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Barriers to peer-to-peer car sharing adoption and strategic pathways forward: a comprehensive literature review with meta-analysis

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ABSTRACT

Peer-to-Peer Car Sharing (P2PCS) has emerged as an innovative and sustainable transportation model, experiencing uneven market development across regions, yet it has not been exclusively and comprehensively reviewed until now. This study reviews 77 P2PCS publications from major academic databases, comprehensively analyzing data sources, methodologies, and key findings. A *meta*-analysis addresses four core themes: comparisons between P2PCS and traditional B2C car sharing to identify key advantages of P2PCS, adoption barriers of P2PCS, user characteristics and motivations, and mitigation strategies for businesses as well as public policy recommendations. Findings reveal that P2PCS offers greater operational flexibility than B2C models, serving both urban and rural areas while achieving more sustainable objectives and reducing emissions by utilizing existing vehicles. Key barriers involve trust issues, low demand, competition, and operational challenges. Users typically include younger, eco-conscious owners and cost-sensitive renters from smaller towns. Effective business strategies focus on building trust, expanding markets, and improving services through technology. Policy recommendations emphasize raising awareness, adapting regulations, fostering multi-stakeholder collaboration, and integrating P2PCS with public transport to support sustainable mobility. Moreover, the study outlines major research gaps and proposes future directions derived from both academic literature and industry insights. This review offers valuable insights for policymakers, business providers, and researchers aiming to advance sustainable transport through P2PCS.

1. Introduction

The trend of access being better than ownership has been recognized in recent decades (Birdsall, 2014), which has been translated into the rapid growth of the sharing economy. This trend has significantly transformed various industries, with transportation being one of the most affected sectors involving various popular forms, including bike sharing, scooter sharing, ridesharing (carpooling and

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vanpooling), car sharing, and on-demand ride services (Birdsall, 2014). For longer journeys or those involving complex routes, micromobility solutions like bicycles and scooters are often inadequate, underscoring the need for car access in such cases. There is a great deal of interest in car sharing services because of the high cost of owning a private car, coupled with the fact that many people only need to use their cars occasionally (Dill et al., 2019).

Peer-to-Peer Car Sharing (P2PCS) has emerged as a new and innovative model in recent decades, which is a system where car owners rent their vehicles to other individuals, usually through a facilitating company (Dill et al., 2019). In some studies, P2PCS is also referred to as private car sharing (Li et al., 2024; Li & Feng, 2025). In traditional car sharing models, vehicles are provided by car companies or clubs, and the forms include the business-to-consumer (B2C) model (Nansubuga & Kowalkowski, 2021), business-to-business (B2B) model (Clark et al., 2015), and cooperative car sharing with car clubs (Bonsall et al., 2002). Nevertheless, the P2PCS model uses cars from private car owners, so it involves two distinct groups of users: renters and owners who make their vehicles available for rent (Dill et al., 2017). Participants in P2PCS both supply and demand vehicles, with car owners controlling aspects such as vehicle availability, parking locations, rental hours, and pricing, with some guidance from the facilitating platform (Dill et al., 2017).

P2PCS offers similar environmental benefits to traditional car sharing that have been widely recognized, including reducing the number of vehicles on the road, alleviating traffic congestion (Anthony Jnr, 2024), decreasing noise pollution, and lowering vehicle emissions (Li et al., 2018), among others. P2PCS can also contribute a new model to Mobility as a Service (MaaS) (Sochor et al., 2018), a rapidly developing sustainable transport concept that integrates multiple transport modalities into one single platform (Hao et al., 2025). MaaS has the potential to reshape travel behavior toward more sustainable choices (Militão et al., 2025), though it continues to face challenges in establishing viable business models (Boer et al., 2022). P2PCS can particularly complement traditional car sharing, ride-sourcing, and carpooling services in advancing the goal of long-distance MaaS (Bruzzone et al., 2025). In addition, as a socio-technical innovation, P2PCS has the potential to enable individuals to share their personal vehicles within their communities using information technology, thus supporting the transition to a more sustainable mobility system (Shaheen et al., 2018; Valor, 2020). Research indicates that cars remain unused and parked approximately 95–96% of the time (Khanji & Assaf, 2019; Valaštín et al., 2019), making them ideal candidates for P2PCS. P2PCS empowers ordinary people to become micro-entrepreneurs. Car owners can transform their cars into income-generating assets by leveraging the idle time of their vehicles. At the same time, P2PCS can provide car users with a wider variety of vehicle access and may offer more cost-effective options compared to traditional car sharing services. Furthermore, beyond environmental and economic benefits, P2PCS is anticipated to promote new forms of collaboration, solidarity, and social bonding among users, contributing to a more collaborative economy characterized by enhanced community spirit, decentralization, and mutual support (Gossen et al., 2019).

After decades of development since 2001 (Shaheen et al., 2012), P2PCS have recently been fueled by technological innovations such as mobile apps, Global Positioning Systems (GPS), software to monitor fuel and battery consumption, flexible booking options, and smart locks that enable instant access (Münzel et al., 2018; Münzel et al., 2019). Globally, the P2PCS market was valued at USD 2.5 billion in 2024 and is projected to reach USD 7.0 billion by 2030, corresponding to a Compound Annual Growth Rate (CAGR) of 18.4% over 2024–2030 (Research and Markets, 2025; Rotaris et al., 2025). The model has gained significant traction in North America and Western Europe, with platforms such as Turo (with 340,000 active vehicles worldwide), Getaround (operating in France, Spain, Norway, Belgium, Austria, and Germany), and SnappCar (operating in the Netherlands, with over 10,000 vehicles) expanding rapidly in metropolitan areas and tourist destinations (Turoń et al., 2025; Rotaris et al., 2025; Rotaris, 2022).

In Europe, P2PCS is recognized as an effective way to achieve the sustainable development goals set out in initiatives such as the European Green New Deal and to meet the accessibility goals of national strategies (Rotaris, 2022). As a result, many countries have actively integrated P2PCS into their urban transportation systems. In Italy, the P2PCS market comprises an established platform, Auting, which operates in 150 cities and serves over 5,000 users with nearly 1,000 vehicles (Rotaris, 2022), alongside a newer entrant, Volvero, managing approximately 50 vehicles across two cities (Rotaris et al., 2025). Despite this limited number of operating platforms, recent survey evidence points to substantial latent demand and supply for P2PCS in Italy (Rotaris et al., 2025). In the Netherlands, the number of cars available for P2PCS has surpassed that of B2C car sharing, with around 3,000 cars for B2C car sharing in 2018, compared to around 34,000 cars for P2PCS (Meelen et al., 2019). P2PCS applications are also flourishing in French cities, while German and Belgian cities are leading the way in B2C car sharing (Münzel et al., 2019). In Spain, approximately 10,000 vehicle owners have listed their cars on the P2PCS platform Amovens, which has distributed about €4.0 million to car owners in Barcelona and €3.5 million in Madrid (Bergantino et al., 2025). Beyond major metropolitan areas, P2PCS is also well established in tourist destinations such as Mallorca, Málaga, Valencia, Seville, Alicante, and Menorca (Bergantino et al., 2025).

Despite this expansion, the P2PCS sector has also faced volatility in some areas, with several platforms encountering financial or operational difficulties. In the United States, HyreCar filed for bankruptcy in April 2023 due to persistent cash flow issues and market saturation before being acquired by Getaround (Zukin Partners, 2023). However, Getaround itself announced the suspension of its U.S. operations in February 2025 following continued liquidity challenges (Korosec, 2025). Similarly, several earlier P2PCS platforms, such as HiGear and EasyCar Club, had ceased operations in previous years, indicating the fragility of P2P business models in highly competitive mobility markets. These market fluctuations highlight both the promise and the ongoing challenges facing P2PCS as it strives for long-term sustainability and wider user adoption.

The COVID-19 pandemic disrupted car-sharing services worldwide, as mobility restrictions and social distancing measures remained in place for extended periods (Batool et al., 2020; Gerwe, 2021; Nocera et al., 2024). Surveys indicate that, globally, 27% of respondents were unlikely to use car-sharing services after the pandemic (Hossain, 2021), partly due to increased reliance on non-contact modes such as cycling and electric scooters (Nuttah et al., 2024). In addition, evidence from the United Kingdom shows that 56% of carless individuals with a driving license considered purchasing a private car because of COVID-19-related concerns (Wang

& Wells, 2020). While systematic academic evidence on the post-pandemic trajectory of P2PCS remains limited, industry reports suggest a heterogeneous recovery. For example, Turo reported revenues of USD 879.6 million in 2023, representing an 88% increase compared to 2021 and exceeding pre-pandemic levels (Forbes, 2024). At the same time, some small platforms struggled: in Italy, for instance, Genial Move suspended its private car-sharing service during the pandemic (https://genialmove.com/home), reflecting uneven resilience across providers.

Against this backdrop of uneven market performance, the present moment represents a critical juncture for P2PCS. The coexistence of successful platform expansion in some regions and stagnation or withdrawal in others suggests that the viability of P2PCS is highly context-dependent and shaped by a combination of technological, regulatory, market, and behavioral factors. This divergence raises an urgent need to move beyond aggregate growth indicators and systematically examine why P2PCS succeeds in certain settings while struggling in others. A comprehensive review is therefore timely not only to consolidate fragmented empirical evidence, but also to diagnose the structural barriers that have constrained adoption and scalability, particularly in the post-pandemic mobility landscape. By synthesizing insights on P2PCS-specific advantages, user behavior, and implementation challenges, this review aims to provide actionable knowledge for policymakers seeking to design supportive frameworks and for industry stakeholders aiming to adapt, reposition, or revitalize P2PCS as part of more sustainable and resilient mobility systems.

Existing literature review studies have predominantly focused on traditional car sharing models or the car sharing field as a whole (e.g., Esfandabadi et al., 2022; Nansubuga & Kowalkowski, 2021; Roblek et al., 2021; Sun et al., 2021). While some literature reviews have included discussions of P2PCS (Esfandabadi et al., 2022; Nansubuga and Kowalkowski, 2021; Roblek et al., 2021), to date, no exclusive, detailed, and comprehensive review of P2PCS has been conducted. For example, Nansubuga & Kowalkowski (2021) reviewed 279 publications on car sharing, including studies on P2PCS. Their analysis identified general drivers and barriers across car sharing models, primarily drawing from research on B2C, B2B, and communal car sharing. In addition, they highlighted a significant gap—few studies have specifically investigated the drivers and barriers unique to P2PCS, which can be useful to promote industry growth. To address this gap, we conducted a systematic literature review complemented by a *meta*-analysis to integrate existing research findings and investigate barriers to P2PCS adoption barriers and mitigation strategies. The review had threefold objectives: (1) to examine existing research findings and identify gaps; (2) to figure out the model advantages, adoption barriers, user characteristics, and user motivations; and (3) to inform P2PCS businesses and public policymakers to facilitate the development of this innovative car sharing approach.

The remainder of the paper is organized as follows: Section 2 outlines the criteria and approach used to select the relevant literature. Section 3 summarizes the main data sources, methodologies, and key findings from previous studies on P2PCS. Section 4 compares P2PCS with traditional B2C car sharing and highlights the key advantages of P2PCS. Section 5 examines the key barriers hindering the adoption of P2PCS. Section 6 analyzes the characteristics of P2PCS users and the main drivers for people to join P2PCS, and Section 7 presents business development strategies for P2PCS and offers policy recommendations for public administrators to promote the P2PCS industry. Finally, Section 8 concludes by summarizing the main findings, identifying key research gaps, and outlining future research directions.

2. Paper selection methodology

Because research on P2PCS began later than that on traditional car sharing (around 2001; Shaheen et al., 2012) and remains relatively limited in number, the primary principle guiding paper selection was to include all relevant and convincing studies. To ensure methodological rigor and transparency, we followed a systematic review protocol adapted from the PRISMA framework (Mishra & Mishra, 2023), of which the main steps involve specifying the inclusion and exclusion criteria, selecting information sources, making search strategies, screening, and quality and relevance assessment (as specified in prisma-statement.org).

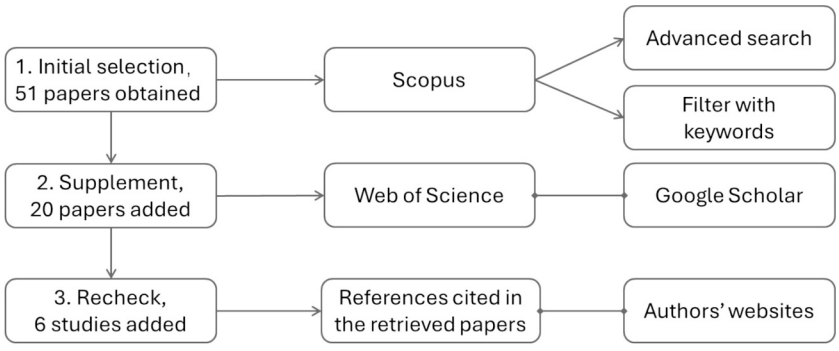

Fig. 1. Paper selection workflow.

2.1. Inclusion and exclusion criteria

The inclusion criteria were: (1) peer-reviewed journals, book chapters, conference papers published between 2001 and 2026; (2) studies explicitly focusing on P2PCS, including platforms, users, or related business models; (3) papers written in English; and (4) studies providing empirical evidence, conceptual frameworks, or policy insights relevant to P2PCS.

Exclusion criteria included: (1) studies focusing exclusively on traditional car sharing, including B2C, B2B, or cooperative car sharing with car clubs; (2) studies focusing on P2P carpooling (e.g., Uber, Blablacar, etc.); (3) publications that mention P2PCS only tangentially (e.g., as a brief example within the broader sharing economy) without dedicated discussion or analysis; (4) non-academic sources such as news articles, reports without methodological details, or white papers; and (5) papers not available in full text.

2.2. Search strategy and screening processes

Papers were primarily collected from three sources: Scopus, Web of Science, and Google Scholar, following the workflow in Fig. 1. A search was first conducted on Scopus.com and then supplemented by Web of Science and Google Scholar. In Scopus, we extracted papers whose titles, abstracts, and keywords contained the set of search terms, and then filtered them with a set of the most relevant keywords, using the string below in the advanced query mode:

"TITLE-ABS-KEY (((peer-to-peer) OR (peer AND to AND peer) OR (p2p) OR (person-to-person) OR (person AND to AND person)) AND ((car AND sharing) OR (car-sharing) OR (car_sharing))) AND PUBYEAR > 2000 AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (EXACTKEYWORD, "Car Sharing") OR LIMIT-TO (EXACTKEYWORD, "Car-sharing") OR LIMIT-TO (EXACTKEYWORD, "Carsharing") OR LIMIT-TO (EXACTKEYWORD, "Peer To Peer") OR LIMIT-TO (EXACTKEYWORD, "Peer-to-peer"))".

This search in Scopus initially yielded 89 articles. After carefully reviewing the titles and abstracts, 38 studies were excluded based on predefined exclusion criteria. For example, Paganelli (2025) only mentioned P2PCS as one of several car-sharing categories without offering any targeted analysis, while Hartl et al. (2025) examined peer-to-peer carpooling rather than P2PCS. Additionally, several papers were excluded because, although indexed with the keyword "car sharing", their content did not substantively engage with P2PCS or car-sharing models (e.g., studies on zero-car households or car ownership reduction policies; Toy et al., 2025).

To ensure comprehensive coverage, the search was extended using the same inclusion and exclusion criteria in Web of Science and Google Scholar, which contributed 7 and 13 additional works, respectively. During the review of these selected papers, we also examined reference lists, literature review sections, and author profiles of frequently cited researchers. This cross-checking process identified 6 additional relevant studies, which were subsequently included in the final dataset.

2.3. Quality and relevance assessment

To ensure the quality and relevance of the final sample, all included papers were reassessed according to the following strengthened inclusion and exclusion criteria. (1) Peer-review status: only peer-reviewed works were prioritized; master's theses and institutional reports were included only when they were sourced from academic institutes and contained substantial empirical contributions not yet published elsewhere. (2) Methodological rigor: each paper was evaluated on the clarity of research objectives, transparency of data collection, and appropriateness of analytical methods. (3) Relevance score: papers were rated on a three-point scale (high, medium, low) according to their direct focus on P2PCS. Only high and medium relevance studies were retained. Studies were excluded if they mentioned P2PCS only marginally without empirical or conceptual analysis.

This systematic process resulted in a final sample of 77 works, including journal articles, book chapters, conference proceedings, review articles, and selected theses, which together provide a comprehensive and credible foundation for analyzing the current state of P2PCS research, including adoption barriers and mitigation strategies.

3. Overview of data sources, methodologies, and results in literature

The existing literature has employed a diverse array of data sources and methodologies to explore this emerging mobility solution. Surveys dominate as the primary data collection method, widely used to capture user perceptions, preferences, and motivations. For instance, Bergantino et al. (2025) and Rotaris et al. (2025) collected survey data in Italy to explore potential demand and supply of P2PCS and examine impact of different policies aimed at fostering the demand and supply of P2PCS services, Beria et al. (2017) conducted surveys in Milan to identify the determinants of residents joining P2PCS, Dill et al. (2019) used surveys in Portland (US) to assess how participation in P2PCS affects car owners' driving behaviors, and Uteng et al. (2019) collected survey responses in Oslo and provided valuable insights into factors influencing participation in P2PCS and cooperative car sharing. Qualitative methods, such as interviews and focus groups, have also been extensively applied, with researchers engaging car owners, borrowers, and platform operators to delve deeper into their experiences and perspectives (Svangren et al., 2019; Wilhelms et al., 2017a, b; Bossauer et al., 2020; Neifer et al., 2024). Moreover, mixed-method approaches, such as those by Hartl et al. (2018), effectively combine interviews and surveys to examine consumer perceptions of P2PCS. Beyond primary data, some secondary sources and advanced modeling techniques have been leveraged to analyze operational, environmental, and economic impacts. For example, Prieto et al. (2022) and Daniele et al. (2025) utilized platform data from P2PCS operators, Hörl et al. (2023) employed agent-based modeling to simulate services, and Dill et al. (2019) analyzed GPS data from shared vehicles. These varied methodologies underscore the interdisciplinary and multifaceted nature of P2PCS research.

With different data sources and research questions, corresponding methodologies have been applied. One large part of studies has

applied quantitative research methods and predominantly performed econometric analysis to quantify the factor impact on P2PCS users' choices and perceptions. Based on the type of the selected dependent variables and hypothesizes, econometric models performed include binomial logit (Rotaris, 2021; Münzel et al., 2020; Tahmasseby et al., 2016; Dill et al., 2019; Beria et al., 2017), multinomial logit (Beria et al., 2017), mixed logit (Barbour et al., 2020; Li et al., 2024), probit model (Prieto et al., 2022; Prieto et al., 2017), and linear regression (Münzel et al., 2020). For example, Beria et al. (2017) used a binomial logit model and a multinomial logit model to analyze survey data from Milan, finding that potential sharers are more likely to be young, male, educated, from multi-car households, having been car sharing member, and he/she has declared a higher price sensitiveness to oil price increase and an area road pricing tool currently in force in Milan.

The second popular research method comes to the theory-based qualitative analysis and descriptive analysis, which has been applied to interview data and survey data, aiming at explaining latent phenomena and behaviors of car owners and renters in P2PCS. For example, Valor (2020) used interview data to anticipate the burden or sharing or the stress associated with their potential participation in P2PCS of car owners and renters, based on the grounded theory (GT). Hawlitschek et al. (2018) applied the Theory of Planned Behavior (Ajzen, 1991, 1985) with survey data to investigate the relative importance of consumer motives for and against P2PCS. Furthermore, simulation models have been applied to investigate the operations of P2PCS. For example, Hampshire & Sinha (2011) applied a simulation of the P2PCS operation and proposed a reservation control policy to increase the revenue generated from P2PCS. Their results show that rejecting reservations, even when the time slot is available, increases revenue when the demand is sufficiently high. A few studies also applied financial models (Schwieterman & Smith, 2020) to estimate the earnings from P2PCS for vehicle owners. Vélez & Plepys (2021) calculated greenhouse gas (GHG) emissions using a well-to-wheel (WTW) approach, which compares the GHG emission changes after applying car sharing.

A detailed summary of the contents, data sources, data analysis methods, and key findings in the P2PCS literature is presented in Appendix A at the end of this paper.

4. P2PCS vs. Traditional car sharing models: Key advantages

Although P2PCS may currently serve a niche market, research has highlighted several advantages it holds over B2C car sharing. Table 1 compares P2PCS and B2C models across operational applicability, environmental impact, and economic benefits.

A key advantage of P2PCS is its broad operational applicability. Unlike B2C car sharing, P2PCS does not require operators to maintain a vehicle fleet or manage complex business infrastructures, making it easier to implement (Hunecke et al., 2021). Studies

Table 1
Comparing P2P and B2C car sharing.

Key advantages of P2PCS	No. of supporting studies	Categories	P2P car sharing	B2C car sharing
Operational applicability	5	Urban areas Rural areas	−P2PCS can effectively serve both urban and rural environments (Shaheen et al., 2018; Hampshire & Gaites, 2011; Münzel et al., 2020; Rotaris et al., 2025; Daniele et al., 2025).	−B2C car sharing focuses on urban areas (Shaheen et al., 2018). −B2C car sharing model may struggle to achieve profitability in rural areas (Shaheen et al., 2018; Hampshire & Gaites, 2011; Münzel et al., 2020).
Environmental benefits	6	Car number	−P2PCS makes use of existing cars and does not increase total car number (Münzel et al., 2019). −People avoided new vehicle purchases due to P2P vehicle access in urban areas (Shaheen et al., 2021; Daniele et al., 2025).	−B2C needs new car production (Münzel et al., 2019) but has also been found to reduce private cars (Kolleck, 2021).
		Car travel miles	−Decrease in emissions from vehicle owners offsets the relatively minor increase from non-vehicle owners shifting to car sharing (Lewis & Simmons, 2012).	−Car sharing can increase car trip miles because of more car access (Jung & Koo, 2018).
Economic benefits	7	Car providers	−Car owners earn supplementary incomes by renting out cars when they would otherwise sit idle (Shaheen et al., 2018).	Not applicable.
		Car renters	−P2PCS offer more car pick-up/drop-off locations. −More car choices. −More affordable than B2C car sharing (Ballús-Armet et al., 2014; Nansubuga & Kowalkowski, 2021).	−The price of B2C car sharing can be higher than P2PCS (Ballús-Armet et al., 2014; Nansubuga & Kowalkowski, 2021).
		Car sharing companies	−P2PCS operators do not need to purchase and maintain a fleet of vehicles, no maintenance costs, no vehicle relocating cost, and their overhead costs can be cut by more than half compared to B2C (Hampshire & Gaites, 2011; Daniele et al., 2025). −P2PCS allows companies to gain access to vehicles that they would otherwise not be able to afford or typically not be included in B2C carsharing fleets (Shaheen et al., 2018).	−B2C car sharing businesses typically invest in standard car fleets which usually cost 70% of the total operating expenses for one-way and round-trip car sharing companies (Shaheen et al., 2012; Shaheen et al., 2018; Hunecke et al., 2021).

have shown that P2PCS can operate effectively in both urban and rural environments, including low-density areas where traditional B2C car sharing models may struggle to achieve profitability (Shaheen et al., 2018; Hampshire & Gaites, 2011; Münzel et al., 2020). This is largely because B2C models involve high fixed costs for acquiring and maintaining a fleet, which may not be economically feasible in sparsely populated neighborhoods (Hampshire & Gaites, 2011). In contrast, P2PCS leverages privately owned, underutilized vehicles, requiring minimal capital investment and enabling more flexible, cost-effective expansion into less densely populated areas, since it avoids the substantial investment and maintenance costs typical of business-to-consumer schemes (Rotaris et al., 2025).

Second, P2PCS holds greater potential than traditional B2C car sharing to make use of resources. The difference is the B2C models require the provision of additional vehicles while P2PCS leverages underused private cars, making more efficient use of existing resources (Münzel et al., 2019). Since most privately-owned cars remain idle for over 90% of the time (Hampshire & Gaites, 2011), P2PCS facilitates direct P2P exchanges that reduce the need to manufacture or deploy new vehicles (Hawlitschek et al., 2018; Lewis & Simmons, 2012). An online survey conducted in 2014 in Italy found that 19% of respondents would avoid purchasing a car due to P2PCS services access in urban areas (Shaheen et al., 2021), which has also been observed in B2C models (Kolleck, 2021). This reduction in the overall number of cars contributes to freeing up valuable urban space, including parking and roads (Perboli et al., 2018), and may help alleviate traffic congestion. For instance, a study in Bremen found that each shared vehicle removed the equivalent of 15 private cars from the road (Glotz-Richter, 2016). Moreover, in rural areas, where car ownership is often necessary due to limited public transit, P2PCS can offer a more sustainable alternative and reduce dependence on personal vehicles. Although P2PCS does not require the production of new vehicles, it's hard to see which model can reduce the overall number of vehicles the most in the long run. A survey conducted in Melbourne (Jain et al., 2022) found that B2C car sharing led to a greater reduction in private vehicle ownership (0.25 cars per household) compared to P2PCS (0.14 cars per household).

Beyond reducing the total number of vehicles, P2PCS can also lower overall vehicle miles traveled and associated emissions. While non-vehicle owning households who adopt car sharing may experience a marginal increase in their carbon footprint, vehicle-owning households who transit to P2PCS exhibit a significant reduction in their environmental impact (Lewis & Simmons, 2012). This substantial decrease in emissions from vehicle owners more than offsets the relatively minor increase from non-vehicle owners shifting to car sharing (Lewis & Simmons, 2012). Another study identified that car sharing users who abandoned private car ownership can decrease their carbon footprint of transport by approximately 40% (Vélez, 2023). At the same time, differences between the carbon footprints of B2C and P2P car sharing users were marginal (Vélez, 2023). Thus, similar to B2C models, P2PCS supports emission reductions and aligns with broader societal goals of sustainability, flexibility, and reduced environmental impact. These findings highlight P2PCS's potential to generate meaningful environmental benefits beyond simply reducing vehicle ownership.

Economic impact has been discussed the most in literature. Compared to traditional B2C car sharing models, P2PCS provides different economic advantages to car owners, car renters, and service operators. For car owners, P2PCS offers an opportunity to earn supplementary income by renting out their cars when they would otherwise sit idle. This allows them to monetize their underutilized assets and contribute to the broader shared economy, advantages that are not present in the traditional B2C model (Shaheen et al., 2018). For renters, P2PCS can offer lower costs compared to B2C models, as private car owners were found to typically seek only supplementary income and set more affordable rental prices (Nansubuga & Kowalkowski, 2021). Additionally, the vehicle pool is broader, and rental prices may be further reduced because car sharing companies do not bear the expenses of vehicle purchase and maintenance. Owners, in turn, can offset some of their vehicle expenses by accepting lower prices (Dill et al., 2019). As a result, P2PCS

Table 2
Public perception and behavioral barriers of P2PCS.

Rank	Barrier	No. of supporting studies	Discussed in papers
1	−Lack of trust. −Lack of knowledge of the renter/owner. −Discomfort with sharing the car with a stranger.	11	Wilhelms et al., 2017a,b,d; Bossauer et al., 2019, 2020; Neifer et al., 2024; Olaru et al., 2021; Anthony Jnr, 2024; Rotaris, 2021; Rotaris & Scorrano, 2023; Ballús-Armet et al., 2014.
2	−Car owners' concern about potential vehicle damage. −Removal of personal belongings. −hygiene and orderliness. −Limited flexibility and control of car use.	8	Rotaris & Scorrano, 2023; Rotaris, 2022; Shaheen et al, 2018; Li & Feng, 2025; Bemmouna & Alyousif, 2020; Hunecke et al., 2021; Daniele et al., 2025; Bergantino et al., 2025.
3	−Resistance to changing travel habits. −Preference for private car use.	5	Kristensen, 2015; Sivasubramaniyam et al., 2020; Itzchakov et al., 2018; Lanzini & Khan, 2017; Daniele et al., 2025.
4	−Car renters' concern about convenience. −Car renters' concern about the level of services.	4	Shaheen et al., 2018; Nansubuga & Kowalkowski, 2021; Hunecke et al., 2021; Bergantino et al., 2025.
5	−Low awareness of this service.	5	Ballús-Armet et al., 2014; Shaheen et al., 2018; Rotaris, 2021; Rotaris et al., 2025; Daniele et al., 2025.
6	−Privacy concerns. −Worries about data misuse.	2	Bossauer et al., 2019; Hunecke et al., 2021.

enables renters to save money compared to traditional car rentals or ownership, improving overall affordability (Ballús-Armet et al., 2014). From the service provider's perspective, research has found the P2PCS market to be economically viable (Hampshire & Gaites, 2011). It's found that B2C car sharing businesses typically invest in standard car fleets, which usually cost 70% of the total operating expenses for one-way and round-trip car sharing companies (Shaheen et al., 2012). Since P2PCS operators do not need to purchase and maintain a fleet of vehicles, their overhead costs can be cut by more than half compared to B2C (Hampshire & Gaites, 2011). This improved cost structure helps make the P2PCS market economically viable in the long term.

5. Barriers to the adoption of P2PCS

Despite its growing popularity and potential, several barriers continue to hinder the widespread adoption of P2PCS. These obstacles can be grouped into three main categories: public perception and behavioral barriers, market barriers, and operational challenges, as illustrated in the subsections below.

5.1. Public perception and behavioral barriers

Among these, public perception and behavioral issues have received the most attention in literature, as summarized in Table 2. Bossauer et al. (2020) suggested that trust is the lubricant of the sharing economy. This is particularly true in P2PCS, in which one leaves a highly valuable good to a stranger in the hope of getting it back unscathed (Bossauer et al., 2020). A lack of trust remains one of the most frequently cited deterrents to P2PCS adoption (Ballús-Armet et al., 2014; Guglielmetti Mugion et al., 2019; Rotaris, 2021). Studies have addressed the source of trust concern from stranger concern (Olaru et al., 2021; Bossauer et al., 2019; Wilhelms et al., 2017a; Valor, 2020). Many people do not use P2PCS because they are not ready to share their car with strangers (Bossauer et al., 2019). Transactions made with strangers would involve asymmetric information and economic risks (Wilhelms et al., 2017b) and can cause the burden of sharing or feelings of stress, anxiety, and fear (Valor, 2020). Julsrud & Uteng (2021) found that both in-group and out-group (i.e., trust towards friends/family or unfamiliar persons) trust levels are significantly lower among P2PCS users compared to those using cooperative or B2C models. According to Wilhelms et al. (2017a), in B2C car sharing, renters benefit from repeated interaction with a single service provider, which follows a predefined set of processes, and the rented cars are largely of the same quality and overall condition. However, in P2PCS, renters need to develop trust toward the vehicle owner (e.g., regarding car maintenance, cleanliness, and availability) and need to do so for every single transaction with a different owner.

Beyond trust, other perceptions and behavioral concerns also exist and are linked to the trust issue. Interviews conducted by Rotaris & Scorrano (2023) in Friuli-Venezia Giulia identified a range of user concerns, including time flexibility, personal belongings, car damage, cleanliness, key handover inconvenience, and familiarity with the owner or renter. For car owners, the primary concern is vehicle damage, along with the inconvenience of not having access to their car while it is being rented (Shaheen et al., 2018; Hunecke et al., 2021). Besides, car owners who maintain their vehicles in pristine condition might see the extra effort required for cleaning as a barrier, especially when hygiene and orderliness significant concerns (Valor, 2020; Li & Feng, 2025). Renters, on the other hand, face challenges such as unresponsive hosts, vehicle unavailability, and inconvenient vehicle locations (Shaheen et al., 2018). Without automated access systems, there was also an inconvenience associated with scheduling and coordinating with vehicle hosts for a key transfer (Shaheen et al., 2018). Nansubuga & Kowalkowski (2021) found that car renters are also concerned about the level of service, which may vary from one individual car owner to another, as P2P cars are owned by individuals. Furthermore, concerns about privacy are prevalent, as users are wary of how their data may be used (Hunecke et al., 2021). Using survey data from Italy, Bergantino et al. (2025) found that car owners tend to be more skeptical and reluctant to engage in P2PCS, and renters' concerns about unexpected costs, vehicle malfunctions, and the inconvenience of locating or accessing a car are particularly pronounced among women, older adults, and individuals with lower levels of education.

Previous travel habits also play a crucial role in shaping attitudes toward P2PCS. Studies have found that a consumer's previous transportation habit could have a negative effect on adopting car sharing (Kristensen, 2015), and people with strong habits of commuting by private car are less likely to engage in obtaining new information about alternative travel modes (Sivasubramaniyam et al., 2020; Itzchakov et al., 2018; Lanzini & Khan, 2017; Ouellette & Wood, 1998; Gifford, 2011). This has been frequently identified in transportation research to explain why people often cannot change their travel patterns to more environmentally friendly travel (Ramos et al., 2023). In Italy, private cars continue to be perceived as status symbols, and personal car ownership remains the preferred choice among many individuals (Daniele et al., 2025). Finally, low public awareness of P2PCS platforms remains a major adoption barrier. A survey in the San Francisco Bay Area found that fewer than 50% of San Francisco residents and only 25% of Oakland residents had heard of P2PCS (Ballús-Armet et al., 2014). Similar findings emerged in Italy, where surveys conducted in 2019 and 2022 revealed that most residents of Friuli-Venezia Giulia were unaware of existing P2PCS platforms (Rotaris, 2021, 2022). According to Rotaris (2021), although 50% of the interview sample knew what a CS service is, none of the individuals knew what a P2PCS is, and nobody was aware that there are already two platforms providing this service in Italy, illustrating a significant lack of awareness of P2PCS. Interestingly, a more recent survey in Italy reports substantially higher awareness of P2PCS, with 68% of car owners and 63% of car renters indicating familiarity with the concept (Bergantino et al., 2025). This suggests a notable improvement in public awareness of the service, while also indicating continued scope for further enhancement.

5.2. Market barriers

Market-related factors also present major obstacles to P2PCS adoption, particularly due to low supply and demand, as well as strong

competition from alternative mobility services, as shown in Table 3. Some research has highlighted limited interest in both renting and offering vehicles. For example, a survey at a Swedish university found that car sharing was one of the least favored P2P services compared with other shared services, with only 8.92% of participants expressing interest in providing it (Laurenti & Acuña, 2020). Similarly, a multi-year study of Getaround in Portland revealed low rental demand, especially outside central neighborhoods, and showed that 27% of participating car owners either never rented out their vehicles or did so infrequently (Dill et al., 2017). These findings highlight the need to address both low demand and limited vehicle supply to support the growth of P2PCS.

P2PCS faces intense competition from established transport alternatives, including B2C car sharing, conventional car rental services, and public transport. Traditional B2C car sharing offers high flexibility through short-term, on-demand rentals, while car rental companies provide medium- and long-term vehicle access, often at comparatively low prices (Daniele et al., 2025). This competitive landscape confines P2PCS largely to niche or underserved segments of the mobility market. Evidence suggests that B2C car sharing competes particularly strongly with P2PCS for family users, who may find coordination with individual car owners less convenient than renting from professional providers (Prieto et al., 2017). Moreover, some users perceive peer-to-peer interactions as more burdensome than transactions with formal services (Kristensen, 2015). Public transport constitutes another major competitive alternative: while a strong public transport network does not appear to deter car owners from participating as hosts, it presents a significant barrier to attracting carless consumers, who often perceive public transport as more convenient and reliable than P2PCS (Kristensen, 2015). Rather than emphasizing direct competition, P2PCS may therefore be more effectively positioned as a complementary component of the existing transport system, addressing specific mobility gaps and enhancing overall system flexibility.

Competition in shared mobility increasingly extends to technological innovations, particularly driverless/autonomous vehicles (DVs/AVs). Although only a limited number of studies have examined the relationship between P2PCS, car sharing, and shared autonomous vehicles (SAVs), this topic deserves attention given the anticipated transformative impact of autonomous technologies on the future transport landscape. Advances in autonomous driving bring both opportunities and challenges to shared mobility systems (Tu & Xu, 2024). SAVs have been proposed as an emerging business model that can operate under different configurations (Silva et al., 2024). In fleet-based models, companies provide on-demand autonomous mobility services, whereas in sharing-based models, private AV owners offer the unused capacity of their vehicles to mobility service platforms. Within this context, AVs and SAVs have the potential to both disrupt and enhance P2PCS. Door-to-door autonomous mobility services may directly compete with P2PCS and traditional car-sharing models by offering lower costs, greater convenience, and higher scalability. Conversely, autonomous vehicle relocation and scheduling could complement sharing systems by improving vehicle availability and operational efficiency. Integrating car sharing with autonomous technologies may also generate broader societal benefits. For example, sharing privately owned AVs could help mitigate future parking challenges and improve urban space efficiency (Hu et al., 2025). These developments have a dual effect: AVs and SAVs may enable new hybrid models that complement P2PCS—such as private owners renting out autonomous vehicles—while simultaneously posing competitive pressures that could reduce demand for human-driven P2P rentals. Empirical evidence supports this ambivalence. A survey of 751 Australian vehicle owners found that, although concerns about DV technology persist, respondents expressed even greater apprehension toward car sharing, indicating ongoing acceptance barriers for P2PCS (Olaru et al., 2021). Nevertheless, P2PCS principles remain applicable within SAV systems, as private AV owners may constitute a key customer segment for shared autonomous mobility (Silva et al., 2024). In line with this, Zhang et al. (2025) proposed a vehicle-sharing scheme that enables private AV owners to integrate their vehicles with mobility platforms. Rather than treating these business models as competitors, a convergence between P2PCS and autonomous mobility may offer a more sustainable and adaptive development pathway for future shared transport systems.

5.3. Operational barriers

Operational barriers from several sources also significantly impact the effectiveness and attractiveness of P2PCS, as listed in Table 4. First, issues have been found with vehicle availability and the variety of car types, i.e., some consumers were unsatisfied with limited access to the service, and some consumers found that the type of car they were looking for was not available to them (Kristensen, 2015). If the consumers do not have the opportunity to access the service easily and pick the desired car type, the service becomes unusable (Kristensen, 2015). These make participation in P2PCS a decision under multiple uncertainties for renters (Li et al., 2024). In addition, Münzel et al. (2019) found that P2PCS may not be often used as part of people's normal routine as they often use it with B2C car sharing, which could be because the car availability and accessibility in P2PCS is often not as solid as B2C car sharing.

Table 3
Market barriers of P2PCS.

Rank	Barrier	No. of supporting studies	Discussed in papers
1	−Low demand for rentals. −Limited availability of shared cars. −Low interest in sharing cars.	5	Dill et al., 2017; Laurenti & Acuña, 2020; Sprei & Ginnebaugh, 2018; Shaheen et al., 2012; Shaheen & Cohen, 2013.
2	−Competition with public transportation, especially for carless consumers. −Competition with B2C car sharing due to lower P2PCS usage frequency and more cost-conscious users of P2PCS. −Competition with driverless/autonomous vehicles.	4	Kristensen, 2015; Münzel et al., 2019; Olaru et al., 2021; Daniele et al., 2025.

Table 4
Operational barriers of P2PCS.

Rank	Barrier	No. of supporting studies	Discussed in papers
1	−Insurance cost. −Insurance availability. −Insurance complexity.	8	Kristensen, 2015; Shaheen et al., 2012; Shaheen et al., 2018; Shaheen & Cohen, 2013; Ballús-Armet et al., 2014; Daniele et al., 2025; Rotaris et al., 2025; Bergantino et al., 2025.
2	−Pricing and financial incentives. −Extra cost for car owners. −Unclear taxation of rental income.	5	Kristensen, 2015; Anthony Jnr, 2024; Shaheen et al., 2012; Shaheen & Cohen, 2013; Daniele et al., 2025.
3	−Car availability and accessibility issues.	3	Kristensen, 2015; Ballús-Armet et al., 2014; Münzel et al., 2019.
4	−Coordination challenges (e.g., key exchange and scheduling).	2	Rotaris & Scorrano, 2023; Shaheen et al., 2018.

Insurance is one of the most frequently reported barriers to P2PCS adoption. High costs, limited availability, and varying responsibilities between platforms, car owners, and renters all complicate participation (Shaheen et al., 2012; Shaheen & Cohen, 2013). Securing appropriate insurance coverage is particularly challenging for P2PCS platforms, as traditional insurers are often reluctant to adapt to this emerging market, and historical data for pricing policies is scarce (Daniele et al., 2025). A study by Shaheen et al. (2018), based on interviews with 12 P2PCS operators in San Francisco and Oakland from mid-2013 to early-2014, revealed that most companies provide mandatory insurance which charged per reservation, per month, or per year, bundled with usage fees. However, some platforms leave insurance entirely to the car owners and renters, while their liability only extends to individuals who have sufficient insurance coverage. In other cases, a single vehicle in a P2PCS network can also receive insurance from more than one party, such as Turo, which is covered by two different insurance policies: one that insures the vehicle's use by the host and the other that covers all driving by guests. High insurance premiums remain a major cost for platform operators. Membership fees for hosts and guests often include insurance, with some platforms allocating up to 20% of these fees to coverage, making it the largest operational expense (Shaheen et al., 2018; Rotaris et al., 2025). However, a lack of insurance coverage can discourage the participation of car owners. In the survey study conducted in the San Francisco Bay Area, Ballús-Armet et al. (2014) noted that where the platform provider's package did not include insurance, fewer owners were willing to offer their car. According to Li & Feng (2025), insurance of the shared cars normally needs to be addressed in the commercial agreement between the car sharing company with the car owners or car renters, with some car owners needing to upgrade their insurance to meet platform requirements for unforeseen incidents. Although management of insurance issues has stabilized in recent years, as operators have found ways to exist within industry frameworks, the provision of insurance remains an evolving dynamic within the shared mobility industry (Shaheen et al., 2018).

Moreover, Pricing in P2PCS presents challenges for both car owners and renters to participate. Typically, the fees paid by users are divided between platforms and car sharers, referred to as "profit share" (Li & Feng, 2025). Car owners can perceive that the monetary gain is not high enough compared to the hassle and repairs that would follow renting out their car (Kristensen, 2015). Regular inspections are crucial for maintaining vehicle safety standards, and business operators typically incur lower inspection costs than private car owners (Li & Feng, 2025). The demand for car sharing needs to be high enough for the car owners to get the pay they want. Taxation of rental income is also a concern due to regulatory ambiguity; for example, Daniele et al. (2025) note that the Italian government has not yet provided clear guidance, leaving the legal framework for P2PCS earnings unclear. At the same time, sharing one's car also introduces extra costs for car owners, e.g., increased insurance and maintenance due to higher mileage (Li & Feng, 2025). The willingness to bear these costs varies among owners, depending on car characteristics like age, type, size, brand, and model (Li & Feng, 2025). On the other hand, affordability can become an external barrier for a consumer to engage in a P2PCS service (Kristensen, 2015). Some scholars have found that consumers can see pricing as a barrier and therefore do not want to use the service because of their high price perception. Using survey data from Italy, Bergantino et al. (2025) estimate that a potential market equilibrium occurs at an hourly rental price of €5, at which approximately 60% of respondents would be willing to participate in P2PCS. Carless consumers will likely compare prices and time used with public transportation (Kristensen, 2015). This is another level of competition with public transport. Even though the P2PCS can be perceived as cheaper than other car sharing modes, it can hardly be cheaper than public transport.

Finally, logistical challenges, such as coordinating key exchanges and ensuring timely access to vehicles, can create friction for both renters and owners (Shaheen et al., 2018). The multiyear study of P2PCS in Portland also proposed the unclear scheduling process as a negative element of applying P2PCS (Dill et al., 2017).

6. Characteristics and motivations of P2PCS users

Many studies have gained insights into the demographic and behavioral characteristics of car owners/sharers and renters, as well as the motivations for owners to share their cars and renters' drivers to rent a car from the P2PCS service. A summary of P2PCS user characteristics and motivations to use P2PCS is presented in Table 5.

Studies have highlighted demographic and behavioral characteristics of P2PCS users. For car owners who participate in P2PCS, a survey in Portland, Oregon (Mathez, 2015) found that those who joined P2PCS were typically younger and well-educated, consistent with research on traditional car sharing. Similarly, a survey in Milan identified potential car sharers as young, educated males who are

Table 5
A summary of P2PCS user characteristics and motivations from literature.

Users	Characteristics	No. of studies	Motivations to join P2PCS	No. of studies
Car owner	−Male (Beria et al., 2017; Barbour et al., 2020; Shaheen et al, 2018; Prieto et al., 2017). −Female (Rotaris, 2022). −Young (Mathez, 2015; Beria et al., 2017; Barbour et al., 2020; Rotaris, 2022). −High-educated (Mathez, 2015; Beria et al., 2017; Bergantino et al., 2025). −Low income (Barbour et al., 2020). −Being cost sensitive (Beria et al., 2017). –Non-retired (Rotaris, 2022). −With a green travel behavior (Beria et al., 2017; Barbour et al., 2020). −Having environmental concerns (Rotaris, 2022). −Students (Uteng et al., 2019; Rotaris, 2022). −Employees starting in new jobs (Uteng et al., 2019). −Having a car not frequently used (Rotaris, 2022; Ballús-Armet et al., 2014; Münzel et al., 2019).	10	−Economic interest and utilizing unused assets (Beria et al., 2017; Wilhelms et al., 2017b; Svangren et al., 2019; Shaheen et al., 2018; Münzel et al., 2019; Bergantino et al., 2025). −Environmental concern/ achieving sustainability (Beria et al., 2017; Wilhelms et al., 2017b; Svangren et al., 2019; Shaheen et al., 2018; Münzel et al., 2019; Bergantino et al., 2025). −Providing convenience and helping others (Svangren et al., 2019; Wilhelms et al., 2017b; Münzel et al., 2019; Shaheen et al., 2018). −Interacting with people (Svangren et al., 2019; Dill et al., 2017).	7
Car renter	−Female (Rotaris, 2022). −Male (Bergantino et al., 2025). −Young (Shaheen et al., 2018; Rotaris, 2022; Bergantino et al., 2025). −High educated (Kristensen, 2015). −Low income (Kristensen, 2015). −Lower level of education and income but more cost-sensitive than B2C users (Münzel et al., 2019).	9	−Convenience (Dill et al., 2017; Ballús-Armet et al., 2014; Shaheen et al., 2018; Münzel et al., 2019; Wilhelms et al., 2017c; Bergantino et al., 2025).	8

(*continued on next page*)

Table 5 (*continued*)

Users	Characteristics	No. of studies	Motivations to join P2PCS	No. of studies
	−Living in small towns or rural areas (Rotaris, 2022). −Aiming at trip choice of leisure, such as vising friends and short holiday trips (Dill et al., 2017; Ramos et al., 2023). −Using more public transport and driving less (Shaheen & Bansal, 2015; Ballús-Armet et al., 2014; Rotaris, 2022; Münzel et al., 2019).		−Cost efficiency (Ballús-Armet et al., 2014; Shaheen et al., 2018; Hawlitschek et al., 2018; Münzel et al., 2019; Wilhelms et al., 2017c; Bergantino et al., 2025). −Expanded mobility options (Ballús-Armet et al., 2014; Shaheen et al., 2018; Münzel et al., 2019; Bergantino et al., 2025). −Independence through car ownership (Hawlitschek et al., 2018; Dill et al., 2017). −Supporting the local (Dill et al., 2017). −Realize lifestyle expectations (Wilhelms et al., 2017a; Hawlitschek et al., 2018).	

cost-sensitive and environmentally conscious, often using bicycles and local public transport (Beria et al., 2017). In Oslo, a web-based survey found P2P schemes were particularly significant for two groups: students moving to Oslo and employees starting new jobs (Uteng et al., 2019). A survey conducted in Florida in 2018 (Barbour et al., 2020) provided further insights, showing that Caucasian female respondents who live in one-person households and have less than 5 min one-way travel time but more than one mile distance to a grocery store had a higher probability of being extremely unlikely to rent their personal vehicle to receive monetary compensation in exchange. This suggests additional impacts from factors of race, household composition, vehicle ownership, and proximity to amenities. More recently, interviews in Friuli-Venezia Giulia, a less-densely populated Italian area, found that the unemployed, students, or employed individuals were more willing to rent out their car than the retired or homemakers (Rotaris, 2022). Car owners who possessed a city car unused during weekdays or for more than six hours a day also showed higher willingness to participate (Rotaris, 2022). Notably, while several studies have reported that females are generally less likely than males to rent out their vehicles (Shaheen et al., 2018; Barbour et al., 2020; Prieto et al., 2017), Rotaris (2022) found the opposite in her study, possibly due to regional differences. Finally, Barbour et al. (2020) noted that body mass index and other health-related variables had no significant impact on the decision to join P2PCS.

Regarding the characteristics of car renters, Münzel et al. (2019) found that B2C and P2P users do not differ greatly except in terms of their education and income level, as well as their used transportation set. Higher-income and better-educated individuals tend to prefer the more expensive but convenient B2C option, whereas cost-sensitive users are more inclined to choose less expensive P2PCS (Münzel et al., 2019). This had also been confirmed in an earlier study where Kristensen (2015) found that individuals with higher education levels were more likely to join P2PCS services, possibly due to stronger environmental awareness and lower car ownership rates. In terms of income, those in the low-mid income class were more likely to become car renters (Kristensen, 2015). As with B2C car sharing services, P2PCS renters also tend to be younger than the population's average (Shaheen et al., 2018). Regarding trip purposes, a study in German cities showed that P2PCS was particularly favored for short holiday travel compared to free-floating or round-trip models (Ramos et al., 2023). In Portland, Oregon, a multi-year study revealed that out of 894 P2PCS trips, 24% were for out-of-town recreation, 21% were work-related, and 14% were for shopping or errands (Dill et al., 2017). Notably, leisure trips, such as visiting friends or engaging in recreation-oriented activities, were most likely to have not been made absent the P2PCS service (Dill et al., 2017). Travel behavior also influences renting P2PCS. Surveys in the San Francisco Bay Area shows that people who drive more are less likely to consider P2PCS, while those who rely more on public transit are more open to it (Shaheen & Bansal, 2015; Ballús-Armet et al., 2014). A similar trend was found by Rotaris (2022) and Münzel et al. (2019), who observed that lower car-dependency/travelling by car only a few days per week increases the willingness to rent a car. Rotaris (2022) found that willingness to rent a P2PCS vehicle in Italy is higher among women, individuals under 45 years of age, employed persons, and residents of small towns or rural areas. By contrast, a more recent survey reports greater interest among young men under 25 and residents of Southern Italy, highlighting heterogeneity in renter profiles across studies and contexts (Bergantino et al., 2025).

Beyond user characteristics, numerous studies have explored what motivates car owners to share their vehicles through P2PCS. Although economic benefit consistently emerges as the primary incentive (Beria et al., 2017; Wilhelms et al., 2017b; Svangren et al., 2019; Shaheen et al., 2018; Münzel et al., 2019), non-financial motivations also play a significant role. For example, Barbour et al.

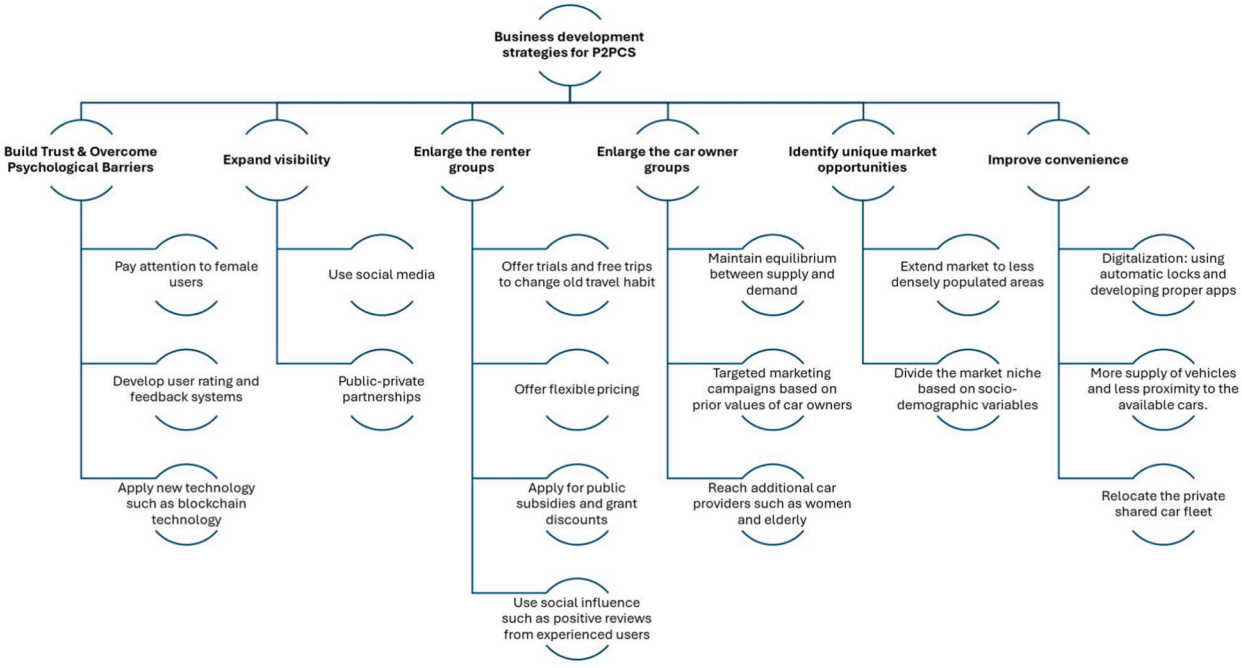

Fig. 2. Summary of business development strategies.

(2020) observed considerable heterogeneity among households with high annual income, suggesting that renting enables usage of their idle possessions, which many providers find gratifying even in the absence of financial need. Similarly, a survey in Portland, Oregon, found that many participants joined simply because they liked the idea of P2PCS, and the higher-income non-millennials were less motivated by economic reasons (Mathez, 2015). In addition to utility, P2PCS was found to offer emotional and social value. Wilhelms et al. (2017a, b, c) reported that both owners and renters derive personal meaning from participation: renters fulfill certain lifestyle aspirations, while owners express their identity and support others' mobility. A focus group study in the Bay Area, United States, further highlighted the advantages perceived by P2PCS car owners such as helping with vehicle access and sharing luxury vehicles with others (Shaheen et al., 2018).

Environmental concern has also been recognized as a motivational factor influencing users' participation in P2PCS. Although it is not the primary driver for most participants, many perceive environmental benefits as a positive and desirable outcome of car sharing. Evidence suggests that individuals with stronger pro-environmental values are more likely to adopt P2PCS, appreciating its potential to reduce the overall number of cars on the road (Kristensen, 2015; Dill et al., 2017). Quantitative assessments further indicate that the most substantial emission reductions occur when prospective car buyers decide to forgo vehicle ownership and instead use P2PCS, resulting in an estimated 85% decrease in their overall transport footprint (Vélez, 2023; Kerr, 2022). Similarly, when existing car owners start sharing their vehicles, their transport-related emissions can decline by approximately 41%, though such effects are subject to uncertainties related to changes in income, savings, and consumption patterns (Vélez, 2023). For some participants, joining P2PCS can reinforce pre-existing intentions to drive less and adopt more sustainable travel behaviors (Dill et al., 2017). Nevertheless, sustainability is generally not a central motive for most peer-providers; rather, it is viewed as an indirect and positive consequence of participation (Wilhelms et al., 2017b; Hartl et al., 2018). It's proposed that social desirability bias may shape respondents' reported attitudes—while environmental motives are rarely mentioned spontaneously, users often express reflective and detailed thoughts about sustainability when prompted (Kristensen, 2015).

In terms of the motivation for renting a car from the P2PCS service, several key drivers have been identified in the literature. Hawlitschek et al. (2018) highlighted financial benefits, trust in other users, and a preference for a modern and car-independent lifestyle as primary factors influencing participation. Convenience also emerges as a dominant motivator across studies, encompassing aspects such as spatial proximity to available cars, service flexibility, and ease of access (Dill et al., 2017). P2PCS additionally alleviates common ownership-related concerns, including vehicle theft, parking, street cleaning, or other concerns associated with personal vehicle ownership (Shaheen et al., 2018), offering benefits comparable to B2C car sharing. Renters further value the broader variety of vehicles available through P2PCS compared to other shared mobility options such as traditional car sharing, scooter sharing, or bike sharing (Shaheen et al., 2018). However, car brands appear to be of minor importance to renters; Pelech (2024) found that vehicle availability and price are considerably more influential attributes. The flexible pricing structure of P2PCS is particularly attractive for longer-distance trips, where it often remains more affordable than round-trip car sharing (Shaheen et al., 2018). Finally, some renters are motivated by altruistic or the opportunity to support the local or sharing economy, preferring to direct spending toward individuals in their community rather than the outside companies (Dill et al., 2017).

7. P2PCS business development strategies and public policy recommendations

Overcoming the barriers to P2PCS adoption and growth requires a combination of targeted business strategies and supportive public policies. Effective approaches should aim to build trust among users, address operational concerns, encourage behavioral shifts, identify niche market opportunities, and enhance overall service quality. This section outlines key strategies drawn from existing literature and best practices.

7.1. Business development strategies

This subsection presents a set of business development strategies that platform managers can adopt to strengthen the P2PCS ecosystem. These strategies, summarized in Fig. 2, are designed to improve platform performance, user experience, and market competitiveness.

First, to overcome behavioral psychology barriers, P2P platforms still need to increase their level of trust among users. Readers can consult the literature review by Räisänen et al. (2021), which summarized 28 technological solutions to build user trust in sharing economy platforms. Some universally applied trust-enhancing solutions across sharing economy platforms include background checks, back-up insurance, identity verification, profiles/personal information, rating systems, reputation systems, reviews, and secure payment systems (Räisänen et al., 2021). In P2PCS, unlike B2C models where trust is institution-based and users rely on a company's reputation and standardized systems, trust in P2PCS relies more heavily on interpersonal mechanisms and transparent peer interactions. In addition, as most studies indicate that car sharing adoption rates are higher among men than women (del Mar Alonso-Almeida, 2019), integrating gender-sensitive trust mechanisms becomes increasingly important. Prior research has shown that trust-related concerns often act as a significant barrier to women's participation in P2PCS (Prieto et al., 2017). Enhancing transparency through detailed information on vehicle history, previous trip evaluations, and peer reliability can help mitigate these concerns. In addition, transparent booking systems, robust identity verification procedures, and guaranteed reimbursement mechanisms are essential for reducing perceived risks and strengthening user confidence (Bergantino et al., 2025). Such measures not only improve overall trust in P2PCS platforms but are especially effective in encouraging greater participation from women users (del Mar Alonso-Almeida, 2019).

According to the literature, a comprehensive approach to trust-building for P2PCS involves establishing a user rating and feedback

system (Ramos et al., 2023), operator screening, social networking, vehicle quality assurance, and responsive customer service (Shaheen et al., 2012). User ratings are believed to be a central mechanism for establishing trust in P2PCS nowadays (Bossauer et al., 2020). P2PCS requires more peer-specific and decentralized trust mechanisms. To address this need, several studies have proposed innovative approaches to developing user rating and feedback systems tailored to the unique peer-to-peer context. Bossauer et al. (2020) suggested that integrating connected car technology can further support trust-building by providing driving behavior statistics as part of user profiles. However, such data collection raises privacy concerns, necessitating a careful design that differentiates information types, context, and negotiability of disclosure. Bossauer et al. (2019) found that people's willingness to share personal information increases when users perceive that data sharing aligns with principles of reciprocity and is limited to necessary circumstances, such as emergencies. It was found that connected car technologies can not only increase trust before rentals but also maintain it during and after the transaction (Bossauer et al., 2020). Moreover, algorithm-based scoring systems have proven effective in supporting trust development in P2PCS, even though user ratings face problems such as fake or biased ratings (Neifer et al., 2024). P2P based sharing was found to be based on a technological-based trust to a high degree (Julsrud & Uteng, 2021). Blockchain technology has been frequently proposed for P2PCS (Auer et al., 2022; Postorino & Sarnè, 2023; Patil et al., 2022; Bossauer et al., 2019; Valaštín et al., 2019), which helps make reputation scores publicly accessible and unchangeable and allows the P2PCS transport solution to be managed without third parties (Postorino & Sarnè, 2023; Abubaker et al., 2019). By creating a more transparent and trustworthy environment, P2PCS can encourage greater participation from both car owners and renters.

Second, expanding visibility of the P2PCS platform is essential for business development. Ballús-Armet et al. (2014) call for more outreach and education to inform potential users about the benefits of this mobility innovation. Rotaris (2021) recommends that P2PCS platforms intensify their promotional efforts using diverse channels, including social media. Wilhelms et al. (2017a) suggest that social media is a powerful tool for promoting car sharing, as mobility-related content is frequently shared. Campaign messages should be framed to resonate with users and encourage sharing on platforms like Facebook and Instagram (Wilhelms et al., 2017a). Moreover, to increase their visibility, they could engage in public–private partnerships with local administrators and public transport providers (Rotaris, 2021). They should provide a more detailed description of the characteristics of the service, informing not only how the service works but also how both car owners and renters could benefit from sharing a private vehicle, emphasizing also the favorable motives stated by our sample (Rotaris, 2021).

Third, to enlarge the renter groups of P2PCS, overcoming ingrained travel habits is critical. Research by Verplanken et al. (1997) indicates that temporary structural changes can help "unfreeze" existing habits, encouraging users to explore alternative modes of transportation. Offering trials and free trips can facilitate this behavioral change and travel mode choices (Fujii & Kitamura, 2003). Additionally, increasing users' trust in the service and enhancing their perception of control over their travel choices can further support the transition away from habitual private car use (Acheampong & Siiba, 2020; Derikx & van Lierop, 2021). In terms of pricing,

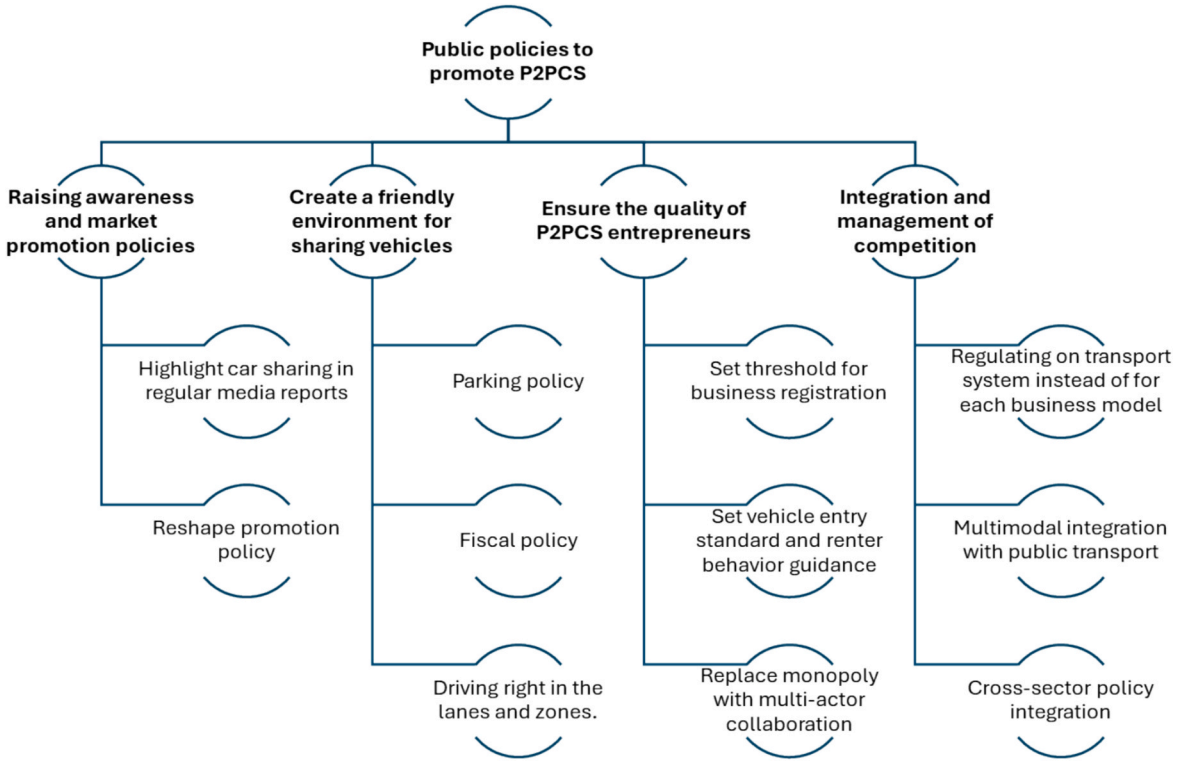

Fig. 3. Summary of public policies to promote P2PCS.

Kristensen (2015) proposed to provide a flexible charge depending on car type or lower charges when driving a more environmentally friendly car, giving car renters more choices. To launch and attract renters in less densely inhabited areas, P2PCS platforms should at least temporarily grant special discounts to new members living in rural areas, applying for public subsidies in light of the higher accessibility level guaranteed due to the service offered (Rotaris, 2021). In addition, social influence has been an important contributor to people's choice behavior (Woo et al., 2024). For instance, positive reviews from experienced users can significantly increase perceived utility (Rasouli & Timmermans, 2016), which can be applied to attract both car renters and owners of P2PCS.

It is worth noting that the balance between supply and demand is crucial, as P2P shared mobility platforms fail if the balance between supply and demand is not reached (Kumar et al., 2018). For example, Koolicar, a P2P exchange platform that allowed renting/leasing of family cars in France, ceased its activities in 2018. Its founder stated in an interview (Usine Digitale, 2018) that the reason for the failure was the insufficient supply of cars available for rent, which affected demand. Exploring both sides of the P2P shared transportation market is therefore critical to managing potential supply–demand imbalances (Prieto et al., 2022).

To gain more car owners to join the P2PCS service, Wilhelms et al. (2017a) categorized car owners based on the prior values motivating them in car sharing and developed targeted marketing campaigns. This study proposed that car owners mainly put their personal benefits first and postpone the benefits for renters, and consequently, advantages for others are perceived as a side product of P2PCS (Wilhelms et al., 2017a). To attract the group of car owners whose main goal is to lower the costs of car ownership, the P2P networks need to clearly outline the ability to save money by reducing fixed costs and highlight the minimal effort required to participate in P2PCS (Wilhelms et al., 2017a). Communication campaigns should adapt the indirect costs resulting from car ownership and highlight the possibility of reducing these costs (Wilhelms et al., 2017a). For car owners who are worried about car maintenance, one way is to provide some specific facts about how much wear and tear the car really gets compared to the monetary gain (Kristensen, 2015). For the car owners who aim at additional income for enjoyment enhancement, i.e., getting extra funds for special things in life, such as premium opera tickets, the motivation is not to save money but to spend it in fields they could not otherwise afford (Wilhelms et al., 2017a). In a sales pitch, dealers could show these groups of consumers how a single one-day rental transaction can create the necessary funds needed to pay for months of a sunroof, entertainment, or driver assistance system (Wilhelms et al., 2017a). Another group of car owners takes pride in empowering renters with a unique experience and in being part of this experience (Wilhelms et al., 2017a). Communication campaigns should emphasize the good feeling that car owners experience when their car is generating a purpose by offering mobility to others (Wilhelms et al., 2017a). Recent research by Turoń et al. (2025) underscores that economic factors, especially energy consumption and safety technologies, are central concerns. Meanwhile, Li & Feng (2025) found that free services like car inspections and cleaning significantly enhance participation intentions by mitigating concerns over additional insurance and maintenance costs. Minimizing effort remains a key factor across all groups, so that platforms should offer in-vehicle telematics (Le Vine et al., 2014) for owners to easily monitor vehicle usage, fuel consumption, and performance (Turoń et al., 2025). Finally, outreach should also target underrepresented provider groups, such as women and the elderly, to broaden participation (Giesel & Nobis, 2016).

The fifth strategy is to identify unique market opportunities for P2PCS. As the B2C car sharing market has grown extensively and diversified with various business models, P2PCS must carve out a unique niche to thrive. According to the market study of Münzel et al. (2019), B2C and P2PCS services can be considered close substitutes as the users are, in the first place, interested in getting access to a car. The key difference holds that B2C users are more frequent users who look for a convenient service, whereas P2P users have less money to spend and use car sharing only infrequently (Münzel et al., 2019). It can be followed that at the moment P2PCS is rather used for special purposes, whereas B2C users make it part of their normal routine (Münzel et al., 2019). Nowadays, B2C car sharing is becoming cheaper and better connected nationally and internationally, indicating that the convenience levels and price differences will be smaller progressively between P2P and B2C car sharing (Münzel et al., 2019). To remain competitive, P2PCS must leverage its scalability, particularly in less densely populated areas where start-up and operating costs are lower compared to B2C services (Rotaris, 2022). This scalability can make P2PCS a more economical option for users, even as the convenience levels between P2P and B2C services continue to converge (Münzel et al., 2019). While P2PCS can offer cheaper alternatives to traditional B2C services, it may struggle with availability and consistency. Therefore, establishing a clear value proposition that highlights the unique benefits of P2PCS—such as cost savings and localized service—is essential for attracting users in a competitive market landscape. For the method to divide the market niche, Witte et al. (2024) proposed a comprehensive segmentation method based on socio-demographic variables, which could provide actionable insights for targeting specific user segments.

Finally, convenience is a critical factor in the appeal of P2PCS. As noted by Münzel et al. (2019), advancements such as automatic locks can enhance user experiences, leading to a convergence of market segments. A further digitalization of the rental process, for instance, by substituting the personal key handover process through technology mechanisms (Münzel et al., 2019), would foster a seamless rental experience. For example, in an effort to optimize the user experience, French P2PCS network Koolicar introduced KoolBox, which enables keyless transactions between car owners and renters. If implemented correctly, P2P networks could then follow Airbnb's footsteps and serve the demands of business travelers as well as move closer to the benefits of B2C solutions (Wilhelms et al., 2017a). Nevertheless, it still needs to be careful about the impact of reducing human interaction, such as handing over the keys, as one study found that reduced human interaction through increased information system integration can negatively influence service acceptance (Trang et al., 2015). Developing proper apps can also help facilitate the entire rental process and increase convenience for both car owners and car renters, including rental contract management, communication hubs, immediate access to insurance services in case of an accident, authentic reviews, and an easy means to contact the P2P network are of paramount importance to lower especially mental barriers to access (Wilhelms et al., 2017a).

Furthermore, easier access to the car is also one of the critical factors to improve convenience. Ballús-Armet et al. (2014) surveyed people in California and found that respondents considered convenience and availability as the main attractions of becoming renters.

An increased supply of vehicles can enhance user experiences (Münzel et al., 2019). Many studies have identified that proximity to available cars increases the probability that individuals will use car sharing (Diana & Ceccato, 2022; Jian et al., 2016; Juschten et al., 2019; Kent et al., 2017; Zhou & Kockelman, 2011). According to a survey conducted by Shaheen & Martin (2010) in Beijing, one kilometer is the maximum distance that users are willing to walk to a car sharing station, which could be proximately transferred to the acceptable distance to a shared car in P2PCS. In this aspect, one corresponding strategy to improve the convenience of P2PCS is to allocate and relocate the shared cars by the car owners or the P2PCS platform in the communities or regions, improving the availability of cars and making it easier for renters to access the cars.

7.2. Public policies to promote P2PCS

This section outlines policy recommendations for public authorities to support the development and integration of P2PCS within the broader transport system. These suggestions, illustrated in Fig. 3, aim to foster a more favorable regulatory, infrastructural, and social environment for P2PCS adoption and growth.

As several studies indicate that public awareness of P2PCS remains limited in many regions (Ballús-Armet et al., 2014; Rotaris, 2021, 2022; Rotaris et al., 2025; Daniele et al., 2025), policymakers can play a key role by strengthening public awareness and actively promoting P2PCS through social norm–based messaging, targeted awareness campaigns, and publicly supported promotional events (Rotaris et al., 2025). Existing empirical evidence supports the feasibility and effectiveness of such measures. For example, Zhang & Li (2020), drawing on the theory of planned behavior in a study of university students in Qingdao, China, found that greater familiarity with the vehicle rental process significantly increases perceived behavioral control and, in turn, users' intentions to participate in car sharing. At a broader scale, Vanheusden et al. (2022), analyzing data from 170 cities across 30 European countries, demonstrated that governance-related factors, such as public awareness campaigns and institutional collaboration between public transport authorities and carsharing operators, positively contribute to the diffusion of car sharing services. An early study proposed that governments and local authorities could play a pivotal role by integrating car sharing into public communication strategies, for instance by referencing it in policy discussions, displaying information near public transport hubs, and organizing awareness campaigns that are distinct from the marketing efforts of individual operators (Glotz-Richter, 2016). In the contemporary context, these traditional approaches can be further reinforced through digital outreach tools, including social media engagement, targeted online advertising, and mobile app notifications, enabling policymakers to reach a broader and more diverse audience.

Beyond increasing public awareness of P2PCS, promotional strategies should be reoriented by reconsidering their core messages and value propositions. Car sharing is often associated with sustainability objectives, and consumers commonly perceive shared mobility as "greener" than private car ownership (Hartl et al., 2018). Environmental considerations may also influence the choice of P2PCS over B2C services. However, empirical evidence suggests that environmental concerns play a relatively minor role in motivating car-sharing use compared to financial considerations, with sustainability often perceived as a positive side effect rather than a primary driver of adoption (Hartl et al., 2018). Consistently, Kristensen (2015) argues that P2PCS services should not primarily target users' environmental attitudes when designing and promoting their offerings. This insight has important implications for policymakers and marketers, who should avoid overreliance on sustainability narratives when promoting car sharing (Bocken et al., 2020). Instead, campaigns may be more effective if they emphasize concrete economic benefits and directly address users' key concerns, such as perceived risks and loss of control. In this regard, Bergantino et al. (2025) recommend that promotional efforts focus on user-centered benefits while explicitly mitigating perceived risks to foster greater adoption.

Furthermore, it is suggested that local authorities develop policies that facilitate vehicle sharing in a user-friendly manner, thereby encouraging people to adopt a multimodal mobility lifestyle, while simultaneously making private car ownership and use more difficult and costly within the city (Casier et al., 2021). The preferential policies for P2PCS mainly involve the parking policy (Daniele et al., 2025), fiscal policy (Rotaris et al., 2025), and driving rights in the dedicated lanes and traffic limited zones (Daniele et al., 2025). For example, the city of Madrid created a restricted access zone for vehicles in 2018, where private vehicles have to pay to enter this zone, while shared cars are free, and parking is also free for car sharing vehicles (Casier et al., 2021). Casier et al. (2021) proposed to develop an equitable and comprehensive parking framework, as if parking a personal vehicle is more burdensome than parking a shared one, people will be more likely to give up their private vehicles. Maintaining enough parking space for shared cars may also make it harder for private cars to park, transforming people's choice from personal vehicles to shared vehicles, and at the same time, car sharing can be a good opportunity to help reduce parking pressure, as it might reduce private vehicle ownership in the long term. The case of Stuttgart, a German city in a valley area and lacking public space, can support this point (Casier et al., 2021). In addition, Münzel et al. (2019) suggest providing preferential driving lane access for shared cars, and Rotaris (2021) supports providing P2PCS users with parking discounts, dedicated parking spots, and access permits to urban limited traffic zones. A recent survey in Italy shows that fiscal measures are among the most effective policy instruments for stimulating participation in the P2PCS market. On the supply side, exemptions from the annual vehicle ownership tax and from income taxation on car-sharing earnings are particularly influential (Rotaris et al., 2025). From the demand perspective, fiscal incentives such as full subsidization of rental fees or highway tolls emerge as the most impactful tools for encouraging user engagement. However, the implementation of such measures should be preceded by a careful assessment of the required financial resources and a comprehensive evaluation of their associated social benefits (Rotaris et al., 2025). Building on this perspective, Bergantino et al. (2025) propose that national policymakers consider subsidizing the P2PCS sector in a manner similar to public transport, to support its growth and integration into sustainable mobility systems.

To ensure the quality of P2PCS entrepreneurs, Gossen et al. (2019) suggest that governments need to develop tools that allow them to distinguish between P2P platforms that incentivize forms of additional consumption and platforms that indeed incentivize a more intensive/efficient use of resources. One possibility to achieve this would be by setting minimal thresholds for the exemption from

business registration in a way that participating on a platform becomes unattractive only for commercially oriented providers of shared goods (Gossen et al., 2019). In addition, as discussed in Section 5.1, both car renters and owners express concerns regarding service quality and vehicle conditions, such as hygiene, maintenance, and overall orderliness. While renters worry about the reliability and cleanliness of shared vehicles, owners are concerned about whether users will properly care for their cars. These issues highlight the need for clear entry and quality requirements for vehicles participating in P2PCS platforms, such as limits on vehicle age, standards for cleanliness and equipment, and valid insurance coverage. Similarly, behavioral guidelines for renters could be established to promote responsible use. Governments could therefore introduce industry-level minimum quality standards, both for vehicle eligibility and for renter behavior, to address mutual concerns, increase trust, and enhance confidence in P2PCS participation. Furthermore, Rotaris (2021) proposed that public administrators replace the public service monopoly with multi-actor collaboration across municipal borders and private market domains.

Finally, it is recommended to integrate P2PCS with other transport modes and manage competition between P2PCS and alternative mobility services to foster an integrated, interconnected, and multimodal transport system. Rather than regulating each sharing model in isolation, Münzel et al. (2019) argue that policy should focus on creating favorable conditions for a coordinated multimodal ecosystem in which different services complement one another. In this context, P2PCS can be strategically positioned alongside public transport and ride-sharing services through integrated or interoperable mobility platforms that offer users multiple car-based options, including B2C car sharing, P2P car sharing, and ride-sharing. Integrating P2PCS services within MaaS platforms for booking and payment may serve as a viable and cost-effective starting point (Rotaris et al., 2025; Daniele et al., 2025). Supporting P2PCS as a supplement to public transport, rather than as a competing mode, can enhance system flexibility and efficiency, particularly in areas or time periods where public transport coverage is limited (Rotaris, 2021).

Such integration is likely to become increasingly relevant as emerging ride-sharing models and, in the longer term, SAVs reshape urban mobility markets. Although large-scale deployment of autonomous vehicles remains limited, their anticipated integration into shared mobility systems highlights the need for adaptive regulatory frameworks that allow P2PCS to evolve, for example by enabling the sharing of privately owned autonomous vehicles within broader mobility ecosystems. To maximize the integration of car sharing into the existing transport system, Casier et al. (2021) declared that car sharing should be included in other policies because it covers different topics such as mobility, public space, new housing developments, and even social cohesion and work. Integration of car sharing in all these fields can avoid conflicting legislation. In line with this perspective, Bergantino et al. (2025) recommend that local governments treat P2PCS as a complement to public transport and actively promote it through urban mobility plans, visibility campaigns, and logistical support measures, such as designated parking spaces or integration with public transit hubs.

7.3. Implementation challenges, feasibility, and cost–benefit considerations

While the proposed business and policy strategies provide a comprehensive roadmap for advancing P2PCS, their implementation involves many practical challenges and trade-offs that must be carefully evaluated.

Implementing the suggested business development strategies primarily faces challenges in finance, security, and operations. For example, efforts to build trust and eliminate psychological barriers, such as introducing user ratings, feedback systems, or blockchain-based verification mechanisms, require substantial investment in digital infrastructure and cybersecurity. While these technologies enhance transparency and user confidence, their high development and maintenance costs may pose challenges for smaller platforms. Attracting female users and other underrepresented groups through safety-focused design and marketing strategies enhances inclusivity but may necessitate customized communication approaches and security features, thereby increasing operational expenses. Strategies to boost visibility through social media and public–private partnerships offer short-term cost-effectiveness; however, their success hinges on maintaining brand image consistency and fostering collaboration among diverse stakeholders with varying objectives. Expanding renter and owner pools through trial offers, flexible pricing, and subsidies can stimulate market participation, yet these incentives may prove unsustainable without external funding or stable revenue streams. For instance, while free rides can effectively alter travel habits, imprecise targeting may erode profit margins. Exploring unique market opportunities, such as extending P2PCS to sparsely populated or rural areas, can enhance accessibility, but it faces feasibility challenges. Insufficient demand density, rising insurance costs, and potential logistical inefficiencies require urgent solutions. Similarly, while enhancing convenience through digital means (e.g., automatic locks, advanced apps) and improving vehicle availability can boost user satisfaction, it requires substantial upfront investment in technology development, system integration, and user training.

To realize the suggested public policies to promote P2PCS, governments will mainly face challenges from finance, operation, coordination, and public acceptance. For instance, media campaigns can effectively boost adoption rates, while long-term effectiveness needs to rely on the consistency of messaging and sustained budget allocation. Policies aimed at creating a vehicle-sharing-friendly environment, such as parking incentives or financial subsidies, can enhance P2PCS competitiveness. Yet, such measures may face opposition from traditional transport operators or residents concerned about parking shortages. Ensuring the quality of P2PCS operators and vehicles through registration thresholds, safety inspections, and renter behavior guidelines can enhance consumer protection and trust. However, this also increases administrative burdens and compliance costs, potentially constraining the development of small operators. Similarly, promoting multi-stakeholder collaboration rather than monopolistic market structures can foster innovation but requires efficient coordination among local governments, platform providers, and insurance institutions. Finally, integrating shared mobility into broader transportation planning frameworks can foster a more coordinated urban mobility ecosystem, while it also requires significant policy coordination across various levels of government and departments, often involving legal revisions and cross-sector data sharing.

In evaluating the feasibility of these strategies, policymakers and businesses should conduct cost–benefit analyses and pilot

programs to assess economic efficiency, user acceptance, operational feasibility, and long-term sustainability. The potential benefits need to be weighed against the costs of digitalization, infrastructure adaptation, and regulatory enforcement. Moreover, differences in local market maturity, socio-economic conditions, and institutional capacity need to be considered by policymakers and business managers to avoid a one-size-fits-all strategy.

8. Conclusion and future research directions

Against a backdrop of rapid diversification in shared mobility and evolving policy priorities, peer-to-peer carsharing (P2PCS) has entered a phase of uneven market development, marked by growth in some contexts and consolidation or decline in others. This study presents a comprehensive literature review and *meta*-analysis of 77 papers sourced from major academic databases that fully or partially address P2PCS. Beyond consolidating existing knowledge on data sources, methodologies, adoption drivers, and barriers, this review responds to the mixed and increasingly divergent market trajectories observed in recent years. While P2PCS has expanded rapidly in some regions, it has simultaneously faced stagnation or withdrawal in others, particularly in the post-COVID-19 context. The findings therefore serve not only as a synthesis of past research, but also as a diagnostic assessment of the conditions under which P2PCS can remain viable, scalable, and socially beneficial. The evidence suggests that P2PCS is most likely to succeed as a complementary mobility service, especially in low-density areas, among car owners with underutilized vehicles, and when embedded within integrated MaaS frameworks and potential future SAV ecosystems. By integrating evidence on user behavior, platform design, business strategies, and policy frameworks, this review provides actionable insights for policymakers and industry stakeholders seeking to adapt, strengthen, or reposition P2PCS within evolving shared mobility ecosystems.

8.1. Summary of main findings

The comparison between P2P and B2C car sharing highlights distinct advantages that inform their suitability and impact. P2P car sharing demonstrates greater operational flexibility, effectively serving both urban and rural areas, while B2C models tend to focus primarily on urban environments and may struggle with profitability in rural settings. Environmentally, P2P platforms leverage existing vehicles, helping to avoid additional car production and reducing the total number of cars, whereas B2C often requires new car procurement despite some evidence of reducing more private car ownership. Additionally, P2P sharing contributes to emission reductions by offsetting increased travel miles among new users, whereas B2C car sharing may increase overall vehicle miles traveled due to easier car access. Economically, P2P allows car owners to earn supplementary income from idle vehicles, which is a benefit not present in B2C models.

However, P2PCS also faces multiple barriers across public perception, market dynamics, and operational factors. Public perception barriers include a lack of trust and knowledge about renters and owners, concerns over vehicle damage and hygiene, privacy issues, resistance to changing travel habits, and low awareness of the service. Market barriers revolve around low demand, limited availability of shared vehicles, and strong competition from public transport, traditional B2C car sharing, and emerging driverless technologies. Operational challenges further complicate the landscape, with issues such as car accessibility, complex and costly insurance, pricing and financial incentives, and logistical coordination like key exchanges and scheduling. Addressing these interconnected barriers is crucial for the sustainable growth and broader adoption of P2PCS systems.

Research on P2P car sharing users reveals distinct demographic profiles and motivations for both car owners and renters. Car owners tend to be younger, cost-sensitive individuals, often with higher education and environmental awareness, who are motivated by economic benefits from utilizing underused vehicles, sustainability concerns, convenience, and social interaction. Renters, meanwhile, are often younger, female, and more cost-conscious, with many living in smaller towns or rural areas. Their motivations primarily revolve around convenience, affordability, increased mobility options, and a desire for independence without car ownership, as well as supporting local communities. These diverse user characteristics and motivations highlight the multifaceted appeal of P2PCS and its potential to meet various mobility needs across different population segments.

Business development strategies for P2PCS should focus on trust-building, market expansion, and service improvement. To overcome psychological barriers, especially for female users, platforms should implement user rating and feedback systems and leverage emerging technologies like blockchain to enhance transparency and trust. Expanding visibility through social media campaigns and public–private partnerships is also essential. Extending the renter base can be achieved by offering free trials, flexible pricing, public subsidies, and leveraging social influence from experienced users. To grow the pool of car providers, targeted outreach should include women and the elderly, supported by marketing strategies aligned with car owners' values and efforts to maintain a balance between supply and demand. Platforms should also explore unique market opportunities by targeting less densely populated areas and tailoring services to specific socio-demographic groups. Finally, improving user convenience through digital tools such as mobile apps and automatic locks, increasing vehicle availability, reducing distance to available cars, and optimizing fleet relocation are essential to enhancing the overall service experience.

Public policies to promote P2PCS should focus on creating a supportive market and regulatory environment. First, market promotion policies can raise public awareness by highlighting car sharing in regular media reports and reshaping current promotional strategies. Second, establishing a friendly sharing environment is essential, which includes adapting parking and fiscal policies, and granting P2PCS vehicles appropriate access to certain lanes or zones. Third, to ensure service quality, governments should set appropriate entry thresholds for P2PCS entrepreneurs and encourage a shift from public service monopolies to multi-actor collaboration models. Fourth, competition between P2PCS and other transport modes should be addressed through system-level regulation that promotes multimodal integration rather than by regulating individual business models in isolation. P2PCS should be strategically

positioned as a complement to public transport and other shared mobility services, for example through integration into MaaS platforms for booking and payment, to foster an interconnected and coordinated mobility ecosystem. Such an approach can enhance system flexibility and efficiency, particularly in areas or time periods with limited public transport provision, while avoiding legislative fragmentation and supporting the adaptive evolution of P2PCS within emerging shared mobility and autonomous vehicle contexts.

8.2. Research gaps

While P2PCS has attracted growing scholarly interests and gained useful insights for understanding the whole system, the current body of research remains limited in scope and depth, revealing several critical gaps in data usage, methodological approaches, overall findings, and policy impact. In terms of data, most studies focus on developed regions such as Europe, North America, and parts of Asia, overlooking developing contexts where socio-economic and cultural variations could yield distinct adoption patterns. Given that transportation systems are often highly country-specific (Münzel et al., 2019), there is a pressing need for more studies conducted across diverse national contexts. Moreover, research continues to rely heavily on survey and interview data, underutilizing transaction logs and usage patterns that could shed light on real-world platform dynamics. There is also a notable absence of longitudinal studies that would help clarify how user behavior, platform expansion, and market conditions evolve over time.

Methodologically, econometric analyses have provided insights into user adoption factors, yet their predominance has arguably restricted the range of inquiries. Mixed-method designs appear only sporadically, meaning that qualitative insights rarely accompany the statistical findings required to capture the nuances of user behavior. Simulation models contribute to understanding operational efficiency, but many still rely on simplified parameters that do not account for varying levels of trust or differing market conditions. Looking ahead, methods such as machine learning, experimental research, and operational research strategies could deepen understanding by testing how users and platforms respond to real-world interventions and policies. Despite the growing adoption of artificial intelligence in related domains, its application within P2PCS research remains minimal.

Regarding the targeted user groups studied, there is a clear gap in research on user diversity and underrepresented populations. Most studies focus on younger, urban, and technologically inclined individuals, while there is limited knowledge about older adults, low-income groups, and culturally diverse populations, particularly in developing regions. More inclusive research is needed to better understand adoption patterns and design P2PCS systems that serve a broader range of users.

In addition, less attention has been paid to operational models that optimize efficiency, as well as to broader social outcomes such as employment, equity, and overall well-being. Critical questions remain unaddressed, including the extent to which P2PCS complements public transportation systems and its role developing the integrated MaaS business models. While the potential rebound effect of increased car usage resulting from easier access to cars has been noticed, empirical evidence is lacking to confirm or refute this phenomenon.

Finally, although many studies on P2PCS briefly reference policies and strategies in relation to their findings, these discussions are often superficial and lack systematic evaluation. Most recommendations outline general directions without thoroughly assessing their feasibility, implementation mechanisms, or broader societal implications. Studies examining how these strategies could be practically executed or adapted to different socio-economic and regulatory contexts remain limited.

8.3. Future research questions

Future research would benefit from broader and more diverse data sources, greater methodological pluralism, comprehensive investigations into diverse user groups, and detailed studies on policy feasibility and implementation. By addressing these gaps, scholars and practitioners can refine our understanding of P2PCS and support its evolution into a more robust, inclusive, and sustainable mobility option. Based on the research gaps identified in this review, several promising questions arise: (1) How do adoption patterns, usage behaviors, and perceptions of P2PCS vary across underrepresented and socio-culturally diverse populations, including older adults, low-income groups, and residents of developing regions, and what strategies can be implemented to design inclusive P2PCS systems that effectively meet their mobility needs? (2) Since convenience is essential for users to choose P2PCS, can car allocation and relocation be made feasible and cost-effective in P2PCS systems to increase convenience? (3) Given that trust is critical for car owners when renting out their vehicles, and that platforms such as Autodelen.com suggest that users tend to drive more carefully and personal connections foster mutual trust, are these patterns consistent across contexts, and how can they be reinforced? (4) How do regulatory measures such as vehicle entry standards and renter behavior guidelines affect trust, user satisfaction, and participation intentions in P2PCS platforms? (5) What are the most effective platform models for P2PCS? For example, should platforms promote open systems accessible to all users or focus on smaller, trust-based groups, and what is the optimal group size to balance vehicle availability and owner returns? (6) How can artificial intelligence be leveraged to enhance pricing strategies, user satisfaction, vehicle reliability, and trust within P2PCS? (7) In terms of the green objective, does the fact that car owners' participation in P2PCS reduce the total cost of ownership encourage the purchase of private cars? This could potentially counteract the environmental benefits of car sharing and warrants further investigation. (8) What are the long-term environmental, economic, and societal effects of P2PCS, including its impact on equity, unintended consequences, and regional differences? (9) Finally, to what extent can hybrid models that integrate P2P and B2C approaches—and, in the future, privately owned autonomous vehicles—be further developed, for example through long-term leasing arrangements in which private owners supply vehicles to B2C carsharing platforms?

CRediT authorship contribution statement

Angela Stefania Bergantino: Supervision, Funding acquisition, Data curation, Conceptualization. **Romeo Danielis:** Validation, Funding acquisition. **Mario Intini:** Validation, Supervision, Conceptualization. **Lucia Rotaris:** Validation, Funding acquisition. **Mariangela Scorrano:** Validation, Funding acquisition. **Chenchen Xu:** Writing – review & editing, Writing – original draft, Visualization, Investigation, Data curation, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A

Table A1
Existing study data sources, methodologies, and key findings.

	Author (s) and Years	Content	Data source, Collection time, and Location	Data Analysis Method	Key Findings
Quantitative Econometric Modeling	Li & Feng, 2025	Identify the factors influencing car owners' participation decisions from business operators' perspective	A sample with 480 responses through a stated choice experiment conducted online in Hiroshima, Japan, in March 2023.	A mixed logit hybrid choice model	Car owners generally dislike the additional insurance and maintenance costs associated with business models, but free car inspections and cleaning services significantly increase their participation intention; Trust and social value positively influence adoption, while concerns about hygiene and orderliness negatively affect decisions.
	Li et al., 2024	Investigate how willing individuals are to share their private cars with others, considering potential uncertainties in earnings and vehicle use.	A sample with 486 responses through a stated choice experiment conducted online in Hiroshima City, Japan, in March 2023.	The cumulative prospect theory and a mixed logit prospect theoretical model.	Car owners are typically attentive to earnings and losses, as well as delays in vehicle returns, and individuals react differently to uncertain situations; Participation in private car sharing is greatly influenced by the decisions of social groups, such as family members, relatives, friends, and colleagues.
	Uteng et al., 2019	Compare users of P2PCS and cooperative car sharing.	A web-based survey with 1724 P2PCS users and 1117 cooperative car sharing users in Oslo, in November-December 2017.	Principal component analysis; Regression analysis.	Students moving to Oslo and employees starting new jobs prefer P2PCS; The birth of children positively impacts people's decision to join cooperative car sharing;
	Beria et al., 2017	Conduct a survey in Milan to identify the	A sample with 1211 respondents from an online	A binomial logit model and a multinomial	The potential sharers are more cost-sensitive and

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	Author (s) and Years	Content	Data source, Collection time, and Location	Data Analysis Method	Key Findings
		determinants of residents joining P2PCS.	survey launched in Milan, in November 2012.	logit model; Quantify the potential supply of cars based on the survey results.	will share vehicles for a monetary reward; People's travel behavior shows environmental concern. When faced with a hypothetical decision instead of a real decision, respondents did not perceive the real extent and impact of P2PCS; The decrease of the motorization rate in Milan can be associated with a lowered interest for the car's status.
	Prieto et al., 2017	Investigate how sociodemographic factors explain adoption intention of car sharing systems (P2PCS and car clubs).	A sample with 2733 respondents of car owners from an international online survey conducted in September 2015, completed in two weeks, in London, Madrid, Paris, and Tokyo.	A standard probit model (using a CS option as the dependent variable) and a bivariate probit model (using yes/no indicator as the dependent variable, where yes means the individual is willing to use at least one CS).	Living in the city center, being male and, being highly educated significantly increase the probability of CS adoption; Car club services are more available in city centers than in the suburbs because of the difference in population density; CS choice is partly driven by younger age; Frequency of car use is a positive driver of CS adoption; CC and P2P choices are correlated, interdependent decisions; Some socio-demographic variables have the same impact on the two options but others do not, suggesting the different target segments of the two CS services types. P2P services are potentially more promising than traditional CC services as P2P appeals to a broader demographic. Opposite effect of household types on CC/P2P adoption intention: arranging car trips through P2P platforms may be more complicated for a family because of greater constraints than those faced by a single user.
	Prieto et al., 2022	Investigate the participation intentions in P2P shared mobility.	Online survey of 2159 licensed car drivers though the online panel of TNS Sofres (a market research firm), in London, Paris, and Madrid.	Principal component analysis; A bivariate probit model (Dependent variable as the binary choice of using or not using P2P shared mobility).	The participation decisions are driven by common latent preferences; People who are more prone to become a peer provider are more likely to use the P2P shared mobility; Individual values, such as possession self-link, individualism, and environmentalism, play a role in the decision to join a P2P shared mobility platform.

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Author (s) and Years	Content	Data source, Collection time, and Location	Data Analysis Method	Key Findings
Dill et al., 2019	Assess how participation in P2PCS affects the driving behavior of participating car owners.	A survey in 2012 in Portland, Oregon, with 235 car owners who enrolled in a P2P program; Vehicle use data collected via in-vehicle GPS; In-depth interviews from a sample of owners.	Standard descriptive; Bivariate analysis; A binomial logit model (Dependent variable as whether owners reduced their vehicle use or not).	Vehicle owners overall made very few changes in their driving behavior according to the GPS data, with average vehicle use increasing slightly; A subset of owners (39%) did decrease their driving by 10% or more from their baseline; Factors associated with reduction in use included higher baseline vehicle use, higher rental activity, income constraints, and more flexibility in daily travel. Some owners appear to use P2P as a catalyst to change travel behavior, including increased use of other modes.
Münzel et al., 2019	Answer the motivation and characteristics of P2P and B2C car sharing adopters.	A survey dataset collected by the Dutch Institute for Public Opinion and Market Research (TNS-NIPO) of 1836 Dutch citizens in 2014 in the Netherlands.	Multivariate logistic Regression	B2C and P2P car sharing adopters are rather similar in their characteristics but differ in the frequency with which they make use of car sharing and public transport; Car owners who already shared their car informally outside a platform are also more likely to provide their car through a platform.
Barbour et al., 2020	Explore individuals' attitudes and perceptions regarding the act of supplying a personal vehicle to P2P vehicle fleet.	Data from a web-based stated preference survey conducted in Florida in February-April 2018.	A random parameter ordered probit model (Dependent variable as the likelihood of renting cars out).	Statistically significant determinants of the willingness to rent a personal vehicle were gender, age, income, household composition, vehicle ownership, living location with respect to a grocery store, and participation in other shared mobility modes. P2PCS services are potentially more promising than traditional car sharing because they can potentially appeal to a much broader demographic. The lack of affordable insurance policies may clearly be a detriment to the expansion of P2PCS. The motivation to share such resources is not driven wholly by financial reasons, as other factors such as gender can also impact the choices.
Tahmasseby et al., 2016	Examine the factors for a social network P2P carpooling system called FacePorter for the University of Calgary staff and students.	A sample of 210 responses from a survey combining revealed and stated preferences in Calgary in 2013.	A binomial logit model and two ordinal logit models.	Factors have significant impacts on FacePorter demand include occupation, income, marital status, working schedule flexibility, trip characteristics (i.e., distance, travel time, and number of required transfers when riding transit), weather condition, carpooling fee, perceived rider and driver profiles, and carpooling fee would significantly influence the market demand of the examined carpooling system.

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	Author (s) and Years	Content	Data source, Collection time, and Location	Data Analysis Method	Key Findings
	Münzel et al., 2020	Analyze car sharing supply of shared cars in Western European cities.	Data collected of all operators in the studied cities in Belgium, France, Germany, the Netherlands, and United Kingdom. The number of shared cars in each city are taken from the sharing suppliers' websites during weekdays between November 2015 and April 2016. Data of city characteristics is drawn from international or national statistical databased.	Linear regression; A negative binomial regression (NegBin); A zeroinflated negative binomial regression (ZINB).	The results indicate car sharing is popular in cities with a high educational level or university presence; car sharing is less popular in cities with many car commuters. P2PCS is especially popular in French cities and B2C car sharing popular in Germany.
	Olaru et al., 2021	Evaluate joint attitudes of vehicle owners towards P2P car sharing and driverless vehicles (DVs) and the impacting factors.	A sample from an online survey on 751 vehicle owners, conducted between October and December 2017, in Sydney and Perth.	The big five personality factors were measured using the 60-item NEO Five-Factor Inventory; A latent class analysis; Descriptive statistics; Confirmatory factor analysis; Multiple analysis of variance (MANOVA); Multinomial logistic regressions (Dependent variable as class memberships).	Positive attitudes about DV do not automatically bring a positive outlook on the car sharing model and that treating the market as homogeneous may lead to ineffective and unsustainable behaviors, against the goals of automated technology.
	Rotaris, 2022	Estimate the potential supply and demand of P2PCS.	Face-to-face interview with 200 potential car renters and 249 car owners in Friuli-Venezia, Italy, conducted in November-December 2019.	A binomial logit model; A mixed logit model; Segmentation analysis.	10% of the sample would use a P2PCS service if the hourly rental rate was €7/h; The main reason preventing the service use is that the FVG residents are not aware of the platforms allowing the matching of car owners and renters
	Meelen et al., 2019	Study the impact of geography of socio-technical regimes on P2PCS and B2C car sharing	Data of the number of shared cars was collected for all cars shared via B2C car sharing and P2PCS models at the postal code area in the entire Netherlands during the months of March, April and May 2014; Data of the number of inhabitants from the Dutch statistical office.	Zero-inflated negative binomial models (Dependent variable as the number of shared cars in an area).	At the landscape level, the distance to facilities (such as supermarkets and schools) in an area has a negative relationship with the number of P2P shared cars; Positive effect of municipal information-related policies, environmental awareness, income, and education on P2PCS was found; Negative effect of expatriates on P2PCS was found; No effect of household size on the number of shared cars was observed.
	Turoń et al., 2025	Analyze the technical factors influencing decisions to rent a car from P2PCS.	A survey with 1,451 responses conducted in November 2023-February 2024, in Katowice, Poland.	Social network analysis.	The most significant issues are economic factors related to energy consumption and safety factors associated with driver assistance technologies.
Theory-based Qualitative Study	Hunecke et al., 2021	Identify psychological barriers in three forms of P2P collaborative car use: lending your own car to another private person, renting a car from another	Two questionnaire samples: a community sample (N = 176) from the City of Bottrop, and a student sample (N = 265) in Dortmund, Germany.	Exploratory factor analysis and confirmatory factor analysis; Theory of planned behavior;	The main barrier to ridesharing is the subjective loss of personal autonomy. Lending one's car to others feels like a privacy invasion, and when

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	Author (s) and Years	Content	Data source, Collection time, and Location	Data Analysis Method	Key Findings
		private person and ridesharing.		Logistic regressions; Path models (analyze the relationships between barriers/ benefits and the different scenarios).	a car is rented via the internet, the concern of data misuse is strong.
	Jain et al., 2021	Examine psycho-social factors of car sharing adoption.	5 focus groups, 18 semi-structured interviews, and 306 surveys in Melbourne, Australia	Theory of Planned Behavior; Theory of Innovation Diffusion.	The difference between P2P and fleet-based systems: P2P services were perceived as better for the environment for it making use of spare capacity of community cars; P2P members liked that some profits from the car share booking were going back to the community, instead of enriching a corporation; The process of picking up a P2P car was seen as more onerous and time-taking compared to fleet-based cars; P2P members liked that the model gave them access to a wider range of vehicles; Some fleet-based members were averse to the idea of using somebody else's car as they were concerned about hygiene, as opposed to a shared vehicle which is cleaned professionally regularly.
	Valor, 2020	Anticipate the burden or sharing or the stress associated with their potential participation in P2PCS of car owners and renters.	20 in-depth interviews with informants fitting the description of early adopters; 527 units of information posted between 2012 and 2019 from media data and naturally occurring conversations on social media; – 10 Spanish videos on YouTube about P2PCS; 10 threads of comments about P2PCS published on Forocoches, the most popular discussion forum in Spain; Websites of the three marketplaces in Spain.	Grounded theory (GT)	Potential owners and renters perceive a series of risks that provoke immediate and anticipated emotions of tension, fear and anxiety; This anticipated stress overrides the potential perceived benefits; These anticipated emotions are fundamental barriers for adoption and diffusion of the innovation; The anticipated feelings of fear, worry and anxiety are greater from the owner's perspective.
	Hawlitschek et al., 2018	Investigate the relative importance of consumer motives for and against P2PCS.	A survey sample of 745 participants recruited from the student pool at Karlsruhe Institute of Technology (Germany).	Structural equation model; A theoretical model grounded in the Theory of Planned Behavior (Ajzen, 1991, 1985).	The five most important drivers and prerequisites of platform usage intentions are financial benefits, trust in other users, modern lifestyle, effort expectancy, and ecological sustainability.
	Kristensen, 2015	Study the barriers that prevent potential consumers from engaging in P2PCS company MinbilDinbil.	Semi-structured interviews with 6 respondents in Denmark	The Motivation, Opportunity, Ability, Behavior (MOAB) theoretical model framework; Empirical study.	The potential car renters' barriers include their ability to use public transport, MinbilDinbil's car locations and selection, coordination problems between consumers, their limited knowledge of MinbilDinbil's car insurance and problems of mistrust;

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	Author (s) and Years	Content	Data source, Collection time, and Location	Data Analysis Method	Key Findings
					The barriers for the potential car owners include low earning potential, limited knowledge of MinbilDinbil's car insurance, issues of mistrust and coordination problems between consumers. The barriers for the P2PCS company MinbilDinbil include consumers' limited knowledge of MinbilDinbil's insurance policy, mistrust problems and coordination problems between consumers.
Descriptive Analysis	Rotaris, 2021	Study the potential demand of P2PCS in a less densely populated Italian region.	200 face-to-face interviews conducted in December 2019, in Friuli-Venezia Giulia, Italy.	Descriptive analysis.	The main reason preventing its spread is that individuals are not yet aware of its existence; In Italy, P2PCS is offered only by two platforms and is seldom known and used; 25% of the individuals we interviewed would be willing to use a P2PCS service if available; The willingness to use CS is significantly influenced by gender, level of education, age, environmental sensitivity and frequency of public transport service use. The motives for willingness to rent a car are mainly related to convenience and cost savings compared to using public transport services and owning a car, respectively. The lack of trust among individuals is one of the most critical issues in personal vehicle sharing.
	Lewis & Simmons, 2012	Investigate the P2PCS user experience.	A sample of 206 responses collected from a survey during April 6-May 14, 2012, targeting US, France, Germany, Spain and Sweden.	Descriptive analysis.	Users of P2P car sharing are young, highly-educated, well-off urbanites; Owners are most concerned about legal and financial protection should their car be in an accident while rented; Borrowers were more concerned with how convenient and cost-effective the service is;
	Svangren et al., 2019	Study how people use the P2PCS service Car Next Door and their experience sharing cars.	Data from semi-structured interviews with 6 car-owners and 10 car-borrower in car sharing service Car Next Door in Brisbane.	Exploratory investigation by booking shared cars; Data analysis.	P2PCS is convenient for many participants by allowing them to utilize unused assets and helping each other out; The service is used for different purposes supporting ad-hoc and planned trips which allow users to complement

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	Author (s) and Years	Content	Data source, Collection time, and Location	Data Analysis Method	Key Findings
					existing transportation options at hand; It's an efficient way to car share by allowing instant bookings and getting the keys without interacting with an owner; The lack of face-to-face communication was in some cases perceived as alienating along with reducing trust in the people borrowing.
	Anthony Jnr, 2024	Develop a decentralized P2PCS prototype framework.	Data from literature and existing technical report documents.	A systematic review, content analysis, a use case scenario study to validate the proposed framework.	Present a case scenario that depicts how businesses can design and implement a distributed P2P electric car sharing platform based on IOTA technology, smart contracts, and IOTA eWallet.
Simulation Study	Hampshire & Sinha, 2011	Present an operational and simulation model of P2PCS; Explored the main operational tradeoff of balancing car utilization with reservation availability.	Data from another study's five-year study of the impacts of City CarShare's car sharing service in San Francisco.	Discrete event simulation.	Results show that rejecting reservations, even when the time slot is available, increases revenue when the demand is sufficiently high.
	Hörl et al., 2023	Perform simulation of P2PCS services considering limited resources in the decision-making of the agents.	An existing open and large-scale simulation for Berlin (Ziemke et al., 2019).	Agent-based transport simulation framework MATSim.	Results prove the practicality of the proposed simulation framework for P2PCS operations.
	Rotaris & Scorrano, 2023	Estimate the adoption rate of P2PCS in less-densely populated areas with the impact of population characteristics and policies.	Data from a discrete choice survey of 449 potential users in Friuli-Venezia Giulia, Italy, in November–December 2019.	A Bass diffusion agent-based model.	P2PCS market would reach a steady state at a rental rate of 6.1 €/h with 7% of car owners and car renters engaging in the system; transport policy packages can help increase the market share up to 42%.
OtherCalculation Models	Schwieterman & Smith, 2020	Estimate the earnings from P2PCS for vehicles owners.	Anonymized data of trips made on Turo in Illinois, 2018–2019.	Financial model to estimate the revenue earned and costs for car owners.	Usage is heaviest in higher-density neighborhoods with above-average unemployment and rental housing rates, with a particularly large concentration on Chicago's near north, south, and west sides, as well as zip codes with sizable minority populations. Most transactions are financially remunerative to hosts who would own their vehicle regardless of their decision to share. When maintenance and other expenses are taken into account (while nonmonetary costs such as the host's time are excluded), 94.9% of trips cover their marginal cost to the host. The returns from sharing sports utility vehicles (SUVs) tend to be higher

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	Author (s) and Years	Content	Data source, Collection time, and Location	Data Analysis Method	Key Findings
					than those for sedans and minivans. A low-income family making $40,000 annually will increase household income by 6% by sharing a vehicle 90 days annually.
	Vélez & Plepys, 2021	Assess potential changes in greenhouse gas (GHG) emissions at an individual and city level, by considering changes in the travel habits of individuals who engage in car sharing.	The mobility dataset ODiN2018 (CBS, 2018). Public data of GreenWheels, a B2C car sharing organization, and proprietary data of a P2P car sharing organization. Data on vehicle characteristics from public data sources in the Netherlands (RDW, 2024a; RDW, 2024b). Vehicle ownership rates and demographics data from Statistics Netherlands (Cervero et al., 2007; CBS, 2019).	A well-to-wheel (WTW) approach, comparing the GHG emission changes after applying car sharing.	Transport-related GHG emissions caused by car-free individuals tend to increase after they engage in car sharing; Emissions caused by previous car owners tend to fall; At the city level, GHG emissions savings can be achieved by using more efficient cars in sharing systems and by implementing greener mobility policies; Changes in travel habits might help to reduce GHG emissions, providing individuals migrate to low-carbon transport modes.

Data availability

Data will be made available on request.

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