Journal of Open Innovation: Technology, Market, and Complexity

Article

From the Classic Business Model to Open Innovation and Data Sharing—The Concept of an Open Car-Sharing Business Model

Katarzyna Turoń

Department of Road Transport, Faculty of Transport and Aviation Engineering, Silesian University of Technology, 40-019 Katowice, Poland; katarzyna.turon@polsl.pl

Abstract: The car-sharing market is changing at a dynamic pace. Along with changes and new user habits, car-sharing systems are required to make this market even more accessible and flexible. This solution is possible due to the joining of Mobility-as-a-Service (MaaS) systems and the sharing of data, as well as the implementation of open innovations. However, these are aspects that strongly interfere with the business models of car-sharing systems. Due to this fact, this article is dedicated to the subject of business models in car-sharing systems and the issues of using data sharing and implementing open innovations. This study aimed to analyze the current state of business models and to propose an individual business model of an open car-sharing system based on the concept of open innovation and data sharing. As part of the study, expert surveys were carried out. The results obtained indicate that the dynamics of business models and the development of innovation in car-sharing enterprises are being disrupted. Moreover, most of the current business models are not updated. They also do not consider the subject of open innovation and data sharing, despite operators considering this problem to be significant. The individual model of an open car-sharing system developed in this article was constructed in such a way as to support operators during the transformation of current business models into a modern open model.

Keywords: car-sharing systems; open innovation; data sharing; transportation engineering; mobility management; open car-sharing systems

Citation: Turoń, K. From the Classic Business Model to Open Innovation and Data Sharing—The Concept of an Open Car-Sharing Business Model. *J. Open Innov. Technol. Mark. Complex.* **2022**, *8*, 36. https://doi.org/10.3390/joitmc8010036

Received: 3 January 2022
Accepted: 7 February 2022
Published: 9 February 2022

1. Introduction

Car-sharing services, i.e., short-term vehicle rental, have become widely available on six continents of the world. The great interest in services is mainly related to the flexibility and freedom of movement provided by vehicles [1,2]. Car-sharing services are generally well-received by society and municipal decision makers. New road and architectural investments dedicated to car-sharing (and in the future also to autonomous car-sharing) are being created in cities, which ensure a better readiness for the development of systems [3,4]. Therefore, car-sharing systems are also becoming more and more interesting for business operators. In line with the trend of interest in services, car sharing, as well as the entire new mobility market, is changing dynamically. These changes include, for example, the type of services provided and changes in the fleet, location, or vehicle allocation [5–8]. In addition, many business innovations are being implemented, especially during the current pandemic period [9].

Services business models should also change according to trends and should be constantly monitored. However, observing the current market of new mobility services by taking part in various industry and advisory meetings, I noticed that not all operators may adapt their business models to changing conditions and newly implemented services. Moreover, I assumed that the models may not be up-to-date and may not consider value-added issues or aspects of open innovation. Based on this assumption, I have devoted this article to business models used in car-sharing systems, analyzing the theoretical approach via a literate review, the actual practices of operators, and proposing my own

improvements in car-sharing models in line with the concepts of open data and data sharing. This article aims to show the possibilities of improving business models with the issues of veracity, concerning open innovation and data sharing. Furthermore, this article aimed to identify the greatest changes that must occur for open innovations to be implemented and the greatest threats and advantages for the functioning of open car-sharing systems to be revealed.

The article is divided into six chapters. The next chapter presents a review of the literature on business models in car-sharing systems. Subsequently, the methodology of the research, results, conclusion, and discussion are presented.

2. Literature Review

2.1. Classic Business Models, Open Business Models, and Open Innovation Dynamics

Business models are concepts of the functioning of a given organization that describe methods of conducting business. The long-term method adopted by the company increases the use of resources and presents clients with an offer that exceeds competitive offers, while ensuring the profitability of the organization [10]. A good business model aims to obtain, and at a later stage to maintain, a competitive advantage [11]. The business model is one of the three main determinants of economic efficiency, and, from the point of view of management, it is usually presented in several aspects. These aspects include elements such as the value proposition (what is offered and to whom?) and how this value is created and delivered; money and other forms of value, such as benefits for the public, are offered [11,12]. Today, more and more companies, in addition to their own resources, use external technologies and innovations to develop new products and actively look at business opportunities created by sharing knowledge, competencies, and technological resources [13]. The next step is to open the business model to take full advantage of the benefits of open innovation. As a driving force for effective external and internal flows of knowledge and technology, open innovation cannot capture the value of these flows unless it is harnessed by key internal resources [13–17]. Open business models enable an organization to be more effective in creating and capturing value. Open business models are considered as 'the desirable end state of firm transformation' [18,19]. They help create value by using many more ideas due to their inclusion of a variety of external concepts [20,21]. They also allow a greater value to be captured by using a firm's key asset, resource, or position not only in its own operations but also in the businesses of other companies' businesses [22,23]. In open business models, firms collaborate with external ecosystems by building value and innovating their business model to take advantage of the emerging opportunities [22,23]. However, to succeed in the process of developing open innovation in an enterprise, it is particularly important to properly align the currently used business model, to perform a comprehensive review of all phases of commercialization of your product or service, take into account the non-linearity of the innovation process, define what innovation will mean for the enterprise, and define the limits and moderators of the innovation process in the enterprise [24–31]. In open business models, collaboration with partners in the ecosystem becomes a central source of value creation [32,33]. Companies that pursue an open business model actively seek new ways of working together with suppliers, customers, or complementors to open and expand their business [34,35]. Therefore, various types of cooperation and opportunities are sought that can help companies to provide their services more effectively. The appropriate development of open business models is closely related to the dynamics of open innovation. This dynamic focuses on the actions taken by companies in the process of changing business models to achieve real results [36–38]. It should be realized that currently, in the digital world, information about what needs to be improved in a given service or product is transferred by users to service providers or manufacturers. Therefore, the essence of open innovation and its appropriate dynamics is to create a business model that considers co-creation [39–47]. It is about building a mutual commitment relationship from the level of value creation, through external openness to

its capture, to which organizations operating according to open business models must be oriented [47–52].

2.2. Car-Sharing Business Models and Open Innovation Aspects

Business models in car-sharing systems are a topic that, from the point of view of management, is of interest to many scientists around the world. However, scientists' studies contain many different definitions of business models. The models that highlight various factors are also considered. For example, Münzel et al., in their article, distinguish between cooperative car sharing, business-to-consumer (B2C) roundtrip and one-way models, as well as peer-to-peer (P2P) car sharing, making the business model dependent on the form of car-sharing services offered [49]. The main factors of the analysis in the article are issues related to the absolute size of the fleet, which means cars per capita in the city of operation [49]. For comparison, Franken, in his research, also distinguishes between a hybrid form of car sharing, which, in his opinion, constitutes a separate business model [50]. He considers the hybrid form an online platform, where vehicles belonging to both private owners and organized companies are made available [50]. Moreover, Cohen and Kietzmann further detail the existence of a non-profit business model [51]. For comparison, Shaheen and Cohen distinguish between specific business motivations of individual business models for systems, pointing to neighborhood, holiday, departmental car-sharing, etc. [52]. A summary of the main archetypes of car-sharing business models is presented in Table 1.

Table 1. Car-sharing business model archetypes.

Car-Sharing Business Model Archetype	Detailed Factors	References
Business relation	B2B, B2C, P2P, hybrid, non-profit college/university	[49–51]
Business motivation type	neighborhood residential, government and institutional fleets, personal vehicle sharing, vacation/resort	[51]
Sharing model	One-way, roundtrip, free-floating	[48–52]

As can be seen from the list presented in Table 1, business models, in their general archetypes, do not focus on the issue of value, innovation, or data sharing. Moreover, it is precisely the individual features that are defined as the business model, when in most cases they indicate the form of vehicle rental, i.e., one-way or roundtrip. To be able to check whether these issues are considered in the detailed relations that take place in business models, detailed analyzes of car-sharing models presented in the literature and their taxonomy dimensions were performed. If we dive into the detailed dimension of the taxonomy of individual models, then these models are based on issues related to the fleet, its location and relocation, the number of stations, booking financing models, or the technologies used [48–57].

3. Methods and Analysis

Based on the trend of creating open innovations, sharing data, and noting a conservative approach to business models in the literature, not considering the issue of value, individual research was carried out, in which car-sharing service operators were involved. An individual research plan was developed, which consisted of nine elements. The first stage was to identify a research problem in the form of an analysis of the current state of business models in car-sharing systems and an analysis of the approach to open business models and the issue of open innovation. The next step was to prepare a research questionnaire in the form of a survey. The survey was divided into two parts. The first part of the questionnaire was concerned with general questions characterizing the company and its approach to business models. It included the following nine questions:

Q1. What are the types of services provided by your company (profit, nonprofit, B2B, B2C, P2P, hybrid)?
Q2. What type of car-sharing services does your company have (one-way car sharing, round-trip car sharing, free-floating)?
Q3. What are the types of business motivations for the services provided in your company (e.g., car sharing for private persons, for universities, for holidays, etc.)?
Q4. How long has your company been operating on the market?
Q5. Have you made any changes to your business model since your company was founded?
Q6. Have you implemented services that can be described as innovative in your company? If so, were these innovations closed or open?
Q7. What are the risks/fears and advantages of implementing open innovation and data sharing in car-sharing systems?
Q8. Assess the level of safety of the indicated aspects against open innovation and data sharing in car sharing.
Q9. In your opinion, will open innovation and data sharing be important in car sharing in the near future?

The second part of the study addressed specific questions about the company's business model. The questions were structured in such a way as to correspond to the individual columns of the CANVAS business model. The CANVAS model is currently a very commonly used template format used to construct and document existing business models in strategic management [58–60]. It consists of a visual table with nine elements related to the company's areas of activity. Infrastructure, offering, customers, and finances issues are considered. CANVAS allows for the easy description and presentation of individual parts of the graphic business model [58–60]. It is a flexible and universal model that can be used in any industry. Importantly, from the point of view of open innovation, it is a value-oriented model [58–60]. It also allows one to analyze the existing solutions in the company to find and eliminate disruptions in the value stream [58–60]. Referring to the main elements of CANVAS, the following nine research questions were developed:

Key partners: C1. Who are your key partners?

Key activities: C2. What key activities does your service proposition require?

Value proposition: C3. What value do you deliver to the customer with your offer?

Customer relationship: C4. What connections does your company have with your target customer?

Customer segment: C5. Who are your most important customers?

Key resources: C6. What key resources does your service require?

Distribution channel: C7. What are the best distribution channels for your service?

Cost structure: C8. What are the biggest costs for your company?

Revenue stream: C9. What are your customers paying for now?

The next step in referring to the questions asked was their inversion. Respondents were asked to identify who is not a key business partner, what values and activities are companies are afraid of, which customer relationships they avoid and which business groups are ignored, those that are not key resources and the costs that operators are concerned about. The responses received were used to develop an open car-sharing business model.

The third step was to define and reach the research sample. The proposed research method was an expert method based on the deliberate selection of respondents. The deliberate selection of the respondents was used specifically to reach people who had managerial positions in the company and were experts in their field. The number of respondents was selected according to Mishin's assumptions for expert groups [61], based on Formula (1):

$$Resp._{min} = 0.5\left(\frac{3}{\delta} + 5\right) = 12.5 \rightarrow 13\ experts \quad (1)$$

where: δ —statistical compliance with the level of 15%.

The respondents were representatives of 13 experts from car-sharing companies operating in Europe. The study was carried out based on an online survey questionnaire. The research was carried out in the period from October to December 2021 via an online survey based on the computer-assisted web interview (CAWI) method. The next step of the research plan was to analyze the first and then the second part of the questionnaires. Based on the collected data, the characteristics of the car-sharing business background and generalized car-sharing CANVAS model were developed. The last part was to prepare the car-sharing open innovation business model and present it in the form of the CANVAS model. A detailed research plan is presented in Figure 1.

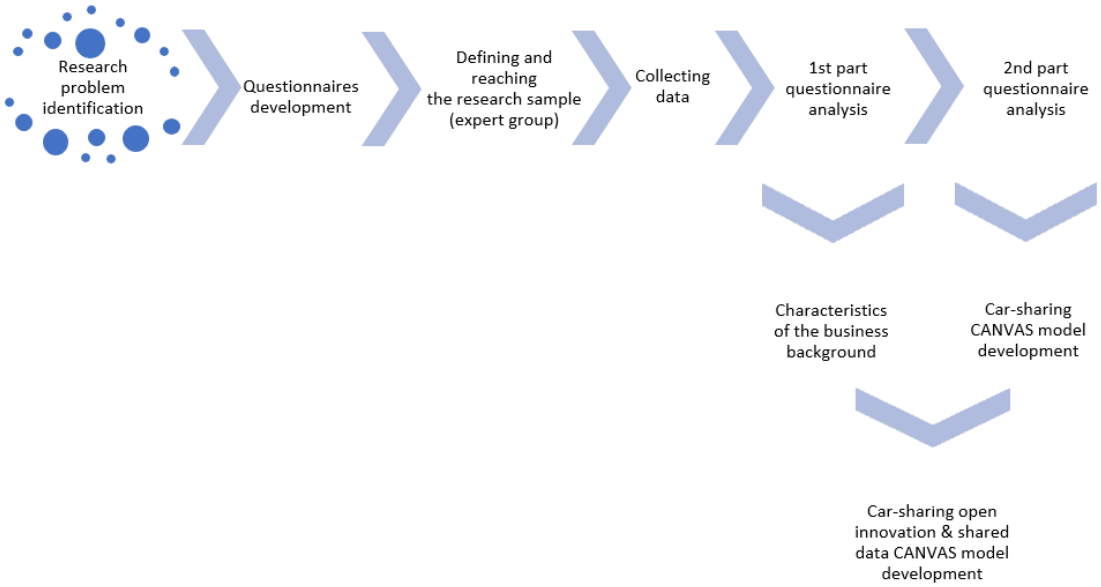

Figure 1. Detailed research plan.

The analyses were conducted quantitatively and qualitatively. The results obtained are presented in the following chapters.

4. Results

Data included in the analysis come from the responses received from car-sharing operators in the research questionnaires (N = 13). The demographic structure of the respondents is presented in Table 2.

The respondents represented car-sharing companies from seven European countries, representing medium and large companies. Detailed data are presented in Table 3 and Figure 2.

Table 2. Sample characteristics.

Demographic Variable	Category	Quantity	Percent of Respondents
Gender	Males	10	77%
	Females	3	23%
Age	30–40	5	39%
	40–50	6	46%
	50–60	2	15%
Education	Secondary education	3	23%
	Higher education	10	77%
Job position	Chief Executive Officer	3	23%
	Chief Operating Officer	8	62%
	Key Account Manager	2	15%

Table 3. Origin of companies.

Country	Quantity of Experts	Percent of Respondents
France	2	15%
Germany	3	23%
Poland	2	15%
Romania	2	15%
Slovakia	1	8%
Spain	2	15%
Turkey	1	8%

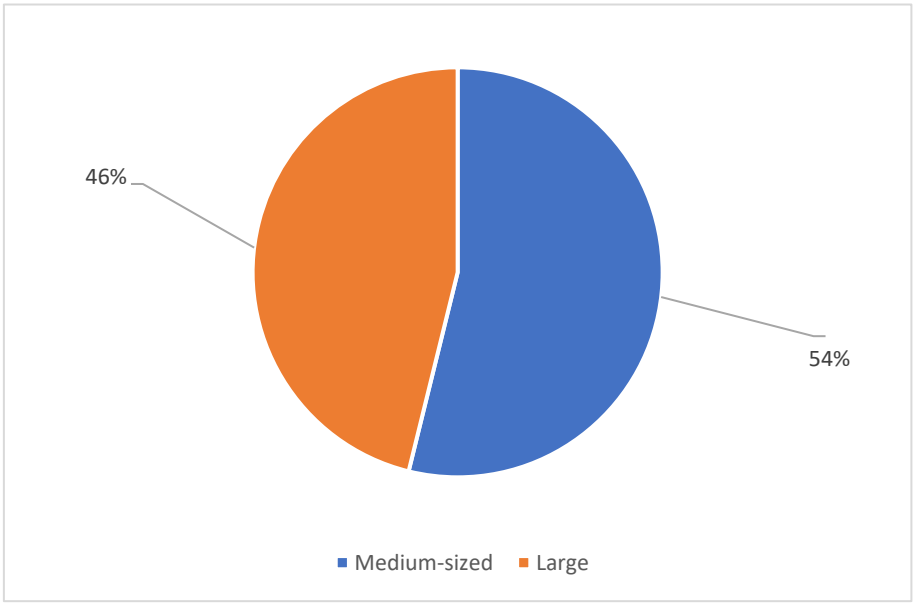

Figure 2. The size of the surveyed car-sharing companies.

The results indicate that seven operators were medium-sized companies, i.e., those with 50 to 249 employees. Additionally, six operators were large companies employing over 250 employees.

From the point of view of the types of services offered in the analyzed car-sharing systems, 100% of the respondents ran their business for profit, of which eight operators provided only B2C, and five operators provided hybrid services both for B2B and B2C. Considering the results of the types of car-sharing services, it can be seen that nine operators

provide services in the free-floating system, and four in the station-based system. Detailed percentages are presented in Figure 3.

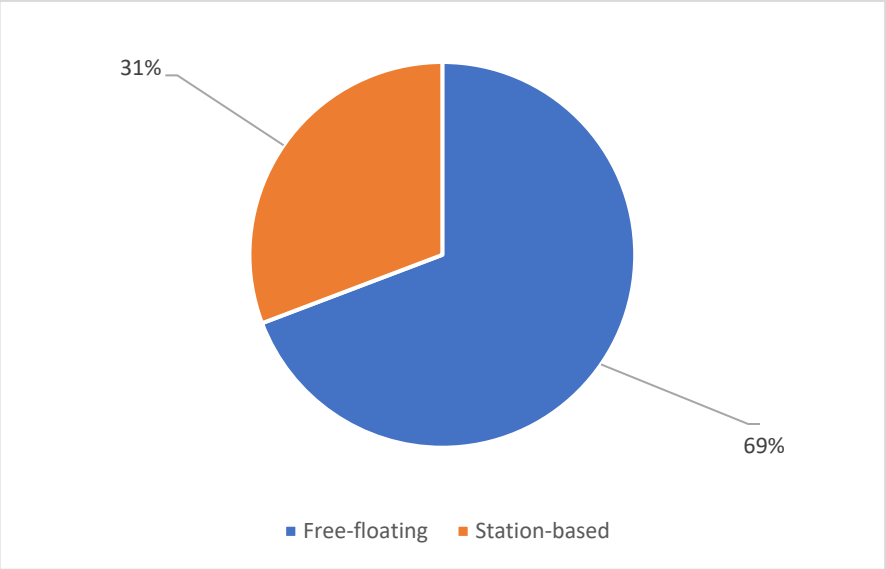

Figure 3. Type of car-sharing services used in operator's systems.

From the point of view of car-sharing systems on the responses market, the received responses are very diverse. Detailed results are presented in Figure 4.

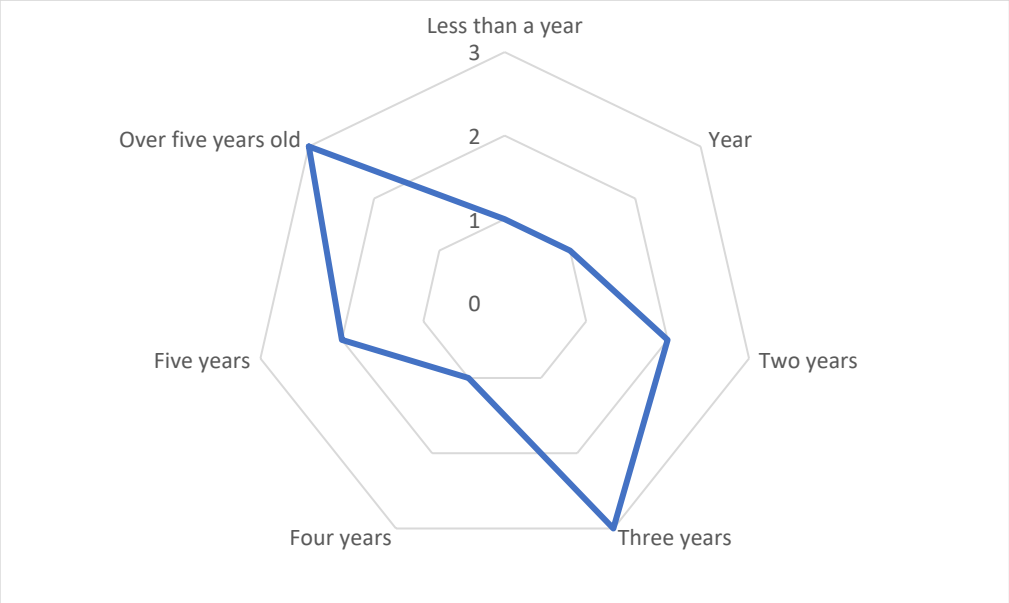

Figure 4. Time of functioning car-sharing systems on the market.

When asked about changes to the business models, the overwhelming majority, in the form of nine representatives of companies, replied that they had not implemented any changes, whereas four replied that they had implemented changes. From a geographic point of view, studies indicate that the most changes in business plans were introduced by operators from Germany (two operators), France (one operator), and Poland (one operator). Detailed results are presented in Figure 5.

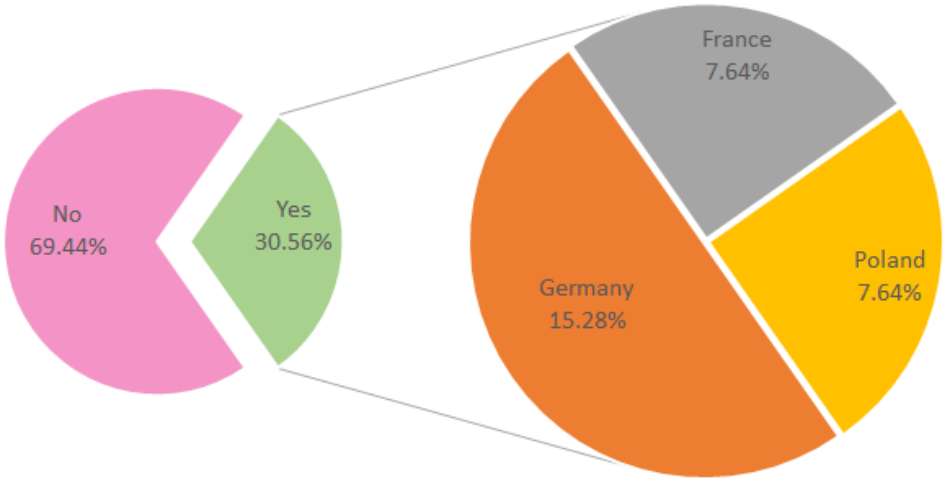

Figure 5. Changes in car-sharing business models from a geographic point of view.

From the point of view of innovation, 100% of respondents replied that they had implemented services that could be described as innovative. Interestingly, 100% of the implemented innovations were also described as closed innovations.

In the case of questions regarding the advantages of implementing open innovations and data sharing in car-sharing systems, the respondents indicated aspects such as increasing the company's reach, greater recognition, greater flexibility of services for car-sharing users, greater involvement of customers in improving services, and increasing the company's profits. Detailed data are presented in Figure 6.

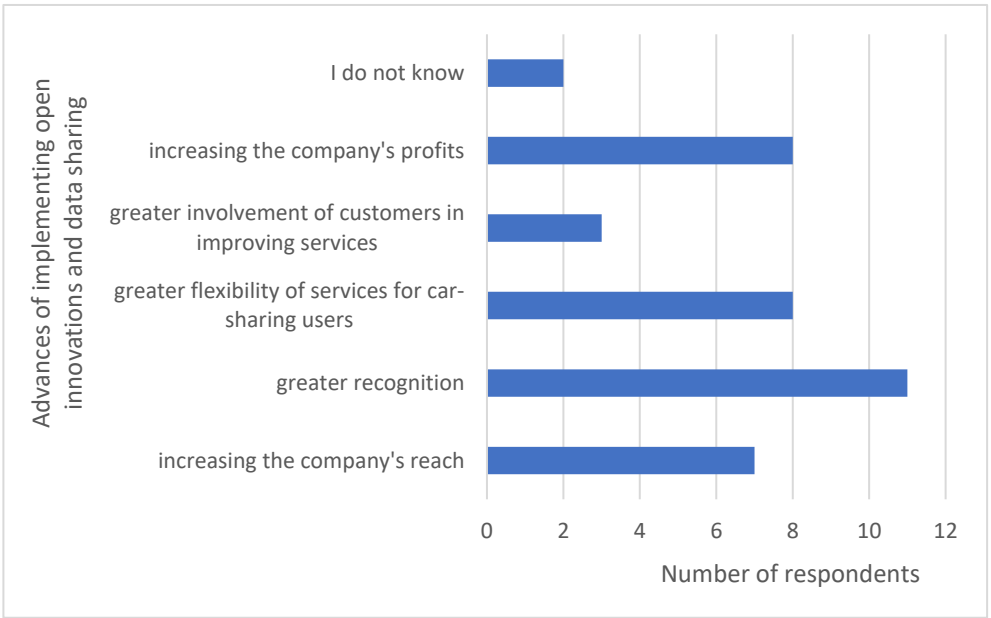

Figure 6. Advantages of implementing open innovation and data sharing in car-sharing systems.

On the other hand, with respect to the disadvantages of open innovation and data sharing, there were responses such as the possibility of disclosing confidential information, copying ideas by competition, the need for additional protection of intellectual goods, and theft of customers. Detailed results are presented in Figure 7.

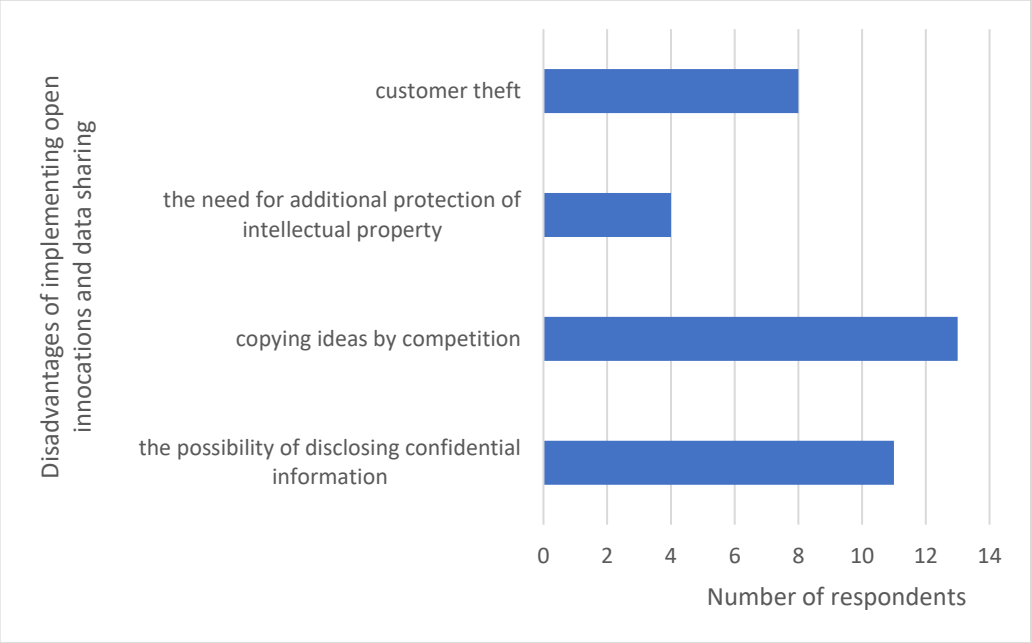

Figure 7. Disadvantages of implementing open innovations and data sharing in car-sharing systems.

Subsequently, the respondents assessed the level of risk for car-sharing companies related to the implementation of open innovation and data-sharing issues. The risk level was assessed using the 7-point Likert method, indicating factors from the least risky to the most risky values as follows: (1) absolutely not risky, (2) not risky, (3) probably not risky, (4) I do not know (5) probably risky, (6) risky and (7) absolutely risky. Detailed data are presented in Figure 8.

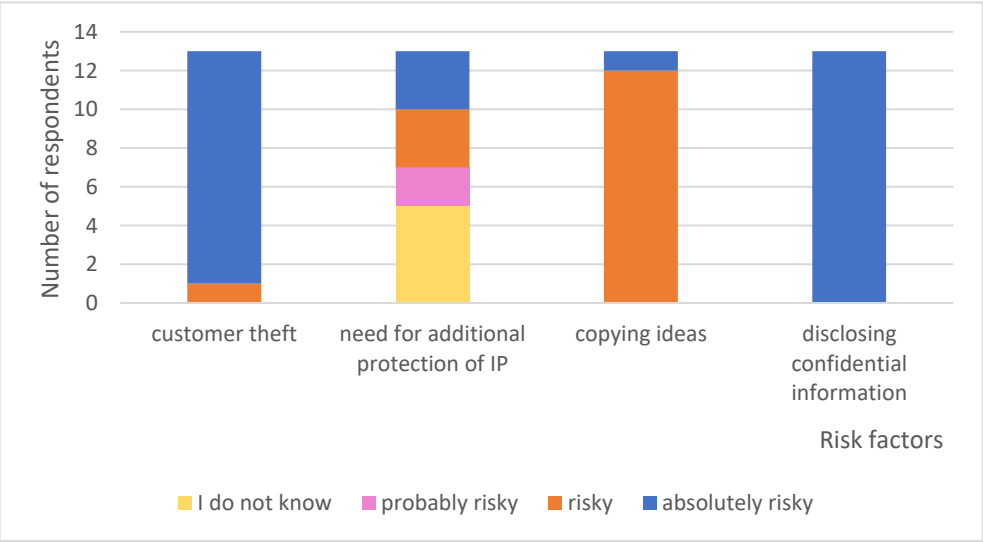

Figure 8. Risk assessment of negative effects of open innovation and data sharing in car-sharing systems.

The last question in the first part of the questionnaire was the future of open innovation and data sharing in car-sharing systems. According to the majority of respondents, these issues will become significant in car-sharing systems in the near future. Detailed results are presented in Figure 9.

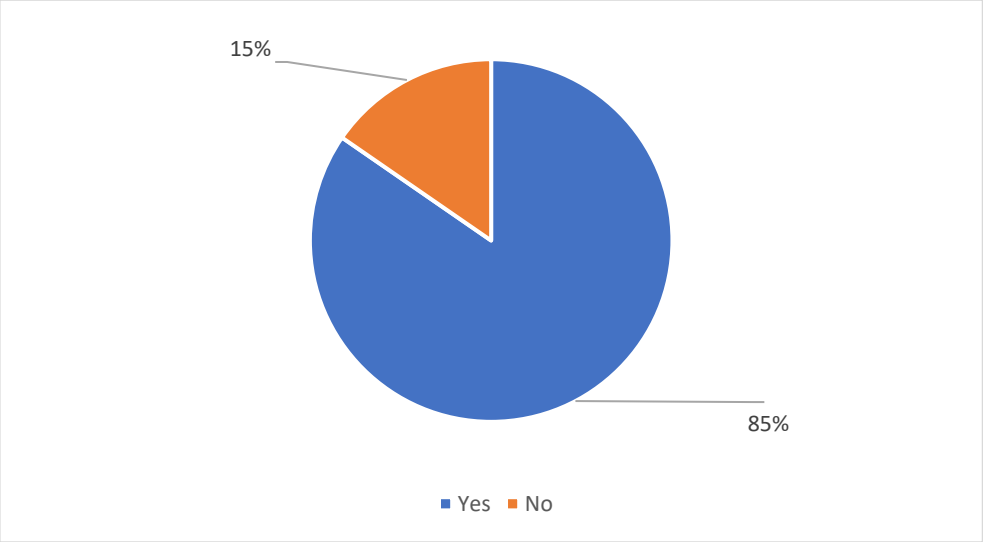

Figure 9. Importance of open data and data sharing in car-sharing systems.

The next stage of the research was the second questionnaire concerning the detailed elements that make up the business model of car-sharing systems. In order to protect the data of sensitive respondents, the responses provided by all respondents were grouped and generalized, and then divided according to the nine elements that make up the CANVAS model. A detailed model is presented in Figure 10.

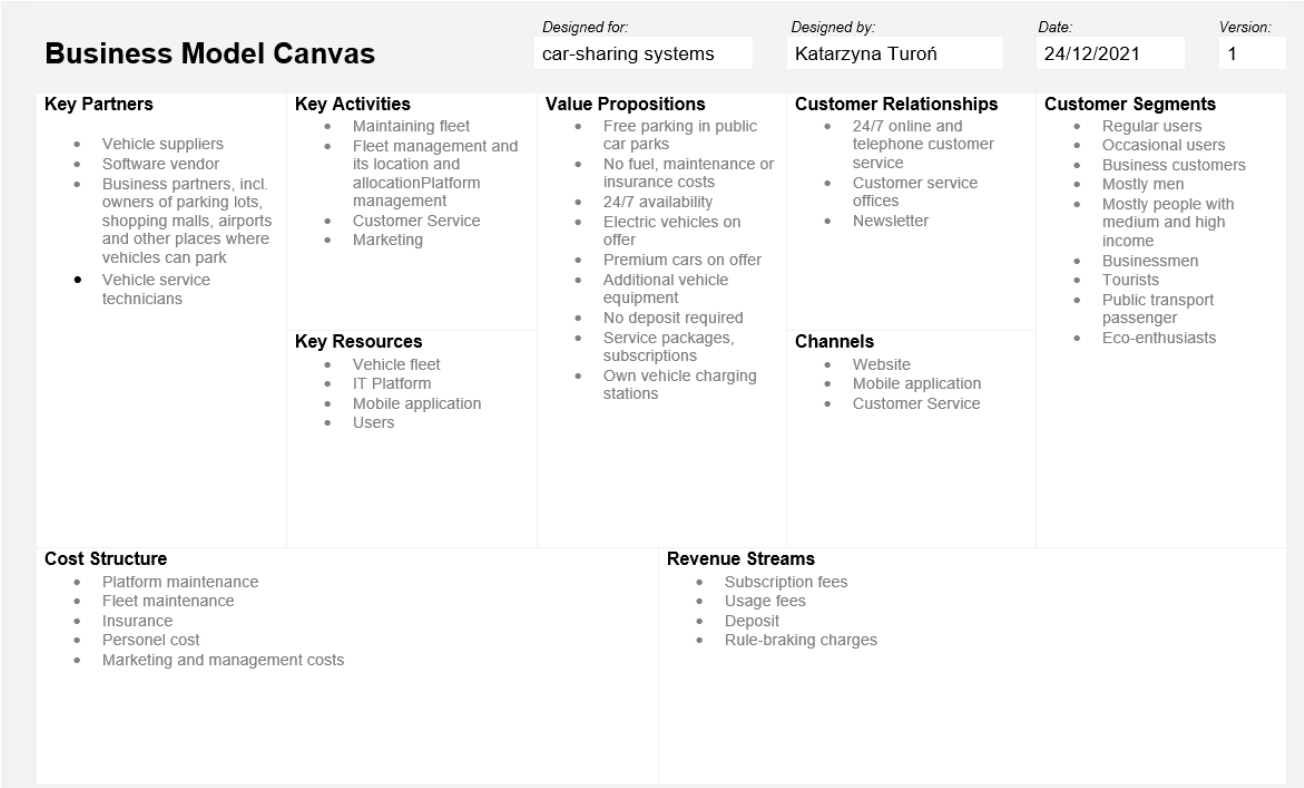

Figure 10. The car-sharing business model based on the CANVAS concept.

5. Discussion

The results obtained as part of the investigation prove that the business models in car-sharing systems in the overwhelming majority (almost 70%) of operators have not

been updated since their implementation. This result is independent of the time that the operators have been operating on the market. This result also does not depend on the size of the enterprise, since an almost equal division into medium and large enterprises has been achieved. Furthermore, the results will also show that the business models have not changed between the operators of free-floating and station-based car-sharing systems. Therefore, one can speak of the disrupted dynamics of both business models and the development of innovation in enterprises. From a geographical point of view, the research shows that the most changes were introduced by operators from Germany, followed by France and Poland. Germany and France are countries with great traditions in car-sharing services. It should be mentioned that Germany is the most developed country in terms of the availability of shared mobility services [62]. They are also characterized by having the greatest competition on the market, as well as a tendency to implement technological innovations in new mobility systems, which may be a response to the updated models. In turn, France had one of the largest free-floating car-sharing systems, Autolieb, which has been shut down [63]. Currently, new types of services are being created in its place, which must meet the expectations of users with extensive experience in the use of car-sharing. In turn, Poland is a relatively new car-sharing market. However, despite the short time since the appearance of the first systems, it is considered one of the most dynamically developing countries in Europe from the point of view of car sharing [64,65]. Intensive expansions, as well as the recessions of subsequent operators, encourage companies to make changes in business models, which is confirmed by research.

From the point of view of the innovations, operators agree that 100% of innovative services were implemented into their business models. However, it is interesting that the implemented innovations were based only on closed innovations, which proves that the industry is closed to sharing its property with other entities.

Despite the lack of interest in open innovation and data sharing, operators were able to identify the main advantages and disadvantages of implementing them. As the main advantage, they agreed that the brand was more recognizable by its customers. They emphasize that open innovation would also increase the availability of their services, which would certainly be an interesting aspect for potential customers. Furthermore, respondents are also aware that open innovation could positively affect the profitability of companies. Despite the many advantages, the respondents also point to the disadvantages of open innovation and data sharing. They consider their ideas being copied by competition as the main disadvantage. In my opinion, this is an unjustified concern because, regardless of the type of services provided, car-sharing systems are based on the same principle of operation. Therefore, this concern is unfounded. The second concern is the possibility of disclosing classified information about the company. In my opinion, operators do not have to share data that are considered confidential. Nevertheless, data relating to, for example, the location of cars cannot be considered confidential. Such data are already owned by mobility accelerators and are shared with the vehicle API. Other data that might be too sensitive to share may be covered by additional protective intellectual property. Another risky issue is also the possibility of customers stealing information. In this case, it is worth paying attention to cities with intensively developed MaaS systems and the offers of services provided there. Interestingly, it may turn out that, despite the possibility of choosing many operators by one application, the interest in services on the part of users grows. An excellent example in this regard is Berlin, where, with a well-developed MaaS system, there are seven service operators on the market [66]. The results obtained also show that all of the operators representing Germany made the biggest changes in their business models. Other examples of proper development of MaaS systems from Europe are Helsinki, Vienna, and Hannover [67]. The systems mentioned are not as integrated as the Berlin system, but they offer many possibilities, including vehicle reservation, price, and the ability to check the availability of various types of vehicles with new mobility in one application [67]. Moreover, such solutions are also used in rural areas, for example in Sweden or Finland [68]. In the case of villages, MaaS systems are not so developed,

e.g., due to the unavailability of all forms of mobility, i.e., e-mopeds or e-scooters [67,68]. However, research indicates that the trend of MaaS systems in the coming years will include other centers, both urban and rural [67–69]. Therefore, it is important to properly adapt the strategic management of car-sharing companies to planned changes. And what is more, to properly collect data from shared mobility systems [70]. Interestingly, despite the lack of implementation of open innovation and data-sharing practices and the recognition of their many shortcomings, 85% of respondents believe that they will be important in the near future, which confirms the need for detailed research in this area.

Car-Sharing Open Business Model

During the research and analysis of responses to business models, no specific solutions for open innovation and open business models were identified. This is because the surveyed companies did not want to fully disclose their business practices due to concerns about the possibility of their competitors using this information against them. However, due to the indicated potential of companies in terms of noticing the need to "open" business models and implement open innovations for the good of the entire industry and the shared economy, a proposition of a set of solutions that can be implemented into business models was presented. This summary was prepared in the form of the CANVAS model. The proposed possibilities are the result of literature studies and empirical research. Their conclusions are not limited to solutions from a specific geographic area, because due to the similar problems of many destinations, they can be successfully used to create open business models in any car-sharing system. Most importantly, the developed model shows how important it is to remodel key partners, customer structure, and the value offered. The open car-sharing model is the evolution of the classic model to a more extensive form that includes the possibility of connecting to MaaS systems, sharing vehicle data, or establishing cooperation with local authorities or universities, i.e., issues that are very often the main problems in the development of MaaS systems. The detailed CANVAS model is presented in Figure 11.

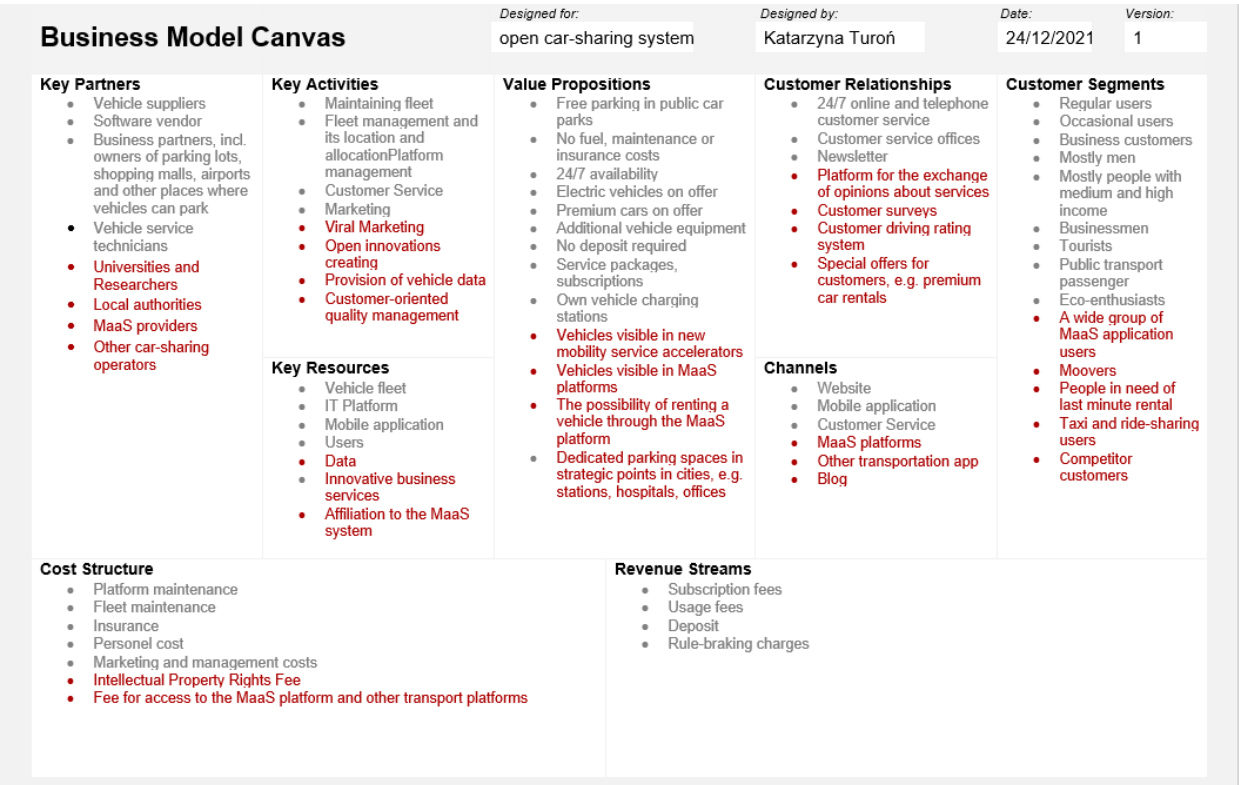

Figure 11. Open car-sharing business model based on the CANVAS concept.

In the course of the analysis, recommendations for car-sharing companies were developed, which can support organizations at the stage of implementing open innovations and transforming their business models:

(1) When selecting key partners, it is worth paying attention to cooperation, not only with suppliers or business partners but also with entities that have an impact on the real functioning of car-sharing systems and affect market trends, including competition. Mutual cooperation between companies has a chance to win common interests, such as dedicated parking spaces for vehicles with car-sharing or special privileges.
(2) Local governments should also be a key partner for car-sharing companies. This applies both to attempts to directly reduce problems with urban transport (law, prohibitions, and orders) and to the use of indirect solutions (education, awareness of the mechanisms of changes in transport needs), and sometimes to a joint search for improvements to the life of society in cities in accordance with the principles of sustainable development.
(3) The value proposition in open business models should be based on the value of the customer value and community value. These aspects are the ones who should make an important contribution to the aspects that need to be improved in the services offered. These should be a key factor in creating new innovations, establish service exchange platforms, offering customer-centric marketing, and allowing customers to become a real part of the business.
(4) Enterprises should trust research organizations and universities and give them the possibility to access their data, e.g., on vehicles, movements and relocation. These data would allow for the performance of analyses that could support the functioning of car sharing and not pose a threat to the development of companies.
(5) Companies must define new rules (or improve existing ones) regarding data sharing, copyright and intellectual data policies, API sharing, and application availability. The validation of rules will allow for the development of an approach that can create the possibility of full or partial involvement in emerging MaaS initiatives or mobility accelerators, which will increase the company's market position and influence its advertising and marketing.
(6) The costs of activities related to running a business must be identified as transparent and included in the cost streams of the business models of car dealers. Operating in an open model should take into account the principles of corporate social responsibility (CSR).

The indicated recommendations should be referred to for each of the enterprises separately, starting with a clear definition of the goals of the organization, and then combining them with the company's strategy and culture. It is worth recalling that the selection of even individual activities indicated in the model of the open car-sharing system is a step to increase the dynamics of the development of open innovations in the entire new mobility industry, and thus a chance for the better implementation of the goals of sustainable development.

6. Conclusions

In conclusion, the conducted research indicated that the subjects of open innovation and data sharing are aspects that are not currently developed in car-sharing systems. These issues are considered risky and are of concern for car-sharing operators. The conducted research has shown that the dynamics of business models and the development of innovation in enterprises are disturbed. Due to the significant development of new mobility, MaaS systems, and all mobility accelerators, it is particularly important that, despite the concerns, the aspects of open business are gradually implemented into the systems. To facilitate this, a proprietary model of an open car-sharing system based on the concept of open innovation and data sharing was proposed. The research carried out and the developed business model developed may support operators in the process of transforming their businesses into a more accessible form of service for users. Moreover, it fills the research gap

in the proposed value-added car-sharing business model. The developed model will allow operators to indicate aspects that they should pay attention to when building relationships with their recipients. The appropriate monitoring of customer needs will allow for the faster creation of open innovations and will improve their flow in the enterprise, which will also affect the business model and may translate into better development of sustainable transport services in cities. It is worth mentioning, that with the development of technology and the process of "opening up" the car-sharing business, the approach, awareness, and preferences of both operators and potential users to using services may change [71]. Therefore, performing more analyses and updating research on the development of open innovations in car-sharing systems is particularly important. This article has limitations related to the geographical areas where car-sharing companies operate. Despite this, the results can be considered reliable, as the analysis includes companies from countries with very large car-sharing traditions, as well as emerging markets. In future articles, the author plans to expand her research to new geographic areas to compare the approach to open innovation and data sharing not only at the European but also global level.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy.

Conflicts of Interest: The author declares no conflict of interest.

References

1. Jittrapirom, P.; Boonsiripant, S.; Phamornmongkhonchai, M. Aligning stakeholders' mental models on carsharing system using remote focus group method. *Transp. Res. Part D Transp. Environ.* **2021**, *101*, 103122. [CrossRef]
2. Boyacı, B.; Zografos, K.G. Investigating the effect of temporal and spatial flexibility on the performance of one-way electric carsharing systems. *Transp. Res. Part B Methodol.* **2019**, *129*, 244–272. [CrossRef]
3. Saeed, T.U.; Alabi, B.N.; Labi, S. Preparing road infrastructure to accommodate connected and automated vehicles: System-level perspective. *J. Infrastruct. Syst.* **2021**, *27*, 06020003. [CrossRef]
4. Saeed, T.U. Road Infrastructure Readiness for Autonomous Vehicles. Ph.D. Dissertation, Purdue University, West Lafayette, IN, USA, 2019. [CrossRef]
5. Golalikhani, M.; Oliveira, B.B.; Carravilla, M.A.; Oliveira, J.F.; Pisinger, D. Understanding carsharing: A review of managerial practices towards relevant research insights. *Res. Transp. Bus. Manag.* **2021**, *41*, 100653. [CrossRef]
6. Terrien, C.; Maniak, R.; Chen, B.; Shaheen, S. Good practices for advancing urban mobility innovation: A case study of one-way carsharing. *Res. Transp. Bus. Manag.* **2016**, *20*, 20–32. [CrossRef]
7. Schwabe, J. The evolution of cooperative electric carsharing in Germany and the role of intermediaries. *Environ. Innov. Soc. Transit.* **2020**, *37*, 108–119. [CrossRef]
8. Abbasi, S.; Ko, J.; Kim, J. Carsharing station location and demand: Identification of associated factors through Heckman selection models. *J. Clean. Prod.* **2021**, *279*, 123846. [CrossRef]
9. Turoń, K.; Kubik, A. Business Innovations in the New Mobility Market during the COVID-19 with the Possibility of Open Business Model Innovation. *J. Open Innov. Technol. Mark. Complex.* **2021**, *7*, 195. [CrossRef]
10. Teece, D.J. Business Models, Business Strategy and Innovation. *Long Range Plan.* **2010**, *43*, 172–194. [CrossRef]
11. Richardson, J. The business model: An integrative framework for strategy execution. *Strat. Chang.* **2008**, *17*, 133–144. [CrossRef]
12. Bocken, N.; Short, S. Towards a sufficiency-driven business model: Experiences and opportunities. *Environ. Innov. Soc. Transit.* **2016**, *18*, 41–61. [CrossRef]
13. Najar, T. Antecedents to open business model in the ICT-based sectors. *J. High Technol. Manag. Res.* **2020**, *31*, 100388. [CrossRef]
14. Moradi, E.; Jafari, S.M.; Doorbash, Z.M.; Mirzaei, A. Impact of organizational inertia on business model innovation, open innovation and corporate performance. *Asia Pac. Manag. Rev.* **2021**, *26*, 171–179. [CrossRef]
15. Safdari Ranjbar, M.; Manteghi, M.; Tavakoli, G. Open innovation, a comprehensive overview of concepts, approaches, trends and key success factors. *Technol. Growth* **2014**, *10*, 10–17.
16. Enkel, E.; Gassmann, O.; Chesbrough, H. Open R&D and open innovation: Exploring the phenomenon. *R D Manag.* **2009**, *39*, 311–316. [CrossRef]
17. Visnjic, I.; Neely, A.; Jovanovic, M. The path to outcome delivery: Interplay of service market strategy and open business models. *Technovation* **2018**, *72–73*, 46–59. [CrossRef]

18. Chesbrough, H. *Open Business Models: How to Thrive in the New Innovation Landscape*; Harvard Business Press: Brighton, MA, USA, 6 December 2006.
19. Weiblen, T. The Open Business Model: Understanding an Emerging Concept. *J. Multi Bus. Model Innov. Technol.* **2016**, *2*, 35–66. [CrossRef]
20. Cirrincione, L.; Di Dio, S.; Peri, G.; Scaccianoce, G.; Schillaci, D.; Rizzo, G. A Win-Win Scheme for Improving the Environmental Sustainability of University Commuters' Mobility and Getting Environmental Credits. *Energies* **2022**, *15*, 396. [CrossRef]
21. Peñarroya-Farell, M.; Miralles, F. Business Model Dynamics from Interaction with Open Innovation. *J. Open Innov. Technol. Mark. Complex.* **2021**, *7*, 81. [CrossRef]
22. West, J.; Bogers, M. Leveraging External Sources of Innovation: A Review of Research on Open Innovation. *J. Prod. Innov. Manag.* **2013**, *31*, 814–831. [CrossRef]
23. Khumalo, M.; Lingen, E.V. The Open Business Model in A Dynamic Business Environment: A Literature Review. *S. Afr. J. Ind. Eng.* **2017**, *28*, 147–160. [CrossRef]
24. Baldwin, C.Y.; von Hippel, E. Modeling a paradigm shift: From producer innovation to user and open collaborative inno-vation. *Organ. Sci.* **2011**, *22*, 1399–1417. [CrossRef]
25. Belussi, F.; Sammarra, A.; Sedita, S.R. Learning at the boundaries in an "Open Regional Innovation System": A focus on firms' innovation strategies in the Emilia Romagna life science industry. *Res. Policy* **2010**, *39*, 710–721. [CrossRef]
26. Berkhout, A.J.D.; Hartmann, P.; van der Duin, O.R. Innovating the innovation process. *Int. J. Technol. Manag.* **2006**, *34*, 390–404. [CrossRef]
27. Fichter, K. Innovation communities: The role of networks of promoters in open innovation. *R D Manag.* **2009**, *39*, 357–371. [CrossRef]
28. Granstrand, O.; Sjölander, S. Managing innovation in multi-technology corporations. *Res. Policy* **1990**, *19*, 35–60. [CrossRef]
29. Spaeth, S.; Stuermer, M.; von Krogh, G. Enabling knowledge creation through outsiders: Towards a push model of open innovation. *Int. J. Technol. Manag.* **2010**, *52*, 411. [CrossRef]
30. Wincent, J.; Anokhin, S.; Boter, H. Network board continuity and effectiveness of open innovation in Swedish strategic small-firm networks. *R D Manag.* **2009**, *39*, 55–67. [CrossRef]
31. Rohrbeck, R.; Hölzle, K.; Gemünden, H.G. Opening up for competitive advantage: How Deutsche Telekom creates an open innovation ecosystem. *R D Manag.* **2009**, *39*, 420–430. [CrossRef]
32. Tsutsui, Y.; Yamada, N.; Mitake, Y.; Sholihah, M.; Shimomura, Y. A Strategic Design Guideline for Open Business Models. *Int. J. Autom. Technol.* **2020**, *14*, 678–689. [CrossRef]
33. Purdy, M.; Robinson, M.; Wei, K. Three new business models for "the open firm". *Strategy Leadersh.* **2012**, *40*, 36–41. [CrossRef]
34. Ottonicar, S.L.; Arraiza, P.M.; Fabiano, A. Opening Science and Innovation: Opportunities for Emerging Economies. Foresight and STI Governance. 2020. Available online: https://www.semanticscholar.org/paper/Opening-Science-and-Innovation%3A-Opportunities-for-Ottonicar-Arraiza/bf0aca6372deb1ba22cbbb36cafa536ee7dd2174 (accessed on 24 December 2021).
35. Brenk, S. Open Business Model Innovation–The Impact of Breadth, Depth, and Freedom of Collaboration. *Acad. Manag. Proc.* **2020**, *2020*, 21971. [CrossRef]
36. Bogers, M.; Chesbrough, H.; Heaton, S.; Teece, D.J. Strategic Management of Open Innovation: A Dynamic Capabilities Perspective. *Calif. Manag. Rev.* **2019**, *62*, 77–94. [CrossRef]
37. Christensen, J.F.; Olesen, M.H.; Kjær, J.S. The industrial dynamics of Open Innovation—Evidence from the transformation of consumer electronics. *Res. Policy* **2005**, *34*, 1533–1549. [CrossRef]
38. Abulrub, A.-H.; Lee, J. Open innovation management: Challenges and prospects. *Procedia Soc. Behav. Sci.* **2012**, *41*, 130–138. [CrossRef]
39. Dahlander, L.; Gann, M. How open is innovation? *Res. Policy* **2010**, *39*, 699–709. [CrossRef]
40. Wantabe, C.; Shin, J.; Heikkinen, J.; Tarasyev, A. Optimal Dynamics of Functionality Development in Open Innovation. *IFAC Proc. Vol.* **2009**, *42*, 173–178.
41. Schoemaker, P.J.H.; Heaton, S.; Teece, D. Innovation, Dynamic Capabilities, and Leadership. *Calif. Manag. Rev.* **2018**, *61*, 15–42. [CrossRef]
42. Bogers, M.; Afuah, A.; Bastian, B.L. Users as Innovators: A Review, Critique, and Future Research Directions. *J. Manag.* **2010**, *36*, 857–875. [CrossRef]
43. Iivari, M.; Ahokangas, P.; Matinmikko-Blue, M.; Yrjölä, S. Opening Closed Business Ecosystem Boundaries with Digital Platforms: Empirical Case of a Port. In *Emerging Ecosystem-Centric Business Models for Sustainable Value Creation*; IGI Global: Philadelphia, PA, USA, 2022; pp. 67–96. [CrossRef]
44. Adner, R.; Kapoor, R. Value Creation in Innovation Ecosystems: How the Structure of Technological Interdependence Affects Firm Performance in New Technology Generations. *Strateg. Manag. J.* **2010**, *31*, 306–333. [CrossRef]
45. Chesbrough, H.; Kim, S.; Agogino, A. Chez Panisse: Building an Open Innovation Ecosystem. *Calif. Manag. Rev.* **2014**, *56*, 144–171. [CrossRef]
46. Laursen, K.; Salter, A. Open for innovation: The role of openness in explaining innovation performance among U.K. manufacturing firms. *Strateg. Manag. J.* **2006**, *27*, 131–150. [CrossRef]
47. Lakhani, K.R.; von Hippel, E. How open source software works: "Free" user-to-user assistance. *Res. Policy* **2003**, *32*, 923–943. [CrossRef]

48. Gawer, A.; Cusumano, M.A. Industry Platforms and Ecosystem Innovation. *J. Prod. Innov. Manag.* **2014**, *31*, 417–433. [CrossRef]
49. Münzel, K.; Boon, W.; Frenken, K.; Vaskelainen, T. Carsharing business models in Germany: Characteristics, success and future prospects. *Inf. Syst. e-Bus. Manag.* **2018**, *16*, 271–291. [CrossRef]
50. Frenken, K. Political economies and environmental futures for the sharing economy. *Philos. Trans. R. Soc. London. Ser. A Math. Phys. Eng. Sci.* **2017**, *375*, 20160367. [CrossRef] [PubMed]
51. Cohen, B.; Kietzmann, J. Ride On! Mobility Business Models for the Sharing Economy. *Organ. Environ.* **2014**, *27*, 279–296. [CrossRef]
52. Shaheen, S.; Cohen, A. Carsharing and personal vehicle services: Worldwide market developments and emerging trends. *Int. J. Sustain. Transp.* **2013**, *7*, 5–34. [CrossRef]
53. Alfian, G.; Rhee, J.; Yoon, B. A simulation tool for prioritizing product-service system (PSS) models in a carsharing service. *Comput. Ind. Eng.* **2014**, *70*, 59–73. [CrossRef]
54. Barth, M.; Shaheen, S. Shared-Use Vehicle Systems: Framework for Classifying Carsharing, Station Cars, and Combined Approaches. *Transp. Res. Rec. J. Transp. Res. Board* **2002**, *1791*, 105–112. [CrossRef]
55. Boyacı, B.; Zografos, K.G.; Geroliminis, N. An optimization framework for the development of efficient one-way car-sharing systems. *Eur. J. Oper. Res.* **2015**, *240*, 718–733. [CrossRef]
56. Hildebrandt, B.; Hanelt, A.; Piccinini, E.; Kolbe, L.; Nierobisch, T. The Value of IS in Business Model Innovation for Sustainable Mobility Services: The Case of Carsharing. In Proceedings of the 12th International Conference on Wirtschaftsinformatik, Osnabrück, Germany, 4–6 March 2015; pp. 1008–1022.
57. Ojasalo, J.; Ojasalo, K. Service Logic Business Model Canvas. *J. Res. Mark. Entrep.* **2018**, *20*, 70–98. [CrossRef]
58. Osterwalder, A.; Pigneur, Y.; Clark, T. *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*; Strategyzer Series; John Wiley & Sons: Hoboken, NJ, USA, 2010.
59. Whyte, W.H. *The Social Life of Small Urban Spaces*; Project for Public Spaces: New York, NY, USA, 2001.
60. Gehl, J.; Svarre, B. *How to Study Public Life?* Island Press: Washington, DC, USA, 2013.
61. Mishin, V.M. *Research of Control Systems*; Textbook for Universities; Unity-Dana: Moscow, Russia, 2003.
62. Wittwer, R.; Hubrich, S. Free-Floating Carsharing Experiences in German Metropolitan Areas. *Transp. Res. Procedia* **2018**, *33*, 323–330. [CrossRef]
63. Mindur, L.; Turoń, K.; Sierpiński, G. Car-sharing development–current state and perspective. *Logist. Transp.* **2018**, *39*, 5.
64. Neumann, T. The Impact of Carsharing on Transport in the City. Case Study of Tri-City in Poland. *Sustainability* **2021**, *13*, 688. [CrossRef]
65. Turoń, K.; Kubik, A.; Chen, F. Electric Shared Mobility Services during the Pandemic: Modeling Aspects of Transportation. *Energies* **2021**, *14*, 2622. [CrossRef]
66. Berlin Official Website. Available online: https://www.berlin.de/en/getting-around/carsharing/ (accessed on 24 December 2021).
67. Audouin, M.; Finger, M. Empower or Thwart? Insights from Vienna and Helsinki regarding the role of public authorities in the development of MaaS schemes. *Transp. Res. Procedia* **2019**, *41*, 6–16. [CrossRef]
68. Eckhardt, J.; Nykänen, L.; Aapaoja, A.; Niemi, P. MaaS in rural areas-case Finland. *Res. Transp. Bus. Manag.* **2018**, *27*, 75–83. [CrossRef]
69. Barreto, L.; Amaral, A.; Baltazar, S. Mobility as a Service (MaaS) in rural regions: An overview. In Proceedings of the 2018 International Conference on Intelligent Systems (IS), Funchal, Portugal, 25–27 September 2018; pp. 856–860.
70. Matyja, T.; Kubik, A.; Stanik, Z. Possibility to Use Professional Bicycle Computers for the Scientific Evaluation of Electric Bikes: Trajectory, Distance, and Slope Data. *Energies* **2022**, *15*, 758. [CrossRef]
71. Saeed, T.U.; Burris, M.; Labi, S.; Sinha, K.C. An empirical discourse on forecasting the use of autonomous vehicles using consumers' preferences. *Technol. Forecast. Soc. Chang.* **2020**, *158*, 120130. [CrossRef]