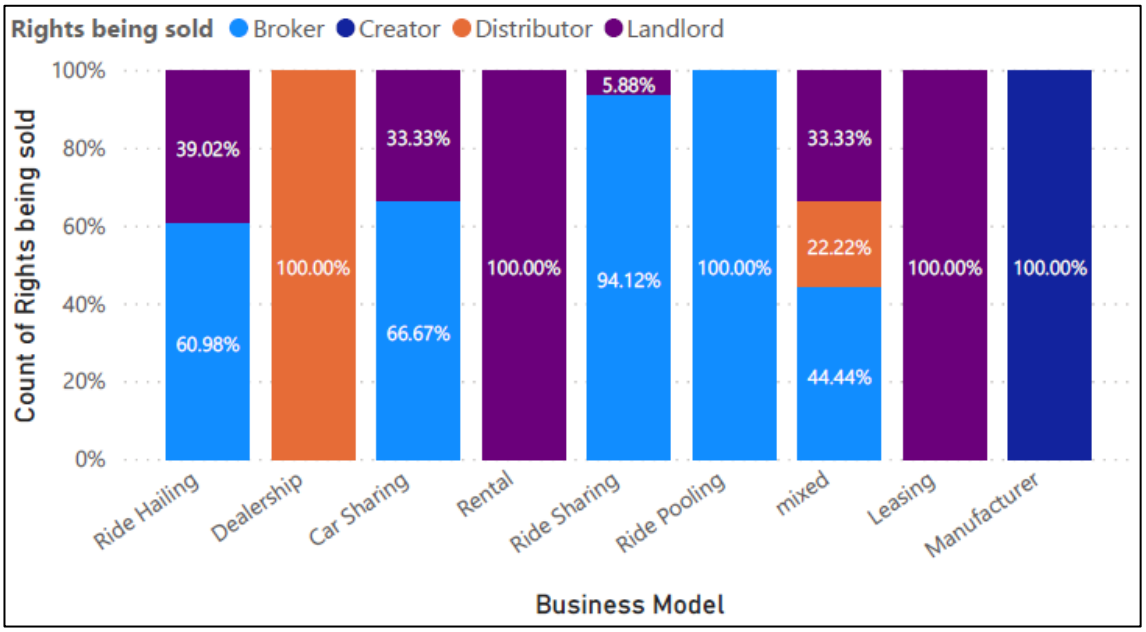

Figure 17. Rights being sold by Business Model.

We also looked at the pricing models. Here, we looked into five business model types more specifically (see Figure 18). The most favorable business model ride-hailing is primarily using the pay-per-use pricing (37) model. This business model also appears to be popular among other business models, such as car-sharing (12) and ride-sharing (6). Besides the typical rental pricing model (7), rental has a subscription-based pricing model (15), which is the most common pricing model amongst car rentals. The pricing model of carsharing is mostly divided into two models, the pay-per-use model and the pricing based on a daily rate. Carsharing was the only case that was identified as mixed for pricing. Continuing with ride-sharing, the graph also illustrates mainly a split into two pricing models, besides pay-per-use, a predefined model (8) is prevalent, which is based on a pre-agreement of price between the two parties. Lastly, all 11 cases of ride-pooling are split fare.

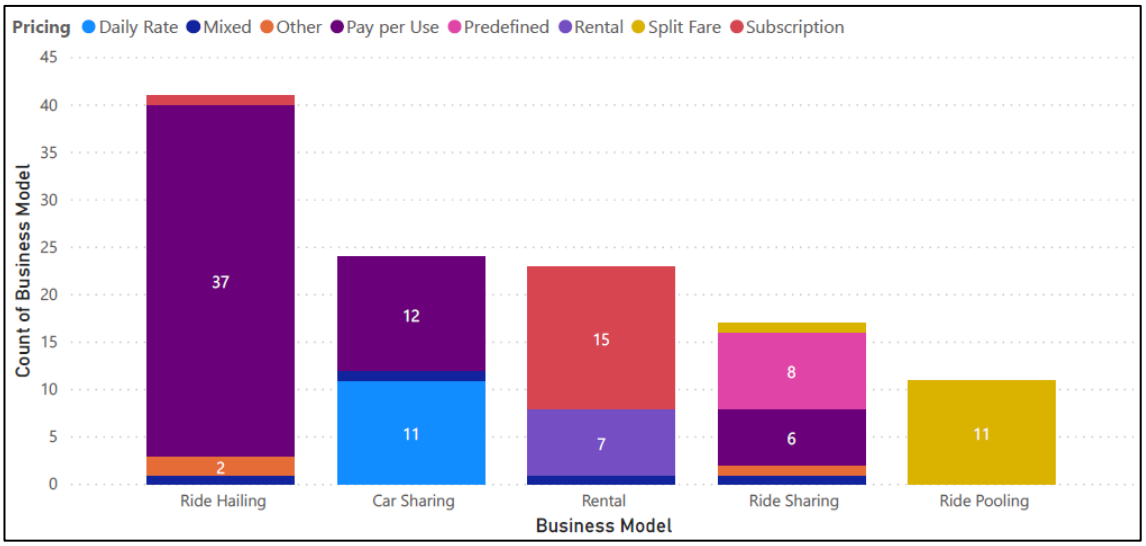

Figure 18. Business Models by Pricing

Worth mentioning are also the other pricing models. The dataset retrieved that two models are flat rate based (i.e., ride-hailing and ride-sharing). More specifically, one ride-sharing model uses a tip-based pricing, while the second other pricing model of ride-hailing is set by the passenger. Additionally, looking at the overall number of each pricing method, it can be noticed that mixed the second-most cases. Looking more thoroughly into the dataset, the high number is representing the combination of full payment and leasing (31), which are all assigned to the Dealership business model. Also, popular, according to our results, are the two pricing types, predefined and split fare. The former is found most common for Ride-sharing models, whereas the split fare is used by the Ride-Pooling model (see Table 12).

Pricing methods	Car-sharing	Dealer-ship	Leasing	Manu-facturer	Rental	Ride-hailing	Ride-Pooling	Ride-Sharing	Mixed	Total
Daily Rate	11	-	-	-	-	-	-	-	-	11
Full Payment	-	4	-	4	-	-	-	-	-	8
Leasing	-	-	4	-	-	-	-	-	-	4
Pay-per-use	12	-	-	-	-	37	-	6	1	56
Predefined	-	-	-	-	-	-	-	8	-	8
Rental	-	-	-	-	7	-	-	-	-	7
Split fare	-	-	-	-	-	-	11	1	-	12
Subscription	-	-	-	-	15	1	-	-	1	17
Mixed	1	31	-	-	1	1	-	1	7	42
Other	-	-	-	-	-	2	-	1	-	3
Total	24	35	4	4	23	41	11	17	9	168

Table 12. Pricing method by Business Model.

Furthermore, it was identified that most of the companies have up to ten employees (61), followed by an employee range of 11-50 employees (48). Noticeable is also that five companies reached the highest employee count within our dataset (1001-5000). The remaining five groups comprised 59 cases, and hereof 28 cases had no information on their employee count (see Figure 19).

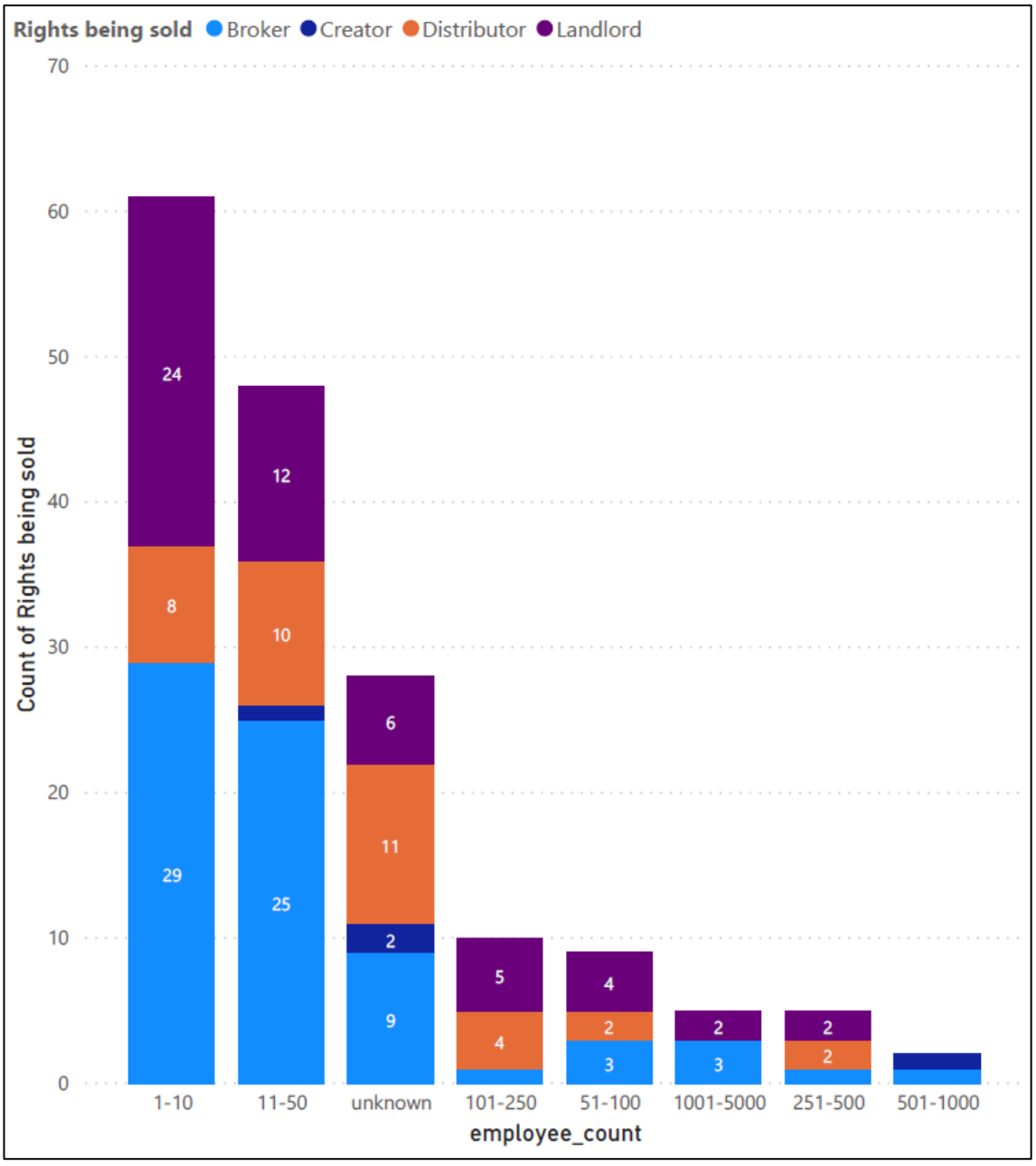

Figure 19. Employee count by rights being sold.

Finally, we visualized the earlier removed marketplaces. The following Figure 20 shows the distribution of the models and the rights sold. Noteworthy, two-thirds of the

marketplaces are based on selling cars and, more specifically, to connect sellers and buyers.

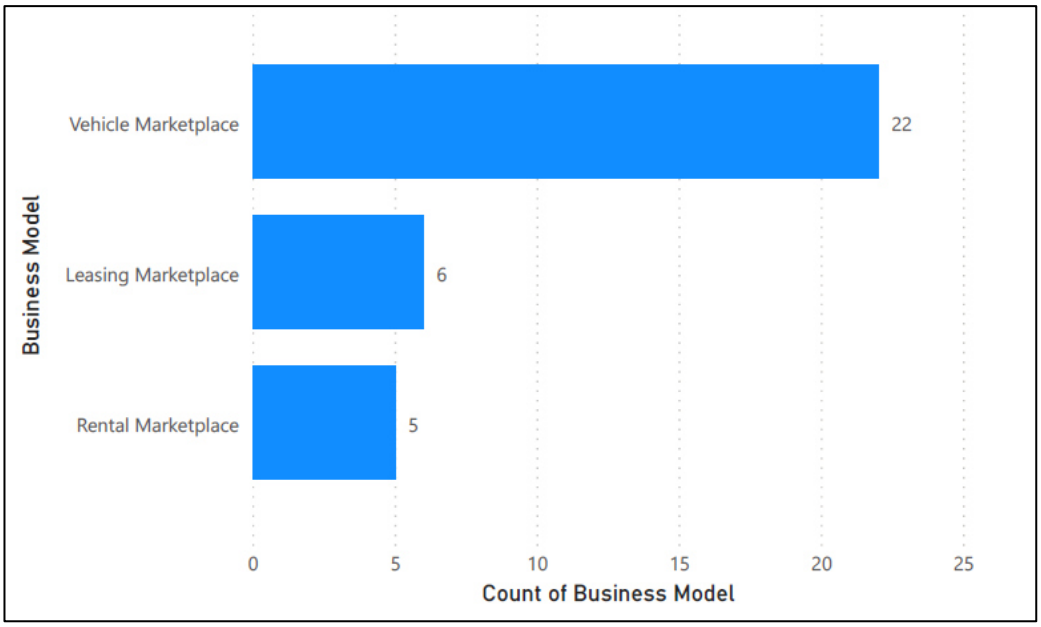

Figure 20. Business Models by Marketplaces.

6 Discussion

Within this chapter, we will discuss the results of the data analysis. We will start by discussing our general findings based on the visualization of the descriptive analysis, followed by a more distinguished examination looking into the single business models. We will go into the patterns of the business concepts and review varieties. Afterward, we will compare selected incumbent automobile brands and their approach to keep up with the newly emerging mobility trends.

6.1 General Findings

We have visualized the full dataset to contrast it with the cleaned dataset. By doing so, we were able to detect the popularity of the chosen business models and their success rate over the years. By considering the **rights being sold**, for instance, the results are not surprising. For the **Broker** model, it can be argued that the fact that the business model is providing a fully digitized service with the purpose of mediating between two parties rather than providing a physical asset, comes with fewer obstacles for establishing a company. Thus, the easier requirements such as independence of localization, low variable costs, and no physical production or purchase of physical goods are attractive premises. Also, services can be easily updated after being sold, and as a result, it is easier to enter the market sooner and add additional value to the service afterward. A potential fail comes with fewer risks compared to the other categories. With that reduced risk, it is more tempting to give its business idea a try and register as a company (Aravis, 2019; Marsiglia, 2014). Thereby, it can be assumed that it is more likely that Broker models are less thought through when entering the market, and the persistence in keeping the business alive may be somewhat lower than of the other identified models. Additionally, due to the mentioned enter requirements, it can be assumed that the Broker model has more competition, leading to difficulties in establishing and maintaining its position on the market. This can also be derived from lousy marketing since this is a bit trickier than the marketing of physical goods, leading to a lack of users since the peer-to-peer models depend on users on both ends (Brandignity, n.d.). For example, the P2P Carsharing business model requires a balanced number of car owners willing to offer their car for sharing and users interested in renting a private car. If there are not enough car owners, the business is not appealing for the renters, and the renters will choose a different platform to get a car; and the same applies to having not enough renters using the platform. This concept is also known as

the cross-side network effect, where value is added to users on one side when another user enters on the other side (Cong, Miao, Tang, & Xie, 2019). A clear marketing objective needs to be set to attract more users, promoting a digitized service that differs from the traditional marketing of physical goods. Applications require more social media and web interaction since there is rarely a physical store or good to advocate its existence (Brandignity, n.d.). Hence, a poor marketing strategy can easily lead to a lacking awareness of one's business.

The opposite of the Broker model is the **Creator** model. This model has difficulties where the Broker model has its strengths. Beginning with the establishment of a business, the Creator model comes with more obstacles than the Broker model. The Creator has to invest more money in manufacturing facilities, labor, and research into its business idea before making any profit. Rarely, the Creators create, produce, market, and sell their products themselves. Vendors are required within this process to increase efficiency in the most profitable way. Thus, the process of creating a physical good takes up more resources until the idea becomes a reality. This makes the Creator model a riskier business. However, it has its advantage when it comes to profitability once the business is established. Since it requires higher investments, the outcome is expected to be more rewarding than for Broker models (Aravis, 2019; Marsiglia, 2014). Nevertheless, the uncertainty and resource-intensity are a deterrent for new market entrants, which explains the few newly registered Creator models in the past ten years. Especially within the **automotive industry**, the high competition of incumbent firms and the mentioned necessary investments and labor costs are entry barriers. Aside from that, new entrants have to comply with more legal requirements now (Pratap, 2017).

The remaining two right models, **Landlord, and Distributor** are somewhat in between. Both have to invest money into physical goods; however, they are not required to create or produce these goods. Depending on the specific Business Model, the Landlord does not require any physical store and can handle the business fully digital (e.g., B2C Carsharing). With that model, Landlords have a clear benefit compared to Distributors. Our identified Distributors are handling their businesses online, but most have a physical showroom for supporting reasons. Nevertheless, more Distributors are implementing digital showrooms by removing physical constraints (e.g., Cazoo). In this way, the customer does not have to physically go anywhere, which saves time and costs on transportation.

Moreover, since the Landlord is providing the goods or services for a certain period without the intention of selling, there is no accumulation of goods required, and the vehicle fleet can be maintained. On the contrary, this fleet needs to be serviced on an ongoing basis implying additional costs. The Distributor is avoiding these costs. However, he must make sure that the vehicle is in the best condition before it is sold, and this applies in particular for used vehicles. From a marketing perspective, the Landlord has the advantage of displaying their brand on the vehicle (e.g., We Share or ShareNow). This solution helps to create awareness of the brand since it can be compared to a moving billboard on the streets. In contrast, a Distributor with a physical showroom might primarily rely on the appearance of his store, except for traditional and digital marketing tools.

6.1.1 Countries

The findings exposed that most of the relevant firms were registered in the USA, noticeably more than France with second-most registered firms. Regardless of the used dataset. However, by comparing the size and the population of the USA and France, the big gap between the two countries seems reasonable. In this matter, the USA may be rather compared with the states of the European Union as one. Counting up the European Union states results in 82 firms compared to the US' 65 and hence becomes more comparable. We have identified that the five biggest economies in Europe (i.e., Germany, France, Italy, Spain, and the United Kingdom) contain 64 business models. Besides the fact that these economies are the largest regarding the nominal Gross-domestic-product (GDP), they are also the ones with the highest population density. In contrast, countries such as Luxembourg are comparably on a lower range in regard to the population density as GDP per capita, which is illustrated in the data with only one business model (The World Bank, 2019; Worldometer, 2020). Thus, the distribution of the identified cases seems plausible.

6.1.2 Years

As earlier described, the Broker model is appealing. Separating the past decade into rights being sold by founding years displays the popularity of the **Broker** model. It was the most common model from 2013 onwards. However, it must be mentioned that after 2013 the overall amount of new businesses increased and had its peak between 2015 and 2017. Not only the Broker model has risen in number, but noticeable is the **Landlord** model. By only comparing the number of models in rights being sold, the Landlord model

does not significantly stand out. The look at the distribution over the years provides more detailed insight, demonstrating the importance of the Landlord model. Compared with the Broker, the Landlord did not continue increasing but stayed over the years on a steady number. This can be argued by being a right middle between Broker and Distributor. A Landlords set up is often similar to a Brokers one but with the feature of a physical good and for some business models with physical pickup points. This implies more resources than for the Broker model but can be more favorable in customer satisfaction cases since the vehicles are usually standardized, and by having info points, it can be assumed that employees can help out with questions locally (Shaheen, Martin, & Bansal, 2018). Compared to the **Distributor** model, it confirms the shift away from ownership. According to our findings in the past decade, new Distributors have entered the market. Nevertheless, the distribution model was robust until 2012; later, the number of new entrants declined steadily. As with Landlords, the illustration of rights being sold by the founding year shows a more detailed and reasonable representation of the current situation than only the count of rights being sold over the years.

Aside from the models, a striking decrease in registered companies in 2019 and 2020 is noticeable from the analysis. A possible explanation is the lack of data. The dataset was retrieved in March 2020; therefore, only one company was registered for 2020. For 2019, it can be assumed that the dataset is not yet complete since we do not know when and how the dataset gets updated.

6.1.3 Employees

In cases of employee count, the majority is in a range of 1 to 50 employees. This was expected since the companies chosen were established in the past ten years. Additionally, as previously discussed, it is assumed that Broker and Landlord models are not as labor-intensive as the Distributor or Creator. Nonetheless, some companies were found to have an employee count in the range of 1001 to 5000 employees, which is remarkable at first sight. Looking more thoroughly into the dataset, it becomes apparent that it is attributed to services such as ride-hailing and ride-sharing services that account for their drivers as employees. By focusing on the two lower ranges (501-1001 and 251-500), it is more balanced with business models such as Carsharing, Manufacturer, and Dealership.

6.1.4 Pricing

Along with assigning a business model to each organization, we have also focused on the pricing models. Determining the pricing types is beneficial to facilitate a better differentiation between business models. The same business concepts can have different pricing models, which may outdo its competitors. Ten different pricing types were identified, including mixed. It caught our attention that the **pay-per-use** pricing is the most favorable. This is deriving from the Broker and Landlord models. The Matrix (see Table 12) shows that pay-per-use is mainly used by Car-Sharing, Ride-Hailing, and Ride-Sharing, which is already within the Broker or Landlord model. One can argue that in a shifting environment, as considered in this research, it is one of the most reasonable pricing models. If consumers, as assumed, are not interested in being car owners due to monetary reasons, this means that paying for a service while not using it is unsatisfactory for the user and hence will not contribute to a favorable reputation of the brand. Particularly business models that do not require the consumer to drive the car, such as ride-sharing and ride-hailing, use pay-per-use as their primary pricing model.

Nonetheless, also, the B2C Carsharing model is offering pay-per-use pricing, which is enabled by higher connectivity between platform and vehicle (Hanelt, Piccinini, Gregory, Hildebrandt, & Kolbe, 2015). That way, one can assume that B2C Carsharing firms can attract different consumer groups in contrast to traditional rental firms, as pricing is based on the time the vehicle is actively used. Thus, it is suitable for low budget users given the vehicle is only required for a short trip within the city.

According to Table 12, the second most used pricing model is **mixed**. This is attributed to the Dealership (Distributor) model, which allows customers to use a car long-term, by either purchasing or leasing it. The latter may not result immediately in ownership of the car but is often an option after the leasing period has ended, at which the consumer can buy out the car instead of returning it. It must also be considered that the Dealership business model is represented as the second most popular business model in our cleaned dataset, hence the conspicuous number of mixed pricing models.

Noticeable is also the **subscription** pricing model. The results show that this is mostly used by the rental (Landlord) business model and works similarly to the Leasing model. The customer pays a monthly fee to be able to use a car. However, the difference is that the customer has no option of buying the car out at the end of the subscription period but can switch between desired cars within the chosen price range in the meantime. Hence, the customer can change the rented car during his subscription without any

changes in price. This way of car rental is monthly terminable; therefore, the monthly rates are higher than for leasing. However, this pricing model is an excellent example of the vanishing demand for car ownership. Consumers have long-term access to a car without the burden of insurance or maintenance with the option to switch the car as required. Indeed, subscribing to a rental service for several years is not profitable for the consumer, yet it offers flexibility and effortlessness. It can be argued that especially subscription-based access is a useful model for consumers who do not want to own a car due to commitment or pricing but want the flexibility that car ownership has to offer (Moran, 2020).

On the other hand, one can argue that car-sharing and its **pay-per-use** pricing are more sensible since the user does not pay unless he uses the car. Nevertheless, it depends on the requirements and driving behavior of the consumer. For instance, if the consumer is hardly in need of using a car, the car-sharing model is more favorable. In contrast, consumers who are frequently in need of a car can profit from the subscription model. This is because this model is expected to save time by enabling end-to-end transportation, while the carsharing model may require a walk or ride to the destination of the car. However, in our dataset, the pay-per-use carsharing is merely a B2C business, whereas the remaining carsharing firms were found to be P2P businesses. Hence, the pricing was instead based on rates than the usage time. This means renting a private car from a peer was mainly based on 24h rates (**Daily rates**). For peers who are renting out their private cars, it is supposed to be easy to carry out the business. This might especially be the case since this method enables one to earn money on the side of one's full-time job. Another reason might be the fact that a daily rate is presumably less complicated than the pay-per-use model from the perspective of both the platform, which is facilitating it, and from the renter. In particular, it seems to be simpler for the platform to provide the service, as the cars being rented out are usually not connected with the platform itself (Shaheen, Martin, & Bansal, 2018). Therefore, it can be believed that keeping track of usage is more complicated. Additionally, one can assume that it is more appealing to renters to offer a daily rate since they will probably profit from the rent if the full 24h are not met. Simultaneously, it is likely more appealing for renters if they require the car for longer than a day since P2P daily rates are often cheaper than pay-per-use, bundles (packages), or B2C car rentals.

Furthermore, more pricing categories need to be evaluated more thoroughly. Also, popular according to our results, are the two pricing types, **predefined** and **split fare**. Both seem relatively similar but differ to some extent. Split fare has the purpose of

sharing transportation costs without any aim of making a profit. In comparison, predefined pricing is often set by the driver and was found to vary from covering the transportation costs to making a profit (Shaheen, Martin, & Bansal, 2018). These two types can be argued to be the most affordable pricing models. It enables consumers to have access to private transportation for a fraction of the price of renting or purchasing a car (Cohen, 2019). We have identified one more pricing model which falls within the category of low budget transport, namely, pricing that is **set by the passenger** rather than by the driver. To be more precise, drivers have to set offers where the passenger can choose from (inDriver, n.d.). This seems to be in between the predefined pricing and the split fare since the price is split into the available seats. Yet, the price setting is in the hand of the driver and can be set higher than for solely covering the transportation costs.

Lastly, we have identified another noticeable pricing model, the **flat-rate** model. It has similarities with the subscription model for Landlords, yet it is for Brokers, and it differs in time and fare. Whereas subscription is for a month, the flat-rate model is valid for a day or specific routes. The first enables the user to use the service as often as required within one day for a fixed price, which is, in general, relatively affordable and allows flexibility (Hamel, n.d.). The latter can be a point of discussion regarding whether it can be understood as flat-rate or not. The common understanding of a flat-rate pricing model would rather be the type based on the day and less on the route. Especially questionable is the fact that the route flat-rate only applies for one-way routes. Nonetheless, there are no additional costs if the transport takes more time than expected or if a de-route is required. Hence, any uncertainty is removed by having a fixed price.

Overall, Creator and Distributor have the least variety in pricing models, which can be explained with the fact that these models are less flexible than the other two. A reason can be that these two types usually include long-established and successfully proven models such as manufacturers and retailers (Kopp, 2020). Whereas other models (i.e., Landlord and Broker) are more flexible and have a bigger scope of variation. In particular, the Broker model suggests eliminating many constraints by dealing solely online and without owning physical assets. Being fully digital comes with the possibility of eliminating any physical constraints and still enable access. We have observed that by operating only digital, the intermediary, who would be responsible for either contract signing or key delivery, is replaced by an app. Especially the latter is becoming more popular as connectivity becomes widely available. Also, higher connectivity helps with tracking vehicles regarding its location no matter if for car-sharing or ride-hailing.

6.1.5 Marketplaces

Finally, we will examine the results of the extracted Marketplaces shortly. As explained in the beginning, marketplaces can be seen as businesses that provide the ability to compare other firms within one business model; therefore, it does not necessarily deliver an added value to our research. Nonetheless, we will discuss the findings here. Altogether, we found 28 marketplaces with the majority being based on Dealerships of new and used cars, including peer-to-peer. Distinct is that the marketplaces are primarily Brokers. This can be explained by the fact that a marketplace is only a digital intermediary and does not trade any goods themselves. Interesting is here that even though the number of Dealerships decreased in recent years, marketplaces stayed relatively steady except for the past three years, partially explained by the lack of data. However, again, it can be argued that this is due to the more straightforward approach to get a Broker model started since fewer resources are required to enter the market.

6.2 Business Models

We can divide our Business Models roughly into two categories, B2C and P2P. Manufacturer, Leasing, Dealership, and Car Rentals are merely B2Cs, whereas Ride-Pooling, Ride-sharing, and Carsharing tend to be generally P2P. This section will elaborate on the findings and the categories of the specific business models and provide examples, if reasonable, in more detail.

6.2.1 No Ownership – Driver Services

We will start looking into the most popular business model **Ride-Hailing**. We found 41 ride-hailing businesses, 20 of them were, in particular B2C taxi firms. Of the remaining 21, only eight firms are P2P. Two of the eight P2P firms differentiated themselves from the rest. One differs in its pricing method as passengers set the price (inDriver, n.d.)**,** which was introduced briefly in the previous chapter. For this model, the passenger decides how much they are willing to pay for a route. Then they can select their driver by comparing their offer based on price, car brand, and estimated arrival. For Ride-Hailing, the standard pricing method is pay-per-use. Hence by presenting different pricing, they distinguish themselves from the rest. By doing so, it may attract a different user group. For example, it allows traveling longer distances pricier for low-budget users as they can set the price they wish to pay beforehand. Moreover, for urgent cases or long-distance routes, the passenger may set a higher price than the default price of the pay-per-use model to attract more drivers, which can also appeal to drivers more

reluctant about the demanded route or time. Another advantage is that the passenger can pick the vehicle brand, which is appealing for picky passengers and useful in cases of transporting goods (e.g., luggage).

Another attractive P2P Ride-Hailing model is **Wingz (n.d.)**. This service can be divided into on-demand and pre-scheduled. The passenger can book the service up to two months ahead for a flat-rate price. As already discussed in the previous chapter, there are two types we have identified, one based on time and one based on the route. The latter applies here, and as mentioned before, it is arguable if this can be considered a flat-rate pricing or rather a predefined pricing. The company refers to flatrate, which is why we have coded it as such. However, in this case, there is no difference between flat-rate and predefined pricing. Nevertheless, this is uncommon for the Ride-Hailing business model and hence worth recognition (Wingz, n.d.).

One B2C Ride-Hailing firm caught our attention, **RubyRide (n.d.)**. This company offers a monthly subscription-based driver service for the community in low-density areas. Since rural areas are less attractive in general, this professional driving service provider can be seen as a first mover within the transportation market. It is a personalized hailing service for daily transit. They are aiming to reduce car ownership by offering a convenient and affordable service (RubyRide, n.d.).

Ride-sharing differs in the fact that the passenger may have to share the ride with other peers who are sharing the same route. We have identified 17 active Ride-sharing companies over the past decade, and all of them apply the P2P business model. The most common pricing models are pay-per-use and predefined pricing. One firm was identified to use flat-rate pricing based on location rather than route (Berymo, n.d.). Hence, the passenger pays a fixed fee to any point in the city. This differs from the earlier discussed flat-rate pricing as there is no variation of price. The passenger always pays six USD regardless of the location given it is within the city. That way, uncertainty about additional fees is eliminated and put effort into looking for the cheapest fair.

Another driver service is **Ride-Pooling**. It is relatively similar to Ride-Sharing where peers share the same route and therefore share a car. The difference in Ride-Pooling is that the driver does not aim for making a profit but for sharing transportation costs. It is a common way of commuting to work with colleagues (Shaheen, Martin, & Bansal, 2018). We have identified 11 platforms providing the service of connecting people with similar travel patterns. Except for one provider, all pooling platforms use split fare as a pricing method, thus splitting the arising costs from transportation. As in section 2.7.3.3

described, pooling aims to reduce costs, reduce pollution, and avoid traffic jams (Shaheen, Martin, & Bansal, 2018). In the USA, the latter applies to all three identified driver services. By having two or more people in the car, including the driver, the restricted carpool lane can be used (High-occupancy vehicle lane) (U.S. Department of Transportation, 2015). Thereby, traffic congestion can be avoided, and air pollution is reduced.

Overall, it can be argued that Ride-Pooling and Ride-Sharing follow the same principle except for the remuneration aspect. Hence Ride-Hailing and -Sharing agree at this point (Shaheen, Martin, & Bansal, 2018). Prices are comparable to public transport, and usually, no change in transport is required. However, passengers need to consider that the routes taken are less predictable and might be shared with the maximum number of passengers as seats are available. Thus, it is a good alternative for car ownership and public transport. During the analysis, it was recognized that many hailing and sharing services also offer delivery services (e.g., Berymo, Wingz). This can be partially explained by the aim of profit maximization using synergies but also by recent events as COVID-19 and its subsequent lockdown in some states.

This is different from existing literature, where Ride-sharing, Hailing, and Pooling are often not distinguished. By assuming that all three are the same, we would have had data of 69 firms solely for driver services. This would present a more meaningful result regarding the mobility trends of the past ten years. However, since these business models differ in their approach, a distinction needs to be made.

6.2.2 Partial Ownership – Rental Services

In this part, we will focus on access to vehicles without gaining ownership. We will begin with the well-known model, **Leasing**. Leasing is a typical model if it comes to the feel of owning a car without having ownership over it. Not many leasing companies have entered the market in the past ten years. This may be derived from the possibility that leasing is a financing tool and can be offered by Dealerships (Martin, 2020). Hence, it can be assumed that the market is very competitive. According to our analysis, many Leasing models that have entered the market utilize the digitization by operating only online to have a competitive advantage compared to incumbent leasing firms. This is also where the new entrants to the car **rental** market try to stand out, offering fully digitized services without in-person interactions (e.g., Virtuo, n.d.).

Moreover, we have noticed that several rental firms adopt features of the leasing model by offering subscription-based car access. By doing so, rental firms offer customers the opportunity to have long-term access to a vehicle without the commitment a leasing company brings along. Further, the customer can swap their rented car within the subscription period, which is monthly terminable. This opportunity gives the customer flexibility, and since maintenance and insurance costs are usually included in the subscription contract, the customer has peace of mind (Moran, 2020). One firm offers a virtual garage (i.e., Revolve), mainly including the newest luxurious and sports cars, where the customer can choose several cars for his subscription and swap them every one to three months. In the case of changing the vehicle, the company delivers and picks up the cars to and from the customer, respectively. This concept is especially appealing for customers with a passion for cars but without the needed space or the money to afford several cars at a time. However, since the vehicles are generally costlier, this service is linked to higher monthly subscription costs than the previously described regular car subscription service. Nevertheless, it is a unique approach of encouraging the transformation away from ownership by giving customers the feels of ownership with the flexibility and independence a car owner lacks, revolutionizing vehicle-as-a-service (Revolve, n.d.). Furthermore, many Rentals are more expensive if they are dropped off at a different destination than picked up. **MirrorTrip (n.d.)** aims to avoid the additional costs for the customer by matching peers who are at the required destination of the other peer to create a roundtrip instead of a one-way drive. For instance, customer A wants to go from San Diego to Los Angeles, and customer B is in Los Angeles and wants to go to San Diego. In this case, A can rent a car, drive it to LA and drop it off there. To make it a roundtrip, B will pick up the car and drive to San Diego to drop it off at the initial pick up point (MirrorTrip, n.d.). This approach saves costs, but questionable is the likelihood that two customers want to travel the same route within a specific time frame. It was observed that car-sharing allows customers to drive to other cities, where the car-sharing provider also operates. This can lead to a reduction of available vehicles in some cities, and hence, the providers offer customers to drive cars “back” for a reduction in price (ShareNow, n.d.). In comparison, this may be a more feasible and appealing service since this does not depend on other peers. On the other hand, if the targeted city has no vehicle deficiency, the reduction will probably not apply, and additional costs will likely be added.

We are now moving on to an on-demand rental service, namely **carsharing**. As earlier explained, we found both B2C and P2P companies within this business model. We have

noticed companies with features similar to B2B, yet they are an excellent addition to our research. These businesses focus on **community carsharing**, which means, in this case, that they are providing an on-demand car fleet to apartment blocks, hotels, or workplaces. Residents have access to the vehicles instantly, or if reserved in advance (Envoy Technologies, n.d.; Gaiago, n.d.). This concept is likely to eliminate the need for long-term rentals or purchases to have vehicle access. Moreover, the earlier mentioned (see section 6.1.4) downside of not having the car in proximity is eliminated here, and additionally, end-to-end transportation is provided. However, the pricing is separate and must be paid by the resident directly to the vehicle provider, either using pay-per-use or prepaid packages (Envoy Technologies, n.d.; Gaiago, n.d.).

Furthermore, carsharing on a P2P basis is an affordable way of gaining access to a car. While the available cars are not necessarily the newest on the market or contain nice in-car gadgets, it fulfills its primary purpose of transportation. Customers who need a car without any specific requirements except for price and size (e.g., students, millennials) might be the potential target group. Although the renting time and price are mostly based on a 24-hour basis, it is more cost-effective than other renting services. Also, by looking at the car owner's perspective, it might be an appealing business, particularly to those who are scarce on the money. By renting out their car via car-sharing, they earn a decent side income and can cover their costs partially for the car (Shaheen, Martin, & Bansal, 2018).

Lastly, we have identified business models that did not fit into our coding structure, which are the firms labeled as mixed. Mixed labeled firms have a business model combining two or more identified business models. For example, **GoMore (n.d.)** offers customers the option of P2P car-sharing, leasing, and P2P ride-sharing. In cases of leasing, the customer has the opportunity to provide the leased car for car-sharing to get the costs of the leasing partially covered, as in the previous example of P2P Car-Sharing already discussed (GoMore, n.d.).

We have also recognized that more emerging businesses combine public transport with alternative transportation modes such as car-sharing or ride-sharing. Such business models are referred to as **Mobility-as-a-service**. Noticeable is that MaaS operates as a Broker, similar to a marketplace, only that they include all kinds of transports. One well-known example is Whim. It claims to be "the world's first MaaS operator" and is a mobility-as-a-service in Helsinki, Finland. It combines all transportation modes in one platform, always available through a smartphone. It offers different pricing packages combining

transport means such as public transport, city bikes, taxis, rental cars, and e-scooters (Whim, n.d.). In a broader scope, we assume that especially MaaS will transform populations' travel behavior, starting with the younger generation and small families, as these groups may be more willing to use transportation alternatives. However, to make it attractive for these groups, requirements must be met. It has to be reliable, economically feasible, and maintain people's autonomy and flexibility (Durand, Harms, Hoogendoorn-Lanser, & Zijlstra, 2018).

6.2.3 Ownership

Only two business models, **Dealership** and **Manufacturer**, are supporting ownership. It is not surprising that all of them apply the Business-to-Consumer model since a private person selling cars on an ongoing basis needs to register as a business. As mentioned earlier, many identified Dealerships often have a supportive physical store. Although we are looking for business models that may disrupt the current state because of the upcoming digitization, we included non-fully digitized Dealerships to our study to have a measure of reference. By that, it means that we can compare the new digitized models with the semi-digitized physical Dealership to get a better estimate of how meaningful the analyzed data is and to what extent businesses adapt to the circumstances. On that note, Dealerships see the rise and opportunity of digitalization, and at least, partially implemented online services. Some even become entirely digitized. For example, **Cazoo (n.d.)** handles everything online over their website. If a sale took place, Cazoo promises to deliver the vehicle to the customer within 72 hours (Cazoo, n.d.). Also, to mention is **uQuote**; they are using a social media channel to manage their business rather than a website (uQuote, n.d.).

For the Creator model, we have also identified four manufacturer business models. All of them have a physical store and focus on electricity and connectivity, which is not within the scope of our present research. However, from our data, we were able to retrieve that in the past decade, 11 manufacturers got registered, of which only four company websites are still active. Since we cannot access the other seven, we can only assume that they failed on the market. Nevertheless, it must be considered that inactive websites are an indication of a closed business. As previously explained (see section 6.1), starting a Creator business requires more resources and more thorough planning than, for instance, a Broker business. Moreover, it is difficult to enter the market and survive with the number of successful competitors. Thus, manufacturers have many obstacles to conquer to be able to enter the market and succeed (Pratap, 2017). Furthermore, this

confirms the identified trend of the shift from ownership to usership. This is not only because the entry barrier is high, but it can be assumed that the decreasing demand for ownership is not appealing or somewhat risky for new market entrants.

6.2.4 Mobility Services by OEMs

We have identified 18 variations of business models within four categories that entered the mobility service market in the past ten years. In this section, we want to investigate if and how incumbent automotive brands cope with the digital transformation regarding car ownership and alternative transport modes. We decided to look into the 15 brands with the highest turnover (Statista, 2020) and pick brands consistent with our location scope. Hence, the brands we are focusing on are Daimler, BMW, Volkswagen, Renault, Peugeot Société Anonyme (PSA) Group, Fiat Chrysler Automobiles (FCA) Group, Ford, and General Motors (GM). It was found that all of the eight firms are involved in mobility services. The same firms established their own mobility brands. Volkswagen, for instance, decided to go both ways, namely ride-sharing with MOIA and car-sharing with WeShare. However, ride-sharing is only available for two locations in Germany and car-sharing only for one (Moia, n.d.; Volkswagen, 2020).

In comparison to its competitors Daimler and BMW, it can be said that Volkswagen (VW) is currently in the beginning stage. Daimler and BMW started their services separately in carsharing (Car2Go, DriveNow). However, in 2019, they have become partners creating a new service platform for urban mobility solutions. They did not only stick to the initial business model carsharing but also added four additional services independent from carsharing. These services include ride-hailing, parking, charging, and planning, which seems like the beginning of a MaaS platform. The latter is formerly Moovel and aids in providing the best way to arrive at the desired transportation combining sharing modes (bike, e-scooter, car) and hailing services. Share Now (carsharing) is available in eight countries in Europe and free now (ride-hailing) in ten European Countries. Thus, it can be argued that Daimler and BMW realized the chances of digitalization and moved fast enough to be the dominant brand in the European market. By implementing several additional services, they have assured stability for their brand and manifested in the mobility market (ShareNow, n.d.). Ford implemented a slightly different approach in regard to carsharing. Whereas VW, Daimler, and BMW offer free float car-sharing, Ford has defined pick up and drop off points. These points are local Ford dealerships within Germany. Hence, Ford provides access to carsharing even in rural areas to affordable hourly renting fees, with a maximum daily price. The prices depend on time and car

model but vary within 1.50 € to 8 € per hour (Ford Carsharing, n.d.). In this manner, Ford added value to its brand with comparably less effort since Ford dealers were already distributed throughout Germany. Other brands such as General Motors have also attempted to establish themselves on the mobility service market but had to surrender due to high competitiveness. GM wanted to compete with Uber and Lyft but ended its business within the car-sharing sector only three years after the announcement (Rondinella, 2017; Rosenberger, 2020). Creating new business models can be a risky business and requires a change in organizational culture and vision. A new business model needs a change in heuristic rules, norms, and beliefs to be open to new opportunities. Hence, the management style is crucial for business model innovation and its success (Doz & Kosonen, 2010; Markides & Sosa, 2013; Prahalad & Bettis, 1986). This may be a reason for failure, as it can be assumed that overly confident management tried to operate the new model without considering the challenges and requirements stated. PSA had a similar experience as GM. In 2017, they had to close their car-sharing service after five years since the competition of Daimler and BMW was too big (AutoBeat, 2017). However, PSA relaunched their car-sharing scheme within their already existing Free2Move brand. The brand works already in cooperation with other car-sharing providers and can be seen as a Mobility-as-a-Service business model, as yet they did not implement their own car-sharing service. Although the first attempt getting hold within the car-sharing market was a bummer, PSA used its established brand to give it another try. This approach can be advantageous since the brand is already known, and the new service is within their industry (PSA, n.d.; Rehberg, 2020).

Nonetheless, the competition is still there and has become firmer over the years (Wyman, 2018). Therefore, PSA has to bring additional value to its service, such as a lower price to keep up with other providers. As PSAs Free2Move brand, some automotive companies are opting for cooperation rather than creating a new brand. This implies that companies such as Renault and FCA supply their vehicles to car-sharing services. Both companies set great stores in connectivity to enable smooth handling and provide real-time data about the vehicle's condition. A corporation is an excellent approach to prevent being driven off the market by its competitors, and yet it does not require a whole new business concept for the automotive brands (Fuhrpark, 2020; Renault, 2019; Wolfinger, 2019). Overall, it can be argued that companies who are offering their cars for carsharing, no matter if in cooperation or not, put their brand and their vehicle in the spotlight. Customers with an interest in buying a car have the chance to try different models by making use of car-sharing and hailing services. That way, firms

can attract new customers if they provide good experiences with the car. Additionally, offering services can result in higher margins and more stable revenues (Oliva & Kallenberg, 2003).

Generally, it needs to be mentioned that regarding the prediction from the FAST 2030 study (Wyman, 2018), the change within the value chain is visible. It is too early to say with certainty that the OEMs set their focus on the downstream activities. However, by offering customer-centric services (e.g., Carsharing), a tendency is noticeable.

Moreover, according to our data, OEMs set their focus on investing in mobility services such as ride-hailing and carsharing, as predicted. As mentioned in the business model innovation section (see section 2.3), implementing new business models can challenge the existing business model and affect brand image and earnings negatively (Chesbrough & Rosenbloom, 2002; Mezger, 2014). Based on this, and according to Johnson et al. (2018) statement that one should initiate business model innovation only if it is crucial in the market, it can be said that the transformation is meaningful.

To pick up on the digital transformation, based on our research, one can say that the incumbent automotive brands mainly focus on the revision of established business models. This is indicated by mobility services partially implementing multi-modal solutions that are managed over a smartphone (e.g., Share Now). Nevertheless, it can be argued that this goes hand in hand with adding digital assets to existing business models since by providing new mobility services, connectivity and interaction with the customer is required (Hanelt, Piccinini, Gregory, Hildebrandt, & Kolbe, 2015).

7 Limitation

Although the data collection, cleaning, and coding have been conducted with absolute diligence, we cannot assure that this research was not subject to significant limitations.

First, we will start with a **general** limitation in 2020, the COVID-19 pandemic, and the resulting worldwide lockdown and restrictions. Since one of the researchers is living in Germany and one in Denmark, closed borders have restricted the research collaboration by being in solely remote contact. This required more time and thorough discussions about the research and its execution.

Next, we will discuss the limitations of our **dataset**. The dataset used for this research was retrieved from Crunchbase. Even though Crunchbase is accepted as a reliable and well-deemed source among researchers, one must consider that the data was initially not created for our research purpose. Thus, the retrieved data contained irrelevant data for our research, which needed to be removed before data could be further processed. However, since the method of cleaning was rather rigorous and the accuracy of the predefined categories uncertain, risks of deleting essential data while scaling down were apparent. Further, an incomplete dataset could also result from Crunchbase researchers and their processes of the website. It is uncertain how data is updated and how frequently this has been conducted. Nonetheless, we were able to see in our processed dataset that companies were updated between 2018 and 2020. This is relatively current; however, in such a fast-changing environment, businesses can change quickly. This may be the reason for the number of organizations listed as ‘operating’ with inactive websites. Crunchbase’s outdated data has also resulted in a higher workload for this research as inactive websites needed to be identified and labeled as such.

Moreover, due to the ambivalence of Crunchbase’s processes, we cannot be sure about the wholeness of recent years. Notably, in 2019, we observed a decline in registered businesses. Lastly, the dataset was retrieved in March; thus, it is likely that changes have been made to the initial data and additional relevant data might have been added or removed. Especially the outcomes and effects of COVID-19 are ambiguous and are indeed a hazard for some business models.

Not only the dataset comes with limitations, but also the **methods** we applied, and in particular, the pre-processing and analysis. As earlier mentioned, the retrieved data holds many irrelevant data for our research. The initial dataset contained up to a million data points. Consequently, it was unreasonable to go through each data point. Therefore,

relevant data was obtained by choosing relevant industries and industry groups. The selected industries were mainly based on the automotive and transportation industry. Due to the scope of this research software industry, for instance, was not considered in this research since this would require a more thorough analysis. Hence, companies were omitted who solely focus on the software component of the researched business models.

Moreover, because of the restricted scope, this research scaled the markets down to the OECD founding states. That way, business models from the Asian market were disregarded as well as most automobile brands to keep the field of research aligned. A broader perspective is favorable but would take up too many resources to conduct a proper study. Both approaches, scaling down to OECD states and cleaning based on specific industries, may seem somewhat radical and could have altered the results by neglecting important information resulting in an incomplete dataset. More relevant data points would lead to more complete and distinct results and display the trends more definite. Also, it must be considered that the dataset was obtained as a CSV-file, and therefore the cleaning was performed in Microsoft Excel. During the process, we had noticed that dates before 1900 were not read correctly by the software. This resulted in falsified dates that needed to be corrected (e.g., instead of 1814, Excel has changed the date to 2014). This was done by using simple v-lookup with the initial dataset followed by changing the data type into text rather than date.

Furthermore, the coding of the data was conducted independently by two researchers, which is relevant for the accuracy of the inter-coder reliability. More specifically, inter-coder reliability might be subject to bias during the coding process if not conducted independently. Thus, we tried to keep the bias as little as possible by discussing and comparing the independent coding results. However, we do not exclude the possibility of potential biases during the coding. Additionally, the classification and assignment of the roles were based on our interpretation and understanding of the single cases. Hence this perception may differ for other researchers. Nevertheless, again, by defining the roles, discussing, and putting the coding into contrast, we kept the variance low.

8 Implication and Further Research

Despite the presented limitations, this study contributes to the existing research. There is only little research on car mobility services for the European market, especially with the focus on customer-centric business models. Therefore, this study is a valuable addition to existing literature. By analyzing the status quo of the current trends, we were able to identify increased popularity in mobility services, in particular driver services. This research was able to narrow down newly established businesses of a decade to a clear, well-structured depiction of emerging mobility services. This enabled us to provide specific patterns and strengths of each selected business model, and additionally, compare selected automobile manufacturers and their approach to coping with the digital transformation. This is showing that the transformation is perceivable and that it is seen as a new business opportunity for incumbent firms. Moreover, by having an overview of the past ten years, a prediction of the future progress and the speed of the shifting mobility behavior can be derived from that. Additionally, by putting active and supposedly inactive firms into contrast, an estimate of the entry barriers and competition can be made. Further, this research can suggest similar trends in other industries since digitalization and the shift to non-ownership are likely occurring in other industries along with the automotive market. The present research not only grasps the current state but also invites further research within the specific area.

Our results show that mainly driver services are attractive business models, especially for new entrants. In future research, it could be interesting to analyze solely these to have a clearer understanding of its popularity and profitability.

To get an even better perspective on the transformation itself, a larger dataset may be considered in future research. The dataset in this project was solely focusing on the past ten years when the digitization was already in process. By looking at the past two or three decades, a more distinguishable trend may be identified, and thus more precise conclusions may be made.

This project was mainly focusing on services within the automobile sector. However, including public transport, may be beneficial to get a general overview of the current situation, including Mobility-as-a-Service. Further, the transition from ownership to access-based consumption includes all transportation modes rather than only car-centered mobility services. For instance, a very novel way of transportation is the shared electric scooter. It belongs to micro-mobility along with shareable bikes. These ways of

transportation allow people seamless end-to-end transportation to their desired destination, which is a favorable way of transportation, especially in traffic-heavy and dense cities. Another aspect to tackle is the environmental impact of access-based consumption. Micro mobility is expected not only to reduce the impact, but it was also noticed that many firms implement, and hence advertise, electric mobility, which is known to be more sustainable than a gasoline engine (Requia, Mohamed, Higgins, Arain, & Ferguson, 2018). Moreover, mobility services are expected to reduce the number of driven cars in urban areas (Deloitte, 2020; Gao, Kaas, Mohr, & Wee, 2016; ITF, 2019; Kuhnert, Stürmer, & Koster, 2018). One can also assume that by using a car within the carsharing model, people are more thoughtful when and how much they are making use of this service. Therefore, a precise study in this field seems reasonable.

Along with digitization comes connectivity. This research raised this subject but never elaborated on it thoroughly. Hence, looking at the software rather than on the tangible might help in cases of forecasting. More precisely, by looking at the number of arising B2B business models offering software solutions might also be an indication of an upcoming or already existing trend. During the coding process, it was noticed that many firms solely focus on software development for mobility services to provide prospects with their platform. Since many mobility services rely on connectivity and software, a similar study should be conducted by focusing on mobility software rather than mobility service providers.

9 Conclusion

For many years, owning a private car was a sign of adulthood, independence, and prosperity, until new technologies were introduced, and new mobility business models entered the market. This caught our attention and motivated us to investigate this topic more thoroughly.

Overall, an upcoming shift in the demand for ownership was observed. With many mobility solution providers entering the market, the automotive industry and their traditional business model are challenged. The interest in Servitization had its beginnings already in the early 70s, and until today, it has become a significant trend in the global market (Lay, 2014). The digitalization is inducing this trend, and even more, creating a bigger urge for customer-centric business with the focus on providing services rather than products (Hanelt, Piccinini, Gregory, Hildebrandt, & Kolbe, 2015). Moreover, studies have shown that urbanization and sustainability play a significant role, and especially millennials are not eager to own cars (Klein & Smart, 2017). Studies also predict that individual mobility services will continue growing, and car ownership is likely to transition from individuals to fleet operators (Wyman, 2018). This can mean a tremendous change for the mobility market, including the automotive industry (Kuhnert, Stürmer, & Koster, 2018). To get a better overview of the current situation, we established the following research question:

What is the current state of customer-centric business models in the automotive industry?

By analyzing the dataset retrieved from Crunchbase, we can confirm an increase in mobility services over the past ten years, especially after 2013, a noticeable rise in broker and landlord models was identified. Those models were classified as providing no ownership or only partial ownership, which means that increasingly more rental services (e.g., carsharing and rental) and driver services (e.g., ride-hailing and ride-sharing) entered the mobility market. Both services were more or less balanced regarding the transaction of the service. We allocated businesses with the focus on peer-to-peer transactions (e.g., ride-sharing and the majority of carsharing) and with the focus of business-to-consumer transactions (e.g., rentals and ride-hailing). With those results, we can say that in recent years, the market began to focus on non-ownership business models.

To provide a general overview of the automotive industry, we have looked into the best-selling OEMs apart from Crunchbase's dataset and their adoption of mobility services. All of the eight selected OEMs have recognized the urgency of this trend and its adaptation. Incumbent firms are revising their existing business models, adding value to their brand. Two main approaches were perceived, either OEMs work directly on the solution and develop their own mobility service platform, or they work on it indirectly by having cooperation with a platform provider equipping them with vehicles. For both approaches, a preference for carsharing models was observed. Additionally, a tendency for multimodal mobility was identified, connecting different transportation modes within one platform, all accessed via a smartphone.

To get a more definitive insight into the current situation, we defined the following sub-research question:

1. What is the prevalence of the identified business models?

Overall, this research determined that driver services were the most favorable business models in the last decade. In particular, ride-hailing had the highest prevalence within our study. Within mobility services carsharing was the second most common model. In general, dealerships were more prevalent than carsharing, followed by the rental business model. Based on the rights sold, the broker model had the most cases, followed by the landlord model. In comparison, the distributor has fewer cases, and the creator had the least cases. Hence, the models contributing to usership rather than ownership (i.e., brokers and landlords) made up the majority of all relevant cases.

Our second sub-research question was tackling the differences between the identified business models.

2. What are the key differences between the identified business models?

We recognized most differences within the transaction parties (i.e., B2C and P2P) and in pricing. We identified three variations of driver services. All three are supposed to drive passengers to their desired destination, but they differ in the remuneration and privacy aspect. Ride-hailing, which is mainly B2C, is primarily using pay-per-use pricing. This model intends to generate revenue by transporting individuals or groups. Furthermore, Ride-sharing also tends to generate a profit but adds another pricing model, namely predefined to the pay-per-use model. However, the ride is usually shared with other peers sharing the same or a part of the route. Additionally, it is predominantly based on peer-to-peer rather than business-to-consumer transactions. Ride-Pooling is only carried

out by peers and often requires sharing the ride with others as well. In contrast to all other pricing models, this model has no purpose in making a profit by sharing a ride but rather in splitting the transport costs, saving time, and avoiding traffic. Hence, the pricing is based on a split fare.

Carsharing, Rental, and Leasing belong to rental services. This means that consumers have access to a car without owning the vehicle. Rental and Leasing are entirely B2C services, whereas Carsharing can be both. These business models also differ in the time the cars are used. Carsharing is primarily targeted at short-time rentals. Depending on the specific transaction type, it differs from a few minutes up to several days. B2C Carsharing offers pay-per-use pricing, and thus it is preferably used for short trips within the city. In contrast, P2P Carsharing is mostly based on a daily pricing rate. Leasing is usually providing access to a car for two to four years with monthly payments, initial down payment, and the option to buy out the vehicle by the end of the contract term. Rental is relatively similar to Leasing but is more flexible in cases of the duration of having access and can differ from a day up to a year. Additionally, rental was identified as having two common pricing models, one based on a daily rate, and the other on subscription. For this reason, the former seems more convenient for short-term rentals. At the same time, the latter is based on monthly pricing such as Leasing with monthly termination opportunities and, therefore, without the contractual bound. Additionally, the subscription-based model often offers the opportunity to change the vehicle within its price class during the subscription period.

The other two identified business models were mainly focusing on providing ownership to the consumer, i.e., Dealerships and Manufacturers. Both are based on business-to-consumer transactions and are the least digitized models compared to the other identified business models. Since both are ownership focused, the pricing usually leads to full payment. However, since leasing is also a financing tool, many dealerships offer that as an alternative to purchasing the car.

Although we conducted this study with the utmost diligence, significant limitations could not be neglected. First, the dataset was retrieved from a secondary source and was therefore initially not collected for our research purpose. Even though the source is accepted among researchers, it cannot be ensured that the data and the labeling are absolutely accurate, current, and complete. Along with that, the immense amount of data required a time-intensive and fairly rigor cleaning process to extract insignificant data, which may have led to discarding important information. Further, bias cannot be ruled

out for the conducted coding and classification of roles since the researchers coded based on their interpretation of the categories. Nevertheless, the process was thoroughly discussed, and the coding results of both researchers were put into contrast to avoid any discrepancies. Moreover, due to the scope of this research, delimitations needed to be set. By doing so, the focused area of research was limited to specific countries within the OECD organization and to solely customer-centric car-related services, excluding micro-mobility, public transportation, and business-to-business transactions.

Nevertheless, this study provides valuable insights into the current state based on the registered companies in the past ten years. It confirms a rising interest in mobility services by presenting the number of market entrants. Since most research is focused on the United States, this study gives a first overview of the mobility market in selected European countries. Moreover, the methods and results used can be partially generalized to other industries, since the digitalization is not only impacting the automotive industry. Nevertheless, further research needs to be conducted considering a broader scope and including other transportation modes to provide a more distinct result.

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Appendix

Appendix 1: Digital business model types in the mobility sector by Remane et al. (2016, p. 10-12)

	Digital business model type	Description
Creator	Autonomous products/robots manufacturer	Produce and sell products that use digital technologies to independently perform services formerly conducted by humans
	Manufacturer direct sales	Produce and sell physical goods directly to the customer online, often allowing customization
	Manufacturer of connected physical products	Produce and sell physical products that are connected to the internet and thus can be complemented by additional services
	Manufacturer of connectivity devices for physical products	Produce and sell a device that can be attached to a physical good, thereby connecting the good to the internet and serving as a platform for new services
	Manufacturer of IT devices	Produce and sell IT devices such as displays and computers
Distributor	Online reseller	Buy and resell physical products purely through the internet
Landlord	App developer	Develop and sell mobile applications via app stores for smartphones
	Data analytics provider	Analyze large amounts of data to make predictions by applying big data and other technologies
	Digital service provider	Provide services completely through use of digital technologies, replacing a traditionally non-digital service
	IT-enabled selfservice provider	Replace traditionally necessary service staff and processes with IT, thus allowing customers to service themselves
	IT-guided service provider	Guide semi-professional/unskilled service staff with IT, thereby replacing more professional staff
	Mobilized service provider	Enable traditionally stationary services to be provided on the go through localization technologies
	Publisher model	Publish journals online, e.g., articles, videos, reviews
	Sell services online	Use the internet to sell services online, often allowing customers to request new services on-demand
	Seller of sensor information	Sell information gathered from multiple sensors

	Sensor-enabled service innovator	Use sensor information to provide new or better services, such as a more accurate pricing
	Software provider	Develop and sell software to businesses or consumers
	Third-party information	Collect large amounts of third-party information and provide customers with the information necessary for a specific situation
Broker	B2C marketplace for physical goods	Create marketplace to trade physical goods between customers and retailers, focusing on the aggregation of offers from different retailers
	Location-based advertising platform	Provide a platform for companies to deliver advertising messages to customers based on their current location
	Integrator of third-party services	Create platform allowing professional services to be booked from several third parties; the focus lies on integrating the services
	P2P goods sharing platform	Create platform to rent physical goods from peers, thus replacing professional lenders
	P2P information sharing community	Provide a platform to share dynamic information among members for mutual benefits
	P2P marketplace for physical goods	Create marketplace to trade physical goods between customers; the focus is on matching needs and providing additional services to ensure safe transactions
	P2P service provision platform	Create platform intermediating a service in which customers replace professional service personnel
	Service comparison portal	Provide online portal for comparing price, user rating, and other properties of third-party services; the focus lies on comparing the services

Appendix 2: Crunchbase dataset after pre-processing, sampling, and coding

name	rank	updated_at	country_code	status	founded_on	employee_co	Rights being s	Business Model	B2C or P2P	Pricing	If Mixed Pricing	Website active
Cazoo	116	28/03/2020 19:14	GBR	operating	01/01/2018	101-250	Distributor	Dealership	B2C	Full Payment		yes
Fair	209	28/08/2019 15:09	USA	operating	01/01/2016	101-250	landlord	Rental	B2C	Mixed	Leasing / Pay per Use / Subscription	yes
Lyft	297	01/04/2019 23:50	USA	ipo	22/05/2012	1001-5000	Broker	Ride Hailing	P2P	Pay per Use		yes
Turo	495	07/02/2020 07:51	USA	operating	01/01/2010	501-1000	Broker	Car Sharing	P2P	Pay per Use		yes
Carvana	696	24/06/2019 21:50	USA	ipo	01/01/2013	1001-5000	Broker	Vehicle Marketplace	B2C	Full Payment		yes
Vroom	1416	17/01/2020 15:01	USA	operating	01/01/2013	501-1000	Broker	Vehicle Marketplace	B2C	Full Payment		yes
Scoop Technologies	1643	15/08/2019 14:31	USA	operating	01/01/2015	11-50	Broker	Ride Pooling	P2P	Split Fare		yes
Cabify	1899	29/05/2019 13:54	ESP	operating	01/12/2011	1001-5000	Broker	Ride Hailing	P2P	Pay per Use		yes
Karma Automotive	2593	27/02/2020 08:35	USA	operating	30/09/2015	501-1000	Creator	Manufacturer	B2C	Full Payment		yes
Carwow	2688	05/08/2019 16:26	GBR	operating	01/01/2013	251-500	Broker	Vehicle Marketplace	B2C	Mixed	Full payment / Leasing	yes
Blacklane	3803	03/03/2020 09:48	DEU	operating	01/09/2011	251-500	landlord	Ride Hailing	B2C	Pay per Use		yes
Heetch	4168	18/11/2019 16:40	FRA	operating	01/01/2013	101-250	Broker	Ride Hailing	P2P	Pay per Use		yes
Virtuo	4999	20/12/2019 14:29	FRA	operating	01/11/2015	101-250	Landlord	Rental	B2C	Rental		yes
Drivy	5393	27/09/2019 08:46	FRA	acquired	03/05/2010	101-250	broker	Car Sharing	P2P	Daily Rate		yes
MILES	5631	14/08/2019 04:56	DEU	operating	01/01/2016	101-250	Landlord	Car Sharing	B2C	Pay per Use		yes
Alto	5665	24/06/2019 21:51	USA	operating	01/02/2018	11-50	Landlord	Ride Hailing	B2C	Pay per Use		yes
inDriver	6134	28/02/2020 03:49	USA	operating	01/01/2012	251-500	broker	Ride Hailing	P2P	Other	passenger sets the price	yes
Bipi	6312	24/06/2019 21:57	ESP	operating	01/08/2017	51-100	landlord	Rental	B2C	Subscription		yes
Wheely	7050	08/10/2019 14:09	GBR	operating	01/01/2010	101-250	Landlord	Ride Hailing	B2C	Pay per Use		yes
Beat	7433	03/01/2019 16:25	GRC	acquired	15/02/2011	251-500	Broker	Ride Hailing	P2P	Pay per Use		yes
Uber Advanced Technologies Group	7534	05/02/2020 09:01	USA	operating	01/01/2015	1001-5000	Broker	Ride Hailing	P2P	Pay per Use		yes
Rodo	7851	03/09/2019 18:01	USA	operating	01/01/2016	11-50	Broker	Leasing Marketplace	B2C	Leasing		yes
finn	8061	04/12/2019 11:00	DEU	operating	01/07/2019	11-50	landlord	Rental	B2C	Subscription		yes
Brumbrum	8403	30/05/2019 13:55	ITA	operating	01/01/2016	11-50	Distributor	Mixed	B2C	Mixed	Full payment / Rental	yes
SnappCar	8660	27/09/2019 16:51	NLD	operating	01/10/2011	11-50	Broker	Car Sharing	P2P	Daily Rate		yes
HyreCar	9261	24/06/2019 22:00	USA	ipo	01/01/2014	51-100	Broker	Car Sharing	P2P	Daily Rate		yes
Kapten	9267	17/09/2019 08:19	FRA	acquired	11/05/2012	101-250	Landlord	Ride Hailing	B2C	Pay per Use		yes
Hitch	9940	10/11/2019 18:17	USA	operating	01/01/2018	11-50	Broker	Ride Sharing	P2P	Predefined		yes
Maxi Mobility	10398	28/02/2020 06:51	ESP	operating	01/05/2011	1001-5000	landlord	Ride Hailing	B2C	Pay per Use		yes
Karos	10470	10/01/2020 15:24	FRA	operating	01/05/2014	11-50	broker	Ride Sharing	P2P	Predefined		yes
Envoy Technologies Inc.	12576	24/06/2019 21:55	USA	operating	01/04/2017	11-50	landlord	Car Sharing	B2C	Pay per Use		yes
Wingz	14226	24/06/2019 22:05	USA	operating	01/01/2011	11-50	Broker	Ride Hailing	P2P	Other	Flat rate	yes
Evezy	14825	13/03/2019 12:36	GBR	operating	01/06/2017	11-50	Landlord	Rental				no
Carvolution	15406	03/03/2020 12:33	CHE	operating	01/01/2018	1-10	Landlord	Rental	B2C	Subscription		yes
Free2Move	16446	13/08/2019 08:49	DEU	acquired	01/01/2013	101-250	Broker	Rental Marketplace	B2C	Rental		yes
GoMore	16899	24/06/2019 21:49	DNK	operating	01/01/2011	11-50	Broker	Mixed	p2p	Mixed	Leasing / Pay per Use / Rental	yes
CapCar	16965	06/11/2019 08:51	FRA	operating	01/01/2015	11-50	broker	Vehicle Marketplace	P2P	Full Payment		yes
Bellhop	18721	24/06/2019 22:13	USA	operating	01/01/2014	11-50	Broker	Ride Sharing	P2P	Predefined		yes
TRED	19983	25/03/2019 20:38	USA	operating	01/01/2011	11-50	Broker	Vehicle Marketplace	P2P	Full Payment		yes
CarHopper (Acquired)	22135	19/03/2020 23:39	USA	acquired	10/01/2016	1-10	Landlord	Rental	B2C	Rental		yes
Joydrive	23266	24/06/2019 21:44	USA	operating	01/01/2016	11-50	broker	Vehicle Marketplace	B2C	Full Payment		yes
Cluno	23882	24/09/2019 16:32	DEU	operating	01/01/2017	51-100	Landlord	Rental	B2C	Subscription		yes
LMP Automotive Holdings, Inc.	25206	24/06/2019 21:24	USA	operating	01/01/2016	11-50	broker	Vehicle Marketplace	B2C	Mixed	Full Payment / Subscription	yes
UFODRIVE	25209	17/12/2019 17:26	LUX	operating	01/01/2018	11-50	Landlord	Rental				no
Ryde	25618	24/06/2019 21:59	USA	operating	30/07/2016	11-50	Broker	Car Sharing	P2P	Daily Rate		yes
Zify	25679	17/10/2019 11:09	FRA	operating	01/01/2014	11-50	broker	Ride Pooling				no
LeCab	26260	26/09/2019 10:09	FRA	operating	01/12/2012	101-250	landlord	Ride Hailing	B2C	Pay per Use		yes
Instamotor Technologies, Inc	27135	24/06/2019 21:34	USA	operating	01/02/2014	1-10	broker	Vehicle Marketplace	P2P	Full Payment		yes
Koolicar	27202	20/09/2019 08:40	FRA	operating	01/01/2011	11-50	Landlord	Rental	B2C	Rental		yes
Klaxit	27516	30/09/2019 11:56	FRA	operating	01/01/2012	11-50	broker	Ride Pooling				no
Wheelz	27561	24/06/2019 22:15	USA	acquired	01/01/2011	11-50	broker	Car Sharing				no
Less	30914	31/12/2019 05:22	FRA	acquired	01/01/2017	11-50	broker	Ride Sharing				no
Citygo	31602	29/01/2020 06:56	FRA	operating	01/06/2013	11-50	broker	Ride Pooling	P2P	Split Fare		yes
Carlease	32947	24/06/2019 22:08	USA	operating	05/12/2017	11-50	Landlord	Leasing				no
Juicar	33591	10/01/2020 13:55	CHE	operating	01/01/2018	11-50	landlord	Rental				no
Amber	33703	24/06/2019 21:57	NLD	operating	01/01/2016	unknown	landlord	Car Sharing	B2C	Mixed	Pay per Use / Subscription	yes
Laureti	33944	04/02/2020 19:14	LUX	operating	20/02/2017	11-50	Creator	Manufacturer	B2C	Full Payment		yes

name	rank	updated_at	country_code	status	founded_on	employee_co	Rights being s	Business Model	B2C or P2P	Pricing	If Mixed Pricing	Website active
Borrow	34400	29/01/2020 07:02	USA	operating	01/01/2015	1-10	Landlord	Rental	B2C	Subscription		yes
SAYM	34735	15/02/2020 22:38	DEU	operating	01/01/2019	1-10	Broker	Ride Pooling	P2P	Split Fare		yes
BiTaksi	35541	24/06/2019 21:51	TUR	operating	30/01/2013	51-100	Broker	Ride Hailing	B2C	Pay per Use		yes
Drive	35967	12/02/2018 22:25	FRA	operating	01/07/2013	11-50	Landlord	Ride Hailing	B2C	Pay per Use		yes
Social Car	36561	21/11/2019 09:34	ESP	operating	01/07/2011	11-50	broker	Car Sharing	P2P	Daily Rate		yes
CarBlip	36918	24/06/2019 21:37	USA	operating	01/05/2017	11-50	Broker	Leasing Marketplace	B2C	Full Payment		yes
Clutch Canada	37173	17/09/2019 10:46	USA	operating	01/01/2016	unknown	Distributor	Dealership	B2C	Full Payment		yes
Nomad Rides	37493	02/08/2019 21:01	USA	operating	01/01/2018	1-10	Broker	Ride Sharing	P2P	Predefined		yes
AutoUncle	38184	24/06/2019 22:23	DNK	operating	01/01/2010	11-50	Broker	Vehicle Marketplace	B2C	Full Payment		yes
Allocab	38639	01/10/2019 08:42	FRA	operating	04/05/2011	11-50	Landlord	Ride Hailing	B2C	Pay per Use		yes
CarPlanner	39919	29/01/2020 10:20	ITA	operating	01/01/2014	11-50	landlord	Mixed	B2C	Mixed	Full Payment / Subscription	yes
Elio Motors	42306	30/05/2019 16:45	USA	ipo	01/01/2012	11-50	creator	Manufacturer				no
OpenRide	42542	24/06/2019 21:48	USA	operating	31/08/2015	1-10	broker	Ride Sharing				no
Hulq.com	42730	19/06/2019 04:58	USA	operating	01/01/2017	unknown	broker	Leasing Marketplace	B2C	Leasing		yes
Fleet	42747	24/06/2019 21:58	IRL	operating	01/01/2016	unknown	Broker	Car Sharing	P2P	Daily Rate		yes
Snapcar	42769	30/09/2019 05:41	FRA	operating	01/01/2012	11-50	Broker	Ride Hailing	B2C	Pay per Use		yes
Wetaxi	43323	05/12/2019 07:06	ITA	operating	01/01/2017	11-50	Broker	Ride Hailing	B2C	Pay per Use		yes
FINDRIVE	43366	24/06/2019 22:22	FRA	operating	01/01/2017	1-10	Landlord	Rental	B2C	Subscription		yes
SammeVei	43939	09/07/2019 09:49	NOR	operating	28/10/2016	1-10	broker	Ride Sharing	P2P	Pay per Use		yes
CARIZY	44970	24/06/2019 22:07	FRA	acquired	01/05/2015	11-50	Broker	Vehicle Marketplace				no
E-Car Club	46786	24/06/2019 21:32	GBR	acquired	01/01/2011	11-50	landlord	Car Sharing				no
GetMyCar	47806	14/01/2020 08:47	ITA	operating	01/01/2017	unknown	broker	Car Sharing	P2P	Daily Rate		yes
Carable Inc	49266	24/06/2019 22:10	USA	operating	01/01/2016	11-50	Broker	Vehicle Marketplace	B2C	Full Payment		yes
Moneyshake	49748	17/09/2019 12:35	GBR	operating	01/01/2019	1-10	Broker	Leasing Marketplace				no
CiteeCar	50786	27/08/2019 11:56	DEU	operating	01/01/2011	11-50	landlord	Car Sharing				no
YOLO Technologies	50809	24/06/2019 22:07	TUR	operating	15/01/2017	11-50	broker	Ride Hailing	B2C	Pay per Use		yes
Drive YOYO	51471	26/11/2018 17:59	TUR	operating	05/03/2012	11-50	Landlord	Car Sharing	B2C	Pay per Use		yes
Idoneo	51579	27/08/2019 13:24	ESP	operating	01/09/2017	1-10	Landlord	Leasing	B2C	Leasing		yes
Canoo	52529	24/06/2019 22:06	USA	operating	01/12/2017	251-500	Creator	Manufacturer				no
Volt	52759	24/06/2019 21:58	TUR	operating	01/01/2014	1-10	Broker	Ride Sharing				no
Dubuc Motors	52849	24/06/2019 22:01	CAN	operating	01/01/2011	1-10	creator	Manufacturer				no
ZabCab	53699	24/06/2019 22:11	USA	operating	01/03/2013	11-50	Landlord	Ride Hailing				no
Canvas	54817	16/03/2020 04:33	USA	acquired	01/01/2016	unknown	landlord	Rental	B2C	Subscription		yes
Cabu	56804	24/06/2019 21:23	USA	operating	31/03/2016	11-50	Broker	Ride Hailing	P2P	Pay per Use		yes
Loop VAN	57311	31/01/2020 10:35	USA	operating	01/01/2018	1-10	Landlord	Rental				no
Envy.rent	57674	31/01/2020 03:55	USA	operating	01/01/2015	1-10	Broker	Rental Marketplace				no
RideBee	57811	15/01/2020 04:37	DEU	operating	01/01/2018	1-10	Broker	Ride Pooling	P2P	Split Fare		yes
Garajyeri	58062	24/06/2019 21:53	TUR	operating	15/01/2015	11-50	broker	Car Sharing	P2P	Daily Rate		yes
Leaseonline	58278	24/06/2019 21:39	SWE	operating	01/01/2014	1-10	Landlord	Leasing	B2C	Leasing		yes
Cab Guru	58619	24/06/2019 21:46	GBR	operating	01/01/2015	1-10	Broker	Ride Hailing	B2C	Pay per Use		yes
Steer	59225	21/12/2019 19:22	FRA	operating	01/01/2019	1-10	Landlord	Rental	B2C	Subscription		yes
Heycar	62570	15/01/2020 09:16	DEU	operating	01/01/2017	unknown	Broker	Vehicle Marketplace	B2C	Full Payment		yes
Hiyacar	63046	24/06/2019 21:55	GBR	operating	01/01/2015	11-50	Broker	Car Sharing	P2P	Pay per Use		yes
Migo, Inc.	63210	24/06/2019 21:59	USA	operating	01/03/2016	11-50	Broker	Mixed	B2C	Mixed	MaaS	yes
Fetch Moto	69868	16/03/2020 08:53	CAN	operating	02/01/2020	1-10	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Shuttle Planet	70485	04/01/2020 22:02	USA	operating	20/12/2017	1-10	Broker	Ride Sharing				no
Ciao Ciao Carsharing	71697	29/05/2019 16:32	SWE	operating	28/03/2018	1-10	broker	Car Sharing	P2P	Daily Rate		yes
HiGear	73238	24/06/2019 21:58	USA	acquired	01/01/2011	1-10	broker	Car Sharing				no
AutoVisual	73383	29/04/2019 05:03	FRA	operating	01/08/2015	11-50	Broker	Vehicle Marketplace	B2C	Full Payment		yes
The Good Seat	73750	24/06/2019 21:28	FRA	operating	04/10/2018	1-10	broker	Ride Hailing	B2C	Pay per Use		yes
JustShareIt	74673	24/06/2019 21:32	USA	acquired	01/01/2011	11-50	Broker	Car Sharing	P2P	Daily Rate		yes
Zipflip	75517	24/06/2019 22:19	USA	operating	20/03/2014	1-10	Broker	Vehicle Marketplace				no
Mondo Taxi	75962	24/06/2019 22:03	USA	operating	15/11/2013	11-50	Landlord	Ride Hailing				no
Whitecar	76864	24/06/2019 22:11	GBR	operating	01/01/2016	11-50	Landlord	Rental				no
RubyRide	76927	31/01/2020 12:27	USA	operating	01/01/2013	11-50	Landlord	Ride Hailing	B2C	Subscription		yes
Autolist	77284	20/01/2020 16:39	USA	acquired	01/01/2011	11-50	broker	Vehicle Marketplace	B2C	Full Payment		yes
Tripndrive	77403	24/06/2019 21:29	FRA	acquired	07/07/2013	1-10	Broker	Rental Marketplace	b2c	Rental		yes

name	rank	updated_at	country_code	status	founded_on	employee_co	Rights being s	Business Model	B2C or P2P	Pricing	If Mixed Pricing	Website active
Bounce	77937	13/12/2019 19:30	USA	operating	01/01/2016	11-50	Broker	Ride Sharing	P2P	Pay per Use		yes
PIGGYCARS	78421	13/02/2020 03:48	USA	operating	01/02/2019	1-10	Landlord	Rental	B2C	Subscription		yes
Ridemind	78443	24/06/2019 22:04	GRC	operating	01/03/2017	1-10	Broker	Car Sharing	P2P	Daily Rate		yes
Cambiomarcia	78932	24/06/2019 21:40	ITA	operating	01/01/2012	11-50	Broker	Vehicle Marketplace				no
Neighbor Technology	79271	22/02/2018 00:19	USA	operating	01/01/2016	unknown	broker	Ride Pooling				no
FÃ¶rmedlarBil	79775	24/06/2019 22:14	SWE	operating	01/01/2014	1-10	broker	Vehicle Marketplace	p2p	Full Payment		yes
HiRide	80806	23/05/2018 18:15	CAN	acquired	01/08/2016	1-10	Broker	Ride Pooling	P2P	Split Fare		yes
Micocar	81312	24/06/2019 22:20	ESP	operating	01/01/2016	1-10	broker	Ride Hailing				no
Rentecarlo	83044	24/06/2019 21:56	GBR	operating	01/01/2013	1-10	broker	Car Sharing				no
uQuote	83571	24/06/2019 22:15	USA	operating	01/05/2015	1-10	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
MamboCar	85401	12/02/2018 23:49	ESP	operating	01/01/2012	1-10	Broker	Car Sharing				no
onewomanowner	86224	16/01/2020 08:45	GBR	operating	01/01/2014	unknown	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
MaxTradeIn.com	86239	24/06/2019 21:49	USA	operating	04/09/2011	11-50	Broker	Vehicle Marketplace				no
A4C	87018	25/03/2019 19:57	USA	operating	24/01/2014	11-50	Landlord	Ride Hailing				no
Journify	87354	24/06/2019 22:11	ESP	operating	01/01/2017	unknown	broker	Ride Sharing	P2P	Predefined		yes
MOIA GmbH	88170	24/06/2019 21:43	DEU	operating	05/12/2016	unknown	Landlord	Ride Sharing	B2C	Pay per Use		yes
Match Rider	89468	24/06/2019 21:45	DEU	operating	01/02/2012	1-10	Broker	Ride Pooling	P2P	Split Fare		yes
iGoOn s.r.l.	92606	24/06/2019 22:00	ITA	operating	11/07/2014	1-10	Broker	Ride Sharing				no
Gotrida BV	92726	24/06/2019 22:05	NLD	operating	31/08/2015	1-10	Broker	Ride Hailing	B2C	Pay per Use		yes
ZIRO	94117	11/03/2020 05:02	USA	operating	22/01/2019	11-50	Broker	Ride Sharing				no
ITYZ	94281	24/06/2019 22:18	FRA	operating	01/06/2012	11-50	Broker	Ride Hailing				no
Peddle	96587	24/06/2019 21:33	USA	operating	11/01/2011	11-50	Broker	Vehicle Marketplace				no
ReachNow	97944	14/01/2020 07:01	USA	operating	08/04/2016	11-50	broker	Car Sharing				no
DriveNow GmbH & Co. KG	99728	24/06/2019 22:09	DEU	acquired	01/06/2011	101-250	landlord	Car Sharing				no
Car Rentals Market	101689	24/06/2019 22:03	USA	operating	03/03/2013	11-50	Broker	Rental Marketplace				no
Karosso	102840	24/06/2019 22:11	DEU	operating	21/01/2015	11-50	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Upshift	102998	24/06/2019 21:58	USA	operating	03/10/2012	1-10	Landlord	Rental	B2C	Subscription		yes
Flexdrive	103016	24/06/2019 22:05	USA	operating	01/01/2014	101-250	Landlord	Rental				no
Zazz Mobility	105586	12/02/2018 23:46	CAN	operating	04/05/2016	1-10	Broker	Ride Sharing				no
InstaRyde Inc	106484	24/06/2019 21:26	CAN	operating	12/02/2014	11-50	broker	Ride Sharing				no
Facedrive	106899	23/03/2020 06:52	CAN	operating	01/01/2016	11-50	broker	Ride Hailing				no
Priva	106921	07/08/2018 14:08	USA	operating	01/07/2018	1-10	landlord	Ride Hailing				no
CarNext.com	107205	13/06/2019 09:25	NLD	operating	01/01/2017	251-500	Distributor	Dealership	B2C	Mixed	Leasing / Subscribtion	yes
Gocar	108024	24/06/2019 22:15	IRL	operating	28/02/2015	1-10	Landlord	Rental	B2C	Subscription		yes
CarSaver	112254	24/06/2019 21:21	USA	operating	01/01/2016	101-250	Broker	Vehicle Marketplace				no
Maven	113695	24/06/2019 21:58	USA	operating	01/01/2016	11-50	landlord	Car Sharing				no
Vamos	114598	26/11/2019 10:16	ESP	operating	21/05/2019	unknown	Landlord	Rental	B2C	Rental		yes
Lula	117474	24/06/2019 22:18	USA	operating	01/01/2016	1-10	Broker	Car Sharing				no
Drivili	118206	24/06/2019 21:45	ESP	operating	01/06/2017	1-10	Broker	Ride Sharing				no
SAFR	121251	25/03/2019 19:41	USA	operating	01/06/2016	unknown	Broker	Ride Sharing				no
Lift Hero	124744	25/03/2019 19:59	USA	operating	01/01/2013	11-50	Broker	Ride Sharing				no
SHARE NOW	125284	07/01/2020 09:57	DEU	operating	01/01/2019	251-500	landlord	Car Sharing	B2C	Pay per Use		yes
GETAWAY	125979	30/07/2019 05:15	DEU	operating	01/08/2015	1-10	Broker	Car Sharing	P2P	Pay per Use		yes
Buzzcar	126041	24/06/2019 21:24	FRA	acquired	01/11/2010	11-50	Broker	Car Sharing	P2P			yes
FairFare	126594	24/06/2019 22:10	USA	operating	01/08/2016	1-10	broker	Ride Hailing				no
urbi	129327	24/06/2019 22:03	CHE	acquired	01/02/2014	1-10	Broker	Mixed	B2C	Mixed	MaaS	yes
Fleek	140196	07/06/2019 18:40	USA	operating	01/02/2018	11-50	broker	Ride Hailing	B2C	Pay per Use		yes
REVOLVE Technology Company	142801	24/06/2019 21:41	USA	operating	15/01/2016	1-10	landlord	Rental	B2C	Subscription		yes
Hoop Carpool	146767	16/10/2019 10:49	ESP	operating	01/01/2017	1-10	Broker	Ride Pooling	P2P	Split Fare		yes
indiGO Auto Group	147552	25/03/2019 18:52	USA	operating	01/01/2010	101-250	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
RideSVP	151168	03/08/2019 07:56	USA	operating	27/08/2018	1-10	broker	Ride Pooling	P2P	Split Fare		yes
Lynk & Co	152914	24/06/2019 21:57	SWE	operating	01/01/2016	1001-5000	landlord	Mixed	B2C	Mixed	Full Payment / Rental / Subscription	yes
GOWAGO	153302	10/03/2020 11:57	CHE	operating	01/01/2017	11-50	Broker	Leasing Marketplace	B2C	Leasing		yes
Cabeo	153867	24/06/2019 22:11	ITA	operating	01/09/2012	1-10	broker	Ride Hailing				no
Green Mobility	154887	24/06/2019 21:43	DNK	operating	01/01/2015	1-10	Landlord	Car Sharing	B2C	Pay per Use		yes
eCarsTrade	155527	20/08/2019 17:08	BEL	operating	01/01/2016	11-50	Broker	Vehicle Marketplace	B2C	Full Payment		yes
tamyca	155818	15/10/2019 08:44	DEU	acquired	28/08/2010	11-50	Broker	Car Sharing	P2P	Pay per Use		yes

name	rank	updated_at	country_code	status	founded_on	employee_co	Rights being s	Business Model	B2C or P2P	Pricing	If Mixed Pricing	Website active
Toogethr	160069	24/06/2019 21:33	NLD	acquired	01/01/2011	1-10	broker	Ride Pooling	P2P	Split Fare		yes
Berymo	161154	12/02/2020 19:30	USA	operating	05/06/2018	11-50	Broker	Ride Sharing	P2P	Other	6 usd flat fee anywhere in a city	yes
CARIFY	162616	17/01/2020 09:41	CHE	operating	01/01/2019	11-50	Landlord	Rental	B2C	Subscription		yes
Viggo	163077	02/06/2019 10:45	DNK	operating	19/02/2019	1-10	landlord	Ride Hailing	B2C	Pay per Use		yes
goFLUX	164466	07/02/2019 16:00	DEU	operating	01/08/2017	1-10	Broker	Ride Pooling	P2P	Split Fare		yes
Carla	165094	12/11/2019 15:06	USA	operating	18/01/2017	11-50	Broker	Rental Marketplace	B2C	Rental		yes
Kiwitaxi	167224	24/06/2019 22:21	ITA	operating	01/01/2012	51-100	Landlord	Ride Hailing	B2C	Pay per Use		yes
Djump	167349	12/02/2018 23:43	FRA	acquired	01/01/2013	1-10	broker	Ride Sharing				no
Hikre	172464	01/01/2020 05:39	USA	operating	15/10/2019	1-10	broker	Ride Sharing				no
Splitcar	176202	27/05/2019 08:47	NLD	operating	01/01/2016	unknown	broker	Car Sharing				no
Weav	179083	24/06/2019 22:17	CAN	operating	08/08/2017	1-10	broker	Ride Sharing	P2P	Pay per Use		yes
Carjojo	180247	24/06/2019 22:00	USA	acquired	10/05/2014	11-50	broker	Vehicle Marketplace	B2C			yes
RideConnect LLC	181359	24/06/2019 21:37	USA	operating	10/02/2015	1-10	broker	Ride Sharing	P2P	Predefined		yes
Carcela	182431	24/06/2019 22:21	GBR	operating	01/01/2016	11-50	Broker	Vehicle Marketplace				no
Whipgo	183363	29/05/2019 09:03	GBR	operating	01/11/2016	1-10	landlord	Rental				no
VikingCars	183578	24/06/2019 21:37	ISL	operating	01/03/2014	1-10	Broker	Car Sharing				no
easyautosale GmbH	184447	23/03/2019 01:25	DEU	acquired	01/01/2011	unknown	Broker	Vehicle Marketplace				no
Figure8	187548	09/01/2020 13:28	USA	operating	01/01/2016	11-50	broker	Ride Pooling				no
Tryp	187642	24/06/2019 21:57	USA	operating	01/09/2014	1-10	broker	Ride Sharing				no
Bluemove Carsharing	188385	24/06/2019 22:14	ESP	acquired	01/01/2010	11-50	Landlord	Car Sharing	B2C	Mixed	Pay per Use / Subscription	yes
Zity	188549	03/02/2020 17:15	ESP	operating	01/12/2017	unknown	landlord	Car Sharing				no
Tripper	189643	22/10/2019 13:37	USA	operating	01/01/2019	unknown	broker	Ride Hailing				no
auting	193153	13/02/2018 00:02	ITA	operating	07/03/2016	11-50	Broker	Car Sharing	P2P	Daily Rate		yes
Hurry Italia	195303	31/07/2019 08:09	ITA	operating	01/01/2014	51-100	Broker	Mixed	B2C	Mixed	Full payment / Rental	yes
Ecoservice Group	200564	24/06/2019 22:18	CAN	operating	01/01/2010	251-500	broker	Car Sharing				no
777 Exotic Car Rental	204443	24/06/2019 21:36	USA	operating	08/11/2015	unknown	Landlord	Rental	B2C	Rental		yes
Travelauto	204739	24/06/2019 21:45	USA	operating	01/09/2012	1-10	landlord	Rental				no
Flit2go	205194	14/10/2019 06:38	ESP	operating	01/01/2018	1-10	Landlord	Car Sharing	B2C	Pay per Use		yes
Currux	205675	26/06/2019 06:17	USA	operating	01/01/2018	1-10	Landlord	Rental	B2C	Subscription		yes
Eloop	209995	28/11/2019 17:00	AUT	operating	09/08/2017	1-10	Landlord	Car Sharing	B2C	Pay per Use		yes
Auto Grab	210466	24/06/2019 22:17	USA	operating	01/03/2012	1-10	Distributor	Dealership				no
Deliver My Ride	214086	16/10/2019 18:08	USA	operating	01/01/2014	unknown	Broker	Vehicle Marketplace	B2C	Mixed	Full payment / Leasing	yes
BeepCar	215841	24/06/2019 21:42	BEL	acquired	01/01/2017	unknown	Broker	Ride Sharing				no
FlexiDrive	217274	15/10/2019 08:46	SWE	acquired	01/07/2011	1-10	broker	Car Sharing	P2P			yes
CarSmartt, Inc.	219217	23/08/2019 06:02	USA	operating	01/01/2016	unknown	Broker	Ride Hailing	P2P	pay per use		yes
Hovee	219939	24/06/2019 22:19	USA	operating	01/01/2013	11-50	Broker	Ride Sharing				no
Daily Ride	228347	24/06/2019 21:46	DEU	operating	01/12/2015	11-50	broker	Ride Sharing				no
Ants	238093	24/06/2019 22:20	DNK	operating	18/02/2012	1-10	Broker	Ride Sharing				no
Autolina	239422	24/06/2019 21:27	CHE	operating	01/01/2015	11-50	Broker	Vehicle Marketplace	B2C	Full Payment		yes
Koons of Silver Spring, Inc. Ford, Lincoln and Mazda	240128	30/07/2019 21:11	USA	operating	10/04/2011	101-250	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Popmove	242013	31/07/2019 08:03	ITA	operating	01/01/2018	11-50	Broker	Car Sharing	P2P	Pay per Use		yes
tripBuddy	247147	25/03/2019 20:27	USA	operating	12/09/2014	1-10	Broker	Ride Pooling	P2P	Split Fare		yes
B4dealer.com	252968	16/04/2019 23:06	USA	operating	01/12/2016	11-50	Distributor	Dealership				no
RentingCarz Holdings	255416	24/06/2019 22:05	USA	operating	01/01/2012	11-50	broker	Rental Marketplace				no
MotoFuze	260351	04/10/2019 05:19	USA	acquired	01/01/2013	51-100	broker	Vehicle Marketplace				no
AnyWay.city	260606	10/07/2019 13:35	NLD	operating	01/01/2018	1-10	Landlord	Rental	B2C	Subscription		yes
ROED	261026	25/02/2020 19:35	GBR	operating	15/03/2016	1-10	broker	Mixed	P2P	Pay per Use		yes
Rapid Inc	261948	24/06/2019 21:40	USA	operating	01/01/2010	unknown	Broker	Ride Sharing	P2P	Predefined		yes
Zego Ride Sharing	262284	25/03/2019 19:20	ITA	operating	20/09/2013	unknown	broker	Ride Sharing				no
EveryAuto	264486	24/06/2019 22:22	USA	operating	01/01/2014	1-10	Broker	Vehicle Marketplace	B2C	Full Payment		yes
Glendevon Motors	264626	24/06/2019 21:43	USA	operating	01/01/2016	unknown	Landlord	Rental				no
cab:app	267250	24/06/2019 21:58	GBR	operating	01/01/2010	1-10	Landlord	Ride Hailing	B2C	Pay per Use		yes
Veezu	268540	24/06/2019 21:23	GBR	operating	01/01/2013	unknown	Broker	Ride Hailing	B2C	Pay per Use		yes
Rdvouz	269520	12/02/2018 23:09	USA	operating	01/12/2014	1-10	Broker	Ride Sharing	P2P	Mixed	Split Fare / Predefined	yes
eCab	284004	25/03/2019 19:56	FRA	operating	01/10/2013	11-50	Broker	Ride Hailing	B2C	Pay per Use		yes
GoCity	285242	12/02/2018 23:42	USA	operating	15/02/2017	1-10	Broker	Ride Sharing	P2P	Pay per Use		yes
MinbilDinbil	294722	24/06/2019 21:42	DNK	acquired	01/05/2013	1-10	Broker	Car Sharing	P2P			yes

name	rank	updated_at	country_code	status	founded_on	employee_co	Rights being s	Business Model	B2C or P2P	Pricing	If Mixed Pricing	Website active
A to B Transportation	305191	08/02/2020 01:14	USA	operating	10/10/2014	1-10	Landlord	Ride Hailing	B2C	Pay per Use		yes
MotorEnvy	310382	25/03/2019 19:29	USA	operating	01/01/2015	1-10	landlord	Rental	B2C	Subscription		yes
monTransport.com	314982	03/10/2019 09:56	FRA	operating	01/06/2013	1-10	broker	Ride Hailing	B2C	Pay per Use		yes
Less Technologies Inc.	315303	24/06/2019 21:54	USA	operating	08/02/2017	unknown	Landlord	Leasing				no
Sameride	316908	24/06/2019 22:05	USA	operating	01/10/2014	11-50	Broker	Ride Pooling	P2P	Split Fare		yes
TrustedCars	321194	24/06/2019 22:16	DEU	operating	30/10/2015	unknown	Landlord	Mixed	B2C	Subscription		yes
BePooler	323273	09/12/2019 08:08	ITA	operating	01/01/2015	11-50	Broker	Ride Pooling				no
Zityfy	323661	24/06/2019 21:23	ESP	operating	01/01/2018	11-50	Broker	Ride Sharing	P2P	Pay per Use		yes
Rent2Buy	325240	25/03/2019 20:30	USA	operating	05/05/2010	1-10	Broker	Rental Marketplace	B2C	Mixed	Full payment / Rental	yes
CarLingo, LLC	331875	25/03/2019 18:57	USA	operating	18/11/2014	1-10	broker	Vehicle Marketplace				no
Tranzitt	334251	06/06/2019 04:27	GBR	operating	01/05/2019	1-10	Broker	Ride Hailing	B2C	Pay per Use		yes
Ozon Rides	336279	05/07/2019 14:43	SWE	operating	26/06/2018	11-50	broker	Ride Sharing				no
MirrorTrip Inc.	344807	12/02/2018 23:42	USA	operating	21/03/2017	unknown	Broker	Rental Marketplace	B2C	Rental		yes
LynkCity	345894	03/10/2019 06:39	GBR	operating	01/01/2019	unknown	Broker	Ride Hailing	B2C	Pay per Use		yes
Taxi Deutschland	362196	24/06/2019 21:21	DEU	operating	01/01/2010	unknown	Broker	Ride Hailing	B2C	Pay per Use		yes
Blongg	365441	24/06/2019 21:28	USA	operating	01/01/2016	1-10	Broker	Car Sharing				no
zooKKs	368189	30/03/2019 01:27	USA	operating	01/01/2014	1-10	Broker	Ride Pooling				no
Northbound	369600	12/02/2018 22:33	ISL	operating	23/11/2015	unknown	Broker	Rental Marketplace	B2C	Rental		yes
Pogoride	375170	24/06/2019 21:33	CAN	operating	01/05/2013	1-10	broker	Ride Sharing				no
London Transfer Network	380093	25/02/2020 04:26	GBR	operating	12/12/2018	1-10	Landlord	Ride Hailing	B2C	Pay per Use		yes
Deways	383755	24/06/2019 21:22	USA	operating	01/01/2010	1-10	broker	Car Sharing				no
Ridebidz	384314	14/03/2019 05:31	USA	operating	01/01/2015	unknown	broker	Ride Hailing				no
Honda of Downtown Los Angeles	387060	25/03/2019 20:38	USA	operating	01/01/2012	11-50	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Same-Way AS	389110	24/06/2019 22:06	NOR	operating	01/01/2014	1-10	Broker	Ride Sharing	P2P	Predefined		yes
Motorcar.com	391866	24/06/2019 21:55	USA	operating	01/07/2013	11-50	broker	Vehicle Marketplace	B2C	Full Payment		yes
OTO NET	394222	24/06/2019 21:47	TUR	operating	01/01/2013	11-50	broker	Vehicle Marketplace	B2C	Full Payment		yes
Go4Spin	398709	24/06/2019 21:39	USA	operating	05/04/2018	1-10	Broker	Car Sharing	P2P	Daily Rate		yes
We Carpool	401882	25/03/2019 19:49	USA	operating	22/01/2014	1-10	broker	Ride Pooling				no
cabhit	404584	24/06/2019 22:00	GBR	operating	01/01/2016	1-10	broker	Ride Hailing	B2C	Pay per Use		yes
LeaseYourNextCar.com	405537	24/06/2019 21:41	GBR	operating	01/11/2010	1-10	landlord	Leasing	B2C	Leasing		yes
Alectrica Motors	407219	12/02/2018 23:51	USA	operating	01/06/2013	unknown	creator	Dealership				no
DriveJoy	411293	18/04/2019 06:41	GBR	operating	01/01/2015	11-50	landlord	Rental				no
PickmeCab	415783	24/06/2019 21:28	FRA	operating	01/01/2010	1-10	landlord	Ride Hailing	B2C	Pay per Use		yes
Autonetzer	431176	17/05/2019 11:33	DEU	acquired	01/01/2010	unknown	Broker	Car Sharing	P2P			yes
PiÃ«ch Automotive AG	435578	12/02/2018 23:35	CHE	operating	01/08/2017	unknown	Creator	Manufacturer	B2C	Full Payment		yes
Carsonar	439253	24/06/2019 22:16	FRA	operating	01/03/2013	1-10	Broker	Car Sharing	P2P	Pay per Use		yes
Carzato	442622	07/01/2020 22:29	USA	operating	09/05/2018	11-50	Broker	Vehicle Marketplace				no
Zippsi	444634	24/06/2019 21:48	TUR	operating	01/01/2016	1-10	Broker	Leasing Marketplace	B2C	Leasing		yes
Vroomo	445806	24/06/2019 21:57	GBR	operating	15/04/2015	1-10	broker	Vehicle Marketplace				no
Renting Finders	446695	22/12/2019 12:11	ESP	operating	01/01/2018	11-50	broker	Leasing Marketplace	B2C	Leasing		yes
Hawk Chevrolet	450744	24/06/2019 21:40	USA	operating	01/01/2010	unknown	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Spaceship - Carpool Simplified	453908	01/04/2019 23:49	USA	operating	01/01/2014	1-10	broker	Ride Pooling				no
Transflex Vehicle Rental Ltd	456610	24/06/2019 22:18	GBR	acquired	01/01/2011	unknown	Distributor	Rental				no
ZENO MOTORS	463594	25/03/2019 19:55	USA	operating	01/01/2015	1-10	Creator	Manufacturer				no
AutoDa	466390	24/06/2019 21:31	DEU	acquired	01/01/2010	51-100	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Zome Inc.	469599	24/06/2019 22:04	USA	operating	01/10/2017	1-10	broker	Ride Pooling				no
Bookingdrive.com	472249	24/06/2019 21:43	PRT	operating	01/11/2016	1-10	Broker	Car Sharing				no
Nomadcar	473525	24/06/2019 21:40	CHE	operating	05/05/2015	11-50	Landlord	Rental	B2C	Rental		yes
CityzenCar	475074	24/06/2019 21:58	FRA	acquired	15/02/2011	1-10	Broker	Car Sharing	P2P			yes
auto.nl B.V	475590	24/06/2019 21:48	NLD	operating	01/01/2011	1-10	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
go2gether	477568	24/06/2019 21:33	CAN	operating	22/02/2012	1-10	Broker	Ride Sharing	P2P	Split Fare		yes
ShareLift	484248	15/03/2019 05:18	USA	operating	01/01/2015	unknown	broker	Ride Pooling				no
G-Ride	486570	17/04/2018 11:13	USA	operating	01/01/2015	1-10	broker	Ride Hailing				no
Wyper	490155	24/06/2019 21:43	USA	operating	01/01/2012	11-50	Distributor	Dealership				no
Rydite, Inc	491772	25/03/2019 20:00	USA	operating	13/10/2014	1-10	broker	Ride Pooling				no
Zilker Motors	495184	25/03/2019 20:38	USA	operating	01/01/2011	1-10	Creator	Manufacturer				no
FlexiCab	495300	24/06/2019 22:06	GBR	operating	19/05/2016	1-10	Broker	Ride Hailing				no

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CabGrab	496239	11/11/2019 19:39	GBR	operating	28/10/2011	11-50	broker	Ride Hailing				no
Auto Natie	502199	24/06/2019 21:36	BEL	operating	22/10/2014	51-100	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
PoolXing	518981	25/03/2019 20:34	USA	operating	15/10/2013	1-10	Broker	Ride Pooling	P2P	split fare		yes
Prospxt	529310	24/06/2019 21:38	USA	operating	01/03/2015	1-10	Distributor	Dealership				no
Fleetbit	537283	25/03/2019 19:49	CAN	operating	01/01/2011	1-10	broker	Ride Hailing				no
Quest Livery Leasing	538356	25/03/2019 19:29	USA	operating	01/01/2013	11-50	Landlord	Rental				no
Cyclone VIP Cars & Couriers	541613	26/07/2018 16:14	GBR	acquired	01/01/2012	101-250	Landlord	Rental				no
California Rent a Car	544617	30/03/2019 01:24	USA	operating	01/01/2014	1-10	landlord	Rental	B2C	Rental		yes
fob	545128	24/06/2019 22:13	USA	operating	01/01/2015	1-10	Distributor	Dealership				no
Ride Velo	557175	14/03/2019 05:17	USA	operating	01/01/2017	unknown	broker	Ride Sharing				no
ED MARTIN NISSAN	559353	24/06/2019 22:00	USA	operating	03/02/2010	1-10	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Source One Auto Group, LLC	559787	24/06/2019 22:03	USA	operating	10/03/2010	1-10	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
LeaseQuoters.com	563575	24/06/2019 22:16	USA	operating	12/02/2018	1-10	landlord	Leasing				no
iPriceCars.com	577698	12/02/2018 23:52	USA	operating	01/01/2013	1-10	broker	Vehicle Marketplace	B2C			yes
Quicksellcar.co.uk	578148	24/06/2019 21:45	GBR	operating	01/10/2012	1-10	Broker	Vehicle Marketplace				no
Platinum Auto Care	587486	01/01/2020 00:35	USA	operating	01/01/2010	11-50	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Katy Nissan	588971	05/08/2019 05:02	USA	operating	01/01/2018	unknown	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Overijse Automotive	592218	13/02/2018 00:01	BEL	operating	10/11/2015	unknown	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Cruze Car Rental	594842	12/02/2018 23:49	CAN	operating	12/02/2014	unknown	Distributor	Rental				no
Pandora Car Rental	608260	12/02/2018 22:15	GBR	operating	05/04/2011	unknown	landlord	Rental				no
Metro Ford of OKC	615587	01/01/2020 01:10	USA	operating	01/01/2014	11-50	Distributor	Mixed	B2C	Mixed	Full payment / Leasing	yes
Greenclick Technologies	616030	28/03/2020 00:29	USA	operating	18/08/2018	1-10	Broker	Car Sharing				no
Acura Of Rochester	621059	21/01/2020 20:26	USA	operating	01/01/2011	251-500	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
taxiID	623201	28/02/2020 02:19	NLD	operating	18/06/2010	1-10	Broker	Ride Hailing	B2C	Pay per Use		yes
Serra Chevrolet	623416	21/01/2020 20:46	USA	operating	01/01/2012	51-100	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Atlantic Choice	627308	13/02/2018 00:00	GBR	operating	01/01/2014	1-10	Broker	Rental Marketplace	B2C	Rental		yes
HikeMob	627942	18/03/2020 05:03	USA	operating	21/06/2017	1-10	Broker	Ride Sharing				no
Caroom	631370	30/01/2020 01:37	FRA	operating	15/06/2011	1-10	Broker	Vehicle Marketplace	B2C	Full Payment		yes
Opel Group	631952	07/09/2018 21:50	DEU	acquired	01/01/2014	unknown	creator	Dealership	B2C	Mixed	Full payment / Leasing	yes
Mount Airy Toyota	631976	01/01/2020 01:12	USA	operating	01/01/2013	unknown	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Whipnik	634659	24/06/2019 21:53	USA	operating	01/03/2014	1-10	Distributor	Dealership				no
Wichita Luxury Collection	652318	15/10/2019 07:22	USA	acquired	01/01/2013	1-10	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Tucson Used Auto Sales	662993	30/01/2020 07:58	USA	operating	01/01/2015	unknown	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Frontbilar	673049	27/02/2020 01:52	SWE	operating	01/01/2010	11-50	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Smart Auto Leasing	674887	21/01/2020 20:58	USA	operating	01/01/2012	51-100	Landlord	Leasing	B2C	Leasing		yes
Schaller Auto World	675300	01/01/2020 02:02	USA	operating	01/01/2012	101-250	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
CarMonks - New Car Deals by Nearest Cars Dealership UK	684536	24/06/2019 21:43	GBR	operating	01/01/2014	11-50	Broker	Vehicle Marketplace				no
Columbus Auto Mall	687212	24/06/2019 03:19	USA	operating	01/01/2011	1-10	Distributor	Dealership	B2C	Full Payment		yes
rent-n-roll	707289	24/06/2019 22:09	DEU	operating	01/01/2011	1-10	broker	Car Sharing				no
McGrath Volvo Cars Barrington	717418	24/06/2019 21:51	USA	operating	01/01/2016	unknown	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
LaFontaine Buick GMC of Ann Arbor	727478	01/01/2020 01:07	USA	operating	14/12/2011	11-50	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Get A Drive	730268	24/06/2019 22:04	USA	operating	01/01/2016	1-10	broker	Car Sharing				no
Legacy Automotive	732400	24/06/2019 21:47	USA	operating	06/01/2012	1-10	Distributor	Dealership				no
Car Confirm	743504	25/03/2019 20:06	USA	operating	01/01/2013	1-10	Broker	Vehicle Marketplace				no
Elite Dream Cars	748529	24/06/2019 21:54	USA	operating	01/01/2013	1-10	landlord	Rental				no
Cartweet	757679	24/06/2019 22:06	NLD	operating	01/04/2011	1-10	broker	Vehicle Marketplace				no
Taxi barato Valencia	761441	24/06/2019 21:32	ESP	operating	01/01/2011	11-50	Landlord	Ride Hailing	B2C	Mixed	Flatrate / Pay per Use	yes
OCGRC	765806	27/12/2019 05:50	USA	operating	01/01/2014	unknown	Landlord	Ride Hailing	B2C	Pay per Use		yes
Nick Auto Sales	769206	23/01/2020 06:48	USA	operating	01/01/2016	unknown	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Xtreme Auto Sales	770614	17/01/2020 08:08	USA	operating	01/01/2014	unknown	Distributor	Dealership				no
TWC Auto Sales	773328	30/01/2020 12:49	USA	operating	01/01/2015	unknown	Distributor	Dealership				no
Jim Butler Auto Group	776013	25/03/2019 19:51	USA	operating	01/01/2013	unknown	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Yuma Qwik Cab	776246	10/01/2020 07:24	USA	operating	17/01/2012	unknown	Landlord	Ride Hailing				no
MySchoolRun	784775	28/08/2018 10:39	GBR	operating	01/01/2015	unknown	Broker	Ride Pooling				no
EcoCab	785358	12/02/2018 23:44	USA	acquired	01/01/2010	unknown	landlord	Ride Hailing				no
AutomotiveMarket.ca	796460	29/08/2018 16:23	CAN	operating	24/11/2017	1-10	Distributor	Dealership				no
PocketCab	812584	24/06/2019 21:42	USA	operating	01/01/2011	1-10	broker	Ride Hailing				no

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Seatsplanet	815012	12/02/2018 23:42	CAN	operating	01/01/2015	unknown	Broker	Ride Pooling				no
PiÃ«ch IP AG	822015	12/02/2018 23:27	CHE	operating	01/08/2017	unknown	creator	Manufacturer	B2C	Full Payment		yes
Fordonsbolaget	825221	27/02/2020 02:24	SWE	operating	01/01/2012	11-50	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Straightline Kia	831046	12/03/2020 22:10	CAN	operating	01/01/2017	1-10	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Bidly.Me	850032	04/06/2019 09:13	GBR	operating	01/01/2018	1-10	Broker	Vehicle Marketplace				no
Opencar	866563	03/10/2019 10:37	FRA	acquired	01/01/2014	11-50	Broker	Ride Pooling				no
Franklin Motors Auto Sales	867867	21/01/2020 20:40	USA	operating	01/01/2011	11-50	Distributor	Dealership	B2C	Full Payment		yes
Folkes Bil	876289	27/02/2020 02:26	SWE	operating	05/08/2010	1-10	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Folkes Biluthyrning	899614	27/02/2020 02:24	SWE	operating	01/01/2014	1-10	Landlord	Rental	B2C	Rental		yes
MaxiTaxi	916174	24/06/2019 21:42	TUR	operating	02/06/2016	1-10	landlord	Ride Hailing				no
Who's Driving	926595	27/03/2019 06:04	USA	operating	01/01/2015	unknown	broker	Ride Pooling				no
VTC Nice	928911	13/02/2018 20:46	FRA	operating	10/01/2010	11-50	Landlord	Ride Hailing				no
Apptaxila	964581	25/03/2020 05:51	ESP	operating	01/01/2019	unknown	broker	Ride Hailing	B2C	Pay per Use		yes
Crestanevada	964902	25/03/2020 06:02	ESP	operating	01/01/2012	11-50	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes
Carfy.es	965467	25/03/2020 06:06	ESP	operating	01/01/2017	11-50	Broker	Vehicle Marketplace	B2C	Full Payment		yes
Grand Auto Sales	972003	23/01/2020 05:38	USA	operating	01/01/2017	unknown	Distributor	Dealership	B2C	Mixed	Full payment / Leasing	yes