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# CarGO: Car Sharing & Rental Service

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**Abstract:- Because of the growth of car-sharing services as a new and ecologically beneficial means of transportation, private mobility is shifting from ownership to service use. Despite the growing importance of this type of mobility and the numerous studies that are available in the scientific literature, to the best of our knowledge, no in-depth research has been conducted, but an organised analysis has been carried out to categorise the research and identify the mainstreams. The goal of this research is to present a taxonomy and to investigate the various aspects of car-sharing, such as the numerous car-sharing services and the research issues addressed in the papers. To obtain a knowledge of the mainstreams, we locate and assess 137 papers from the last fifteen years of research. Finally, we carefully examined scholarly perspectives and research trends, highlighting gaps in the literature on operational level, economic, business development, and consumer validation issues.**

## I. INTRODUCTION

The transportation business has undergone significant change in recent decades, owing mostly to urbanisation, shifting demographics, and technological advancements. The advent of automobile sharing and rental services, which provide a convenient and cost-effective alternative to traditional car ownership, has been one of the industry's most significant advancements. These services provide customers with short-term access to vehicles, either through traditional car rental firms or through peer-to-peer sharing networks. Vehicle sharing and rental services have grown in popularity in many urban areas throughout the world to decrease congestion, slash costs, and increase access to transportation.

The advantages of car sharing and rental services are numerous. For starters, they are frequently less expensive than traditional automobile ownership, especially for people who do not use a car daily. Users of car sharing and rental services pay simply for the time they use the vehicle, rather than the cost of a car, insurance, maintenance, and other associated fees. This can be a major cost savings, especially for people who reside in cities where public transportation is frequently available. Furthermore, car sharing and rental services can help to lessen transportation's environmental effect by increasing shared vehicle use, lowering the number of automobiles on the road, and encouraging the use of more fuel-efficient vehicles.

A multitude of factors, including user demographics, geographic location, and the availability and quality of alternative transportation choices, influence the acceptance and usage of car sharing and rental services. Policymakers, urban planners, and other stakeholders face new issues as a result of these services. These may, for example, necessitate new legislation and infrastructure to assure the safety and fairness of all users, as well as to reduce the potential negative effects on the broader community.

The goal of this review article is to provide a thorough overview of automobile sharing and rental services, as well as to identify the important factors influencing their uptake and utilisation. We will specifically look at the advantages and disadvantages of various types of services, the factors that impact consumers' decisions to utilise these services, and the consequences for urban transportation policy. We will also talk about upcoming trends and advances in the industry, such as the adoption of electric and self-driving vehicles, and how these might affect the future of mobility.

To achieve our goal, we shall first define automobile sharing and rental services and examine their history and evolution. We will then look at the several sorts of services available, such as round-trip, one-way, peer-to-peer, and standard automobile rental services. We will also investigate the economic, environmental, and social benefits and downsides of each service type.

In addition, we will look into the elements that influence the acceptance and use of automobile sharing and rental services, such as user demographics, geographic location, and the availability and quality of alternative transportation options. We'll also go over the important literature on the subject and talk about the consequences for policymakers, urban planners, and other stakeholders. Finally, we will look at emerging trends and advances in the industry, such as the adoption of electric and self-driving vehicles, and how these may affect the future of mobility. We will also examine the issues and opportunities presented by these developments, as well as the implications for the future of car sharing and rental enterprises.

In summary, the purpose of this review article is to provide a thorough overview of automobile sharing and rental services, including its advantages, disadvantages, and prospective impact on urban mobility. We hope that by doing so, we may contribute to the continuing conversation about the future of mobility and help policymakers, urban planners, and other stakeholders make informed decisions regarding transportation policy and planning.

## II. LITERATURE REVIEW

In recent years, scholars and practitioners have been focusing on vehicle sharing and rental services in order to better understand their impact on urban transportation and mobility. Many studies have been conducted to investigate

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the economic, environmental, and social benefits of automobile sharing and rental services. Martin and Shaheen (2011) discovered, Car sharing services, for example, can significantly reduce vehicle ownership and use, leading in lower greenhouse gas emissions and other environmental benefits.

Similarly, Martin et al. (2014) discovered that car sharing programmes can lower household transportation expenditures, especially for lowincome households.

Several studies have looked at the elements that influence the use and acceptance of automobile sharing and rental services. For example, Sivak and Schoettle (2013) discovered that younger, urban inhabitants are more likely than older, suburban people to use automobile sharing programmes.

They also discovered that the availability and quality of public transit can influence demand for car sharing programmes. Similarly, Shaheen et al. (2014) discovered that the availability of on-street parking as well as the closeness of car sharing facilities to public transportation can influence the use of vehicle sharing services.

## III. CAR SHARING

Vehicle sharing dates back to the 1940s in Switzerland, where a cooperative car-sharing organisation was set up to assist individuals in sharing cars during the World War II-related petrol crisis. The first commercial car-sharing programme, however, didn't begin in Switzerland until the late 1990s, when it did (Shaheen et al., 2010). Since then, car-sharing has expanded substantially throughout the world, with over 2 million members enrolled in North America alone (Shaheen et al., 2018).

Many advantages of car sharing include fewer cars on the road, which results in less traffic congestion and greenhouse gas emissions. Additionally, car sharing gives users access to vehicles whenever they need them without the associated costs of ownership, making it an affordable choice for many (Cervero & Golub, 2007).

Car-sharing must manage vehicle maintenance, develop a dependable and secure method of accessing the vehicle, and make sure that participants abide by the laws and regulations, among other obstacles (Shaheen et al., 2010). Furthermore, not everyone can use car sharing because some people need a car for everyday use or long-distance trips.

The first bike-sharing system was created in Amsterdam in 1965, making bike sharing a relatively new concept. However, Copenhagen, Denmark, where a municipal bike sharing programme was created, is where the contemporary bike-sharing system first arose in the late 1990s (Shaheen et al., 2010). Since then, the global bike-sharing industry has expanded quickly, with more than 2,500 programmes in more than 1,500 locations (Fishman et al., 2015).

In addition to encouraging active commuting, bike sharing eases traffic and offers an affordable mode of transit. Additionally, bike-sharing gives users access to bikes whenever they need them without the associated costs of ownership, making it an affordable alternative for many (Fishman et al., 2015).

The management of bike maintenance, ensuring that the bikes are available when needed, and providing safe and secure bike parking are some of the obstacles that bike sharing must overcome (Fishman et al., 2015). Bike sharing is also not appropriate for everyone because some people may not feel secure riding a bike in congested or strange places.

As an alternative to conventional vehicle and bike rental services, online automobile and bike rental services have grown in popularity recently. These websites give people a platform to hire out their personal vehicles to others, making it a more cost-effective and practical choice than standard rental businesses (Shaheen et al., 2018).

Websites that allow users to rent cars and bikes have several benefits, including providing users with access to vehicles when they need them without having to pay for ownership, contributing to sustainability by reducing the number of vehicles on the road, and providing a flexible mode of transportation (Shaheen et al., 2018). The management of vehicle upkeep, ensuring that the vehicles are available when needed, and ensuring that the renters adhere to norms and regulations are some of the obstacles that car and bike rental websites must overcome (Shaheen et al., 2018).

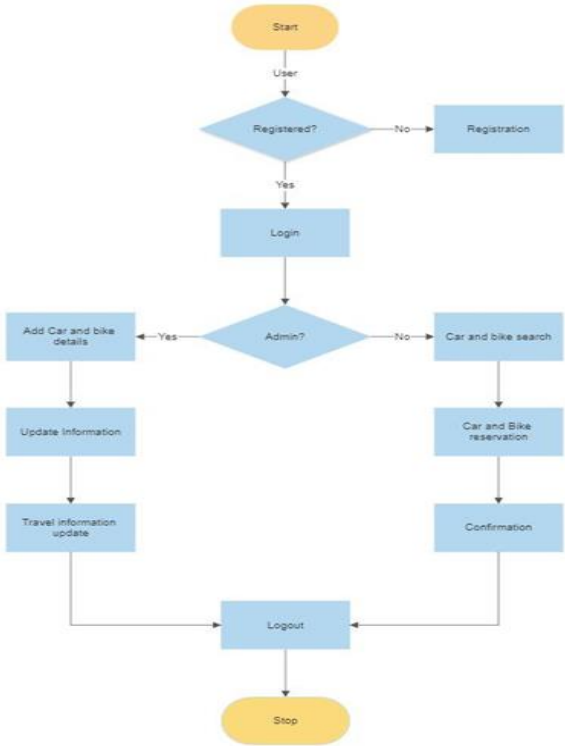


**Fig 1 Flowchart on Car and Bike rental and sharing website.**

➢ *Authentication on car and bike sharing and rental services.*

To protect both the provider and the customer, authentication is a key component of vehicle and bike sharing and rental services. These are some applications for authentication in these services:

- Preventing unauthorized services: By ensuring that only approved users may access the service, authentication stops any illegal access to the vehicles. This helps to safeguard the provider's investment by preventing theft and improper use of the vehicles.
- Verifying user identity: A user's identity is verified through authentication. Due to the provider's capacity to confirm the user's identification in the event of an incident or disagreement, this is crucial for security and liability reasons.
- Enabling secure transaction: Secure transactions between the provider and the customer are made possible via authentication. Sensitive data is protected during the processing of payments and the sharing of personal information.
- Facilitating tracking and monitoring: The use of the automobiles by clients can be tracked and observed by the provider thanks to authentication. This assists in preventing misuse, ensuring adherence to the terms and conditions, and keeping track of the vehicles' condition.

In general, verification is a crucial part of rental and sharing services for cars and bicycles. Together with defending the provider's and customers' interests, it aids in ensuring the security and safety of the cars. Aadhaar-based car-sharing and rental businesses can provide customers with a simple and safe way to rent vehicles. The Indian government has created a special identifying number called Aadhaar that includes a person's biometric and demographic data. Using Aadhaar authentication for car rentals can help to confirm the renters' legitimacy and lower the possibility of fraud or abuse.

- Integrate Aadhaar authentication into the rental process: Either at the rental location or through an online portal, the rental service should incorporate Aadhaar authentication into their rental procedure.
- Validate the Aadhaar number: After the consumer gives the rental business their Aadhaar number, they should use the Aadhaar Authentication Service offered by the Unique Identification Authority of India to confirm it (UIDAI).
- Get required data: Following Aadhar number verification, the rental service can gather required data, such as the client's name, address, and contact details.
- Once the customer's information has been gathered and verified, the rental business can deliver the vehicle to the client.
- To make sure the customer is using the car in line with the rental agreement, the rental provider should keep an eye on the rental.

Using Aadhaar authentication, car and bike sharing and rental firms can provide customers with a simple and secure way to rent vehicles.

➢ *Dos attack on car and bike sharing and its prevention.*

Car sharing and bike rental businesses may be seriously threatened by denial of service (DoS) attacks. These services frequently use an internet platform to handle bookings, payments, and reservations, which leaves them open to different DoS assaults and other cyberattacks. A denial-of-service (DoS) assault against a car- or bike-sharing service may involve flooding the platform with a large amount of traffic or requests, rendering it unusable or unavailable to users. By interfering with the service and preventing users from making bookings or obtaining crucial information, this may disrupt the operation and result in inconvenience and possible financial losses. The mobile applications used by car and bike sharing services are similarly susceptible to DoS assaults. An attacker may, for instance, flood the app's servers with requests, which would make the app crash or stop responding. This may restrict users from enjoying the app's services, such renting a car or checking their account details, or from accessing the app at all. Car and bike sharing services should put in place strong security measures including firewalls, intrusion detection systems, and content delivery networks to stop DoS attacks.

➢ *Features that will prevent ddos attack on car and bike sharing and rental services*

Car and bike sharing and rental businesses can use a number of security measures to thwart or lessen DDoS (Distributed Denial of Service) attacks, which try to saturate their servers with traffic and make them unreachable to users.

These qualities include, among others

1. Using a content delivery network (CDN) can assist spread traffic among several servers, lessening the impact of a DDoS attack.
2. Applying rate limiting measures can lessen the impact of DDoS attacks by preventing an excessive number of requests from a single IP address or user.
3. Using a WAF can assist in identifying and preventing malicious traffic from reaching the application server.
4. With network segmentation, an assault on one segment won't necessarily affect the availability of the other segments because application servers are placed in various network segments.
5. Scalability: Making sure that the infrastructure and application are made to be scalable can assist the system handle sudden surges in traffic and keep it from getting overloaded.
6. Regular security testing and vulnerability assessments can assist find vulnerabilities and potential attack points, enabling preventative action to be taken to stop DDoS attacks.

Car and bike sharing and rental services can considerably lower the danger of DDoS attacks and increase the availability and dependability of their services for their consumers by incorporating these features.

## IV. FUTURE DIRECTIONS

With numerous new technological developments and advancements being developed to enhance these services, the future of car and bike rental and sharing websites appears bright. The fusion of mobile and digital technology is one of the biggest advancements in this field. Nowadays, a lot of car and bike rental and sharing providers include mobile apps that let customers book and access vehicles using their cell phones. Future developments, such as virtual key systems that let users access vehicles without a physical key, are anticipated to make this technology more sophisticated.

The incorporation of electric vehicles is another advancement in this field. Electric vehicle and bike sharing and rental services are growing in popularity since they provide a green and affordable mode of transportation. These services are likely to grow in popularity as electric vehicle adoption rises, especially in urban areas where access to electric charging stations is more prevalent.

The use of artificial intelligence (AI) and machine learning (ML) technology in automobile and bike rental and sharing services is likely to grow in the future. The user experience can be enhanced, vehicle availability can be optimised, and maintenance costs can be decreased with the help of these technologies. For instance, AI and ML algorithms can be used to forecast truck demand, improve scheduling and routing, and identify potential maintenance concerns before they become serious difficulties.

Finally, changes in regulations and policies are likely to influence how vehicle and bike rental and sharing services expand in the future. Governments and local authorities are enacting policies to support the expansion of car and bike sharing and rental services as they become more aware of the significance of sustainable transportation options. For instance, numerous towns are putting in place designated bike lanes, giving electric vehicle subsidies, and granting tax breaks to car-sharing businesses. These restrictions will most likely support the growth of car-sharing and bike-rental firms while also guaranteeing that they continue to play an important role in the development of sustainable urban transportation networks.

## V. CONCLUSION

Car and bike sharing and rental websites have transformed how people get around, particularly in cities. Users can utilise these services to hire a vehicle for a few hours, a day, or longer periods of time without worrying about ownership, maintenance, or insurance. Furthermore, car and bike sharing and rental services are eco-friendly options that lessen traffic congestion, increase air quality, and lower greenhouse gas emissions.

Car and bike rental and sharing services have many benefits, but they also have certain drawbacks. Maintaining vehicle availability and managing maintenance issues are two of the most difficult challenges. Furthermore, ensuring compliance with regulations and insurance requirements can be difficult, especially in different jurisdictions. Nonetheless, novel solutions to these problems are being developed.

The future of car and bike sharing and rental services is bright, with several technological advancements being developed to improve user experience and sustainability. Because of the integration of mobile and digital technologies, car and bike sharing and rental services can now provide users with greater flexibility and ease of access. Many cars and bike sharing and rental services, for example, now have mobile apps that allow users to reserve and access vehicles via their smartphones. Furthermore, as electric vehicles become more popular, car and bike sharing and rental services are becoming more environmentally friendly and cost-effective.

Furthermore, AI and ML technologies are expected to play a growing role in optimising vehicle availability, lowering maintenance costs, and improving user experience. These technologies can be used to forecast vehicle demand, optimise routing and scheduling, and detect potential maintenance issues before they become major issues.

Finally, regulatory and policy changes are likely to drive future growth in car and bike sharing and rental services. Governments and local governments recognise the importance of sustainable transportation options and are enacting policies to encourage the expansion of these services. Many cities, for example, are implementing dedicated bike lanes, providing subsidies for electric vehicles, and providing tax breaks to car-sharing companies.

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