



What Can We Learn from the ‘Wisdom of Crowds’? Drivers of (Dis)satisfaction in Shared Mobility Platforms: A Comparison of Free-Floating and Station-Based Models

Anna Akhmedova^{a,*}, Natalia Amat-Lefort^b, Federico Barravecchia^c, Luca Mastrogiacommo^c

^a International University of Catalonia, Spain

^b Leiden University, Netherlands

^c Polytechnic University of Turin, Italy

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ABSTRACT

Enabled by digital platforms, shared mobility holds the promise of alleviating the number of pressing social and environmental problems associated with mobility. However, shared models are neither sustainable nor circular by default, creating a need to carefully manage these platforms' value proposition. This study analyses 17,386 reviews of 16 mobility providers (Zipcar, Turo, Car2Go, Getaround, Shrenow etc.) collected from six different online review containers (Playstore, Appstore, Trustpilot, Yelp!, etc.) over a 7-year period. Structural Topic Modelling (STM), Mean Topic Prevalence (MTP), regression analysis and perceptual mapping were applied. As a result, 14 service-related topics were extracted from the corpus and grouped into six service quality dimensions, identifying the weight of the service dimensions and their evolution over the years. Further analysis examined differences between free-floating and station-based platforms. A key finding was the recent growth in importance of sharing experiences – that is, quality interaction among peers for station-based platforms, by which loyalty can be strengthened through adopting business models that facilitate more cooperative and collaborative forms of exchange. For free-floating models, the role of the (functional) quality of the application was found to be key.

1. Introduction

Transport-related activity accounts for 23% of annual emissions worldwide (Tikoudis et al., 2021), with passenger cars responsible for 56% of total transport-generated emissions in the EU in 2021 (EEA, 2023). This is particularly concerning as emissions from transport have continued to rise despite mitigation policies and improvements in fuel efficiency (Tikoudis et al., 2021). In this context, shared mobility (which includes car-sharing, scooter-sharing, and bike-sharing, but excludes ride-hailing services like Uber and Lyft) has become an interesting alternative to traditional transport services. Vehicle-sharing holds the promise of transition to a circular economy (Shams Esfandabadi et al., 2022; Chapman et al., 2024), particularly in urban areas where car usage is concentrated (Tikoudis et al., 2021), reducing car ownership, traffic congestion and pollution (Wadhwani and Saha, 2020). However, as Curtis and Mont (2020) point out, sharing economy business models are neither circular nor sustainable by default and there is a need for a

more nuanced debate in the scientific literature (Reike et al., 2018). For example, sustainability gains and losses may vary depending on whether P2P or B2P business models are employed (Curtis and Mont, 2020; Nijland and van Meerkerk, 2017), the vehicle type that is shared (Tirachini et al., 2020), or the relocation scheme (Vasconcelos et al., 2017). Compared to station-based models, free-floating car-sharing systems initially showed promise as a more technologically advanced and sustainable option (Greca et al., 2017; Sun and Ertz, 2021). However, these models represent B2C business models, where the car is owned and provided by a car-manufacturer, meaning that reduced car-production may not occur. On the other hand, while they may create more traffic (Greca et al., 2017), station-based models often represent P2P models, which are potentially more beneficial for reducing car production and ownership (Glotz-Richter, 2016) and extending the car usage lifecycle (Curtis and Mont, 2020). Accordingly, each model has potential benefits and drawbacks in terms of sustainability impact, and the balanced presence of the two options can have a positive impact on

* Corresponding author.

E-mail addresses: a.akhmedova@uic.es (A. Akhmedova), n.amat.lefort@liacs.leidenuniv.nl (N. Amat-Lefort), Federico.barravecchia@polito.it (F. Barravecchia), luca.mastrogiacommo@polito.it (L. Mastrogiacommo).

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environmental sustainability, urban infrastructure, and the transition to circular business models (Becker et al., 2017).

However, current analyses of environmentally sustainable mobility tend to examine the role of the consumer. Indeed, this is a general trend in which the consumer takes on the more active role of value co-creator, which is often overlooked by the academic research (Vidal-Ayuso et al., 2023). Sustainable business models should educate and encourage consumers to make more sustainable choices that increase the overall value of the ecosystem, as opposed to value extraction, which was the focus of the traditional or pipeline business models (Biancuzzi et al., 2024). Service quality (SQ) is the key element of the value proposition (Akhmedova et al., 2020b). Numerous studies demonstrate its importance to customer satisfaction and loyalty (Ju et al., 2019). However, achieving high SQ in the sharing economy often relies on the willingness of decentralized actors within the ecosystem to contribute (e.g., car-owners on the car-sharing platform). While the academic literature often suggests that platforms should orchestrate the ecosystem for value creation, innovation, and growth (Cobben et al., 2022), individual actors within the ecosystem may have different priorities. The research suggests that actors may extract varying levels of value from their interactions (Hollebeek et al., 2020), which can lead to potential trade-offs when platforms strive to balance customer loyalty and pressing social and environmental issues. For example, a platform might prioritize convenience and affordability for users, potentially leading to practices that have a negative environmental impact. To this effect, the research should explore how platforms can nurture perceived SQ while ensuring the accomplishments of the social and environmental promises inherent in collaborative consumption.

User generated content (UGC) is generated by highly engaged consumers who exercise their voice for service improvement or help other actors within the ecosystem. UGC in the form of customer reviews therefore provides valuable insights into user experiences and perceptions of SQ (Barravecchia et al., 2020; Ding et al., 2020; Ju et al., 2019; Korfiatis et al., 2019; Mastrogriaco et al., 2021a; Palese and Usai, 2018). Every day, a vast amount of data are generated as countless users worldwide leave reviews. Text mining is an efficient way to analyze this unstructured data and extract meaningful insights (Hu and Liu, 2004). Compared to traditional surveys, the unstructured nature of UGC allows for capturing richer details about users' personal experiences (Tsao et al., 2020). Analysis of UGC is useful to enhance the value proposition for different actors in the digital ecosystem, and to innovate and reimagine the service. Although consumers do not give direct answers to management questions (customers would say they want a *faster horse*), understanding the consumer voice is a crucial starting point to refine value proposition and enhance customer satisfaction.

Sharing economy (SE) is a diverse and evolving domain that encompasses several models, including collaborative consumption (CC), gig economy, on-demand economy, access economy, and peer-to-peer economy (P2P) (Akhmedova et al., 2020a). Business models within the SE vary as a function of: (1) the nature of the assets (capacity constrained vs unconstrained); (2) the nature of the interaction (access vs transfer of ownership), and (3) ownership of the assets (peer-provided vs platform provided) (Akhmedova et al., 2020a; Wirtz et al., 2019). According to this classification, car-sharing platforms represent a *subtype of SE* based on *access* to the *capacity constrained physical resource* (car), which can either be *platform* (B2C model) or *peer provided* (P2P model). This distinction necessitates a dedicated focus on SQ attributes in car-sharing as these may be different in terms of sustainability and circularity (Curtis and Mont, 2020; Nijland and van Meerkerk, 2017). While some research has addressed this gap (Mastrogriaco et al., 2021b; Zuo et al., 2019), the role of social and environmental considerations in the value proposition of car-sharing for consumers remains under-explored.

This study leverages user-generated content (UGC) in the form of customer reviews to reimagine the car-sharing platform service. Accordingly, two key research questions are put forward.

RQ1. What can we learn about service quality aspects from UGC?

RQ2. What can we learn about differences in car-sharing models from UGC?

Exploring these variations has provided valuable insights for platforms to tailor their service offerings and enhance user experience. Accordingly, our research offers valuable contributions in three key areas. First, we define and broaden the understanding of SQ aspects specific to car-sharing platforms. This includes aspects that extend beyond mere service provision, encompassing the coordination of various actors and the quality of social interactions within the platform ecosystem. Second, we identify key SQ aspects that influence user satisfaction, drawing comparisons between free-floating and station-based car-sharing models. Third, we outline the role of user engagement in CS platforms based on the finding that the role of interaction is critical for perceived SQ. Last, we provide practical recommendations for platform-based car-sharing services, focusing on value creation and leveraging user-generated content to enhance user experience.

2. Literature review

2.1. Car-sharing model variations and their role in sustainable urban mobility

The rise of access-based consumption models such as car-sharing is transforming consumption practices in urban mobility (Bardhi and Eckhardt, 2012). In access-based models, consumers pay for temporary access to different mobility options, including cars, scooters, bikes, etc., which presumably has positive environmental and social impacts that are not limited to reducing car ownership (and consequently production), extending the useful lifespan of individual cars, and reducing traffic congestion (and consequently emissions) and the costs associated with owning a car. Digital platforms play a crucial role in facilitating these access-based transactions, connecting users with providers, and streamlining the process.

There are different car-sharing systems, varying in terms of logistics, user journeys, and interaction with the platform (Firnkorn and Müller, 2011). The most popular models are station-based and free-floating. Free-floating systems offer high flexibility. Users can pick up the car without a reservation and leave it anywhere within the designated service area (Ciari et al., 2014). They typically only pay for the driving time, not for parking durations. These models usually represent B2C business models, where the car fleet is provided by a car manufacturer (Schmöller et al., 2015). The assets and services in these platforms are therefore largely homogeneous, and value creation is oriented at use and availability. The platform centralizes exchange and has control over price, and relatively high control over SQ as the platform has control over many user touchpoints.

Station-based models require users to book the car in advance and return it to the same designated location (Heilig et al., 2018). On some station-based model platforms, the car may be owned by other users who rent out their spare cars (P2P business model), or by a car rental company. Their business model is less centralized, and markets are more multifaceted with two or more types of actors transacting on the platform. Value creation is based on the development of the ecosystem, facilitating co-creation of value for all actors. These platforms normally do not have control over price and have much less control over SQ.

Free-floating car-sharing is a relatively new option in terms of urban mobility, initially showing more potential than station-based models regarding resource conservation (Sun and Ertz, 2021) and car ownership (Le Vine and Polak, 2019). However, the implementation and subsequent assessment of the model has raised some concerns about the short lifespan of the shared cars and the low recycling rate (especially during the hype of the model), even resulting in car-sharing graveyards (Wang and Sun, 2022), as well as about the inconsistent results in terms of reducing car ownership (Haustein, 2021; Jochem et al., 2020; Kolleck

et al., 2021), vandalism, improper parking (Wang and Sun, 2022), and car relocation problem (Huang et al., 2020; Schmöller et al., 2015). On the other hand, station-based models allow for cost reductions associated with owning a car for both renter and rentee. This model is more suitable for electric cars (Kaya et al., 2022; Lemme et al., 2019). However, there are many factors that enter into play that influence environmental and social sustainability of SB models such as size of fleet and station location (Rickenberg et al., 2013; Brandstätter et al., 2020), relocation models (i.e. by consumers or by the platform) (Boyacı et al., 2015; Illgen and Höck, 2019; Vasconcelos et al., 2017; Wang et al., 2024), pricing (Jorge et al., 2015).

The interaction between the user and the digital platform is different in the two models. Table 1 summarizes the differences between the models. These characteristics have a great impact on how customers can use the service. For instance, station-based models may not be the best option for spontaneous and short city trips. For their part, free-floating systems require less planning, as users can pick up the car at one location (without a reservation) and drop it off in another within the service area. Furthermore, the free-floating option can also be used for daily commutes, since the user does not have to pay for the service while the vehicle is parked at their workplace (Ciari et al., 2014). There is also no booking fee, and no minimum hire length, monthly usage or base fee (Firnkorn and Müller, 2011). Free-floating vehicles incorporate an automatic system that provides GPS-based real-time information on availability, level of fuel, and the inner and outer state of cleanliness of the vehicle.

Previous research on SQ in car-sharing has generally taken a confirmation approach as opposed to an explorative one. To this effect, the dimensions of SQ have been inferred from existing studies (Csonka and Csiszár, 2016). study the SQ of car-sharing with respect to the following variables: freedom, parking space, connection with public transport, reliability, ease-of-use, sustainability, belonging to the community, and security. They found conditions of parking and reliability to be key factors (Guglielmetti Mugion et al., 2019). define CS SQ in terms of reliability, convenience, security, and support. They found that SQ and a green attitude are antecedents of CS usage (Molnar and Correia, 2019). suggest vehicle reservation as a SQ attribute for free-floating systems (Wireko-Gyebi et al., 2024). use SERVQUAL general dimensions (assurance, tangibles, responsiveness, reliability, empathy) and price as antecedents of customer satisfaction with CS. No distinction

has been made between free-floating and station-based models.

2.2. The use of user-generated content to reimagine the car-sharing platform service

Consumer choices play a crucial role in the transitioning of the mobility sector to a sustainable and circular economy. As Sopjani et al. (2019) observe, the transition to a circular economy requires not only the availability of sustainable product-service systems, but also the active participation of consumers in sustainable practices. User-generated content (UGC) is a spontaneous consumer post-consumption evaluation (Guo et al., 2017) found online in specialized content containers, or on product/service website, in consumer communities, and on social media. UGC is one type of engagement behavior that leads to co-creation (Eigenraam et al., 2018; van Doorn et al., 2010). Co-creation is a resource exchange and integration between consumers and other players in the platform ecosystem that goes beyond transaction. Co-creation stems from consumer engagement in production and delivery, and results primarily in either suggestions for service improvement or helping actors within the ecosystem (Yi and Gong, 2013). UDG can therefore be seen as consumer collective knowledge that is credible because consumers (i.e., the reviewers) typically have no stake in the product (Bickart and Schindler, 2001) and its aim is to help the broad community of users and non-users to make the correct choices and prevent fraud. However, this collective knowledge can be biased due to self-selection bias and social influence, known as the ‘bandwagon effect’ (Moe and Trusov, 2011; Muchnik et al., 2013), the design of the rating system (Schneider et al., 2020), the extent of disconfirmation (Ho et al., 2017a), fraud (Luca and Zervas, 2016), and frequency of postings (Ho et al., 2017a). UGC is often used by marketers for service innovation and continuous improvement (Lin et al., 2022), which make it suitable for the purposes of the current research.

3. Methodology

3.1. Data set extraction and preprocessing

Gathering reviews from different sources of information provides different perspectives and increases the trustworthiness of the content being analyzed. First, data were collected from the Apple Store and the Google Play Store (with the aim of obtaining reviews about the online pre-purchase experience and app-related service issues). Data was then crawled from Google Reviews, Facebook, Trustpilot and Yelp! (with the aim of obtaining reviews evaluating the rest of the service aspects related to the consumption and post-consumption stages). The selected platforms were chosen because they are mostly used by consumers (Qualtrics, 2022). The reviews were extracted using Octoparse, a web scraping tool that enables the automated collection of data (Octoparse, 2021). Specific scraping workflows were set up for each platform, ensuring that all relevant review information was captured.

Following the recommendations from previous studies (Feinerer et al., 2008; Mastrogiacomo et al., 2021a), several preprocessing steps were conducted to prepare the data set for topic modelling.

- Non-English reviews were excluded, using the textcat package in R (Hornik et al., 2013) for language filtering.
- Text was converted to lowercase and punctuation was removed, together with numbers, stop words, and other words that did not contribute to the identification of topical content (e.g.: ‘review’, ‘did’, ‘made’, etc.)
- Stemming was applied to eliminate each word’s inflections or derivations, leaving only the stem of the word (e.g. the words ‘travelled’ and ‘travelling’ would become ‘travel’)
- Words shorter than two or longer than 15 characters were removed, as well as the words with a very low frequency (appearing in less than 20 documents) and the reviews with less than 10 words

Table 1
Differences between station-based and free-floating platforms.

	Station-based	Free-floating
User interaction with platform	Locate stations and book cars	Search for closest available car
Fee structure	Users are charged for the total time that the vehicle has spent out of the station (even if it is parked)	Users are charged for the time spent driving (no payment while the car is parked)
Planning	Requires booking in advance	No reservation needed
Pick-up/Drop-off	Designated stations	Anywhere within service area
Link to other models	Mostly P2P but also B2C	Mostly B2C car manufacturers
Value creation	Creating value for an extended ecosystem by facilitating interactions between car owners and users. In P2P, less control over price and SQ.	Creating value for the customer through a value proposition oriented on use and availability. More control over linear series of activities in a value chain.
Sustainability impact	With the optimization of several factors (stations, relocation, vehicle type) an increased lifespan of cars, decreased car ownership, reduction of costs of owning a car can be achieved	Current research is not conclusive about the sustainability impact of FF model, some studies reporting positive outcomes of adoptions, while others, neutral or negative implications

- An N-gram analysis was conducted to identify frequently co-occurring words and convert them into unigrams (e.g., 'car rental' to 'car_rental').

3.2. Structural topic modelling

In natural language processing, a topic model is a type of probabilistic model that can be used to identify the latent semantic structures that can be found in a collection of documents (Lafferty and Blei, 2009). Intuitively, topic models are based on the idea that each document usually refers to multiple topics in different proportions (the higher the proportion, the more a topic is discussed in a particular document). Therefore, topic modelling can be used to explore the main topics in a set of documents, identify the keywords associated with each topic, and estimate the distribution of topic proportions in each document (Blei, 2012).

In the current study, the method used to extract the latent topics from the user-generated content was the Structural Topic Model (STM) (Roberts et al., 2019). STM is an advanced statistical method that builds on the foundations of Latent Dirichlet Allocation (LDA) (Blei et al., 2003), but also incorporates several additional features that enhance its capabilities. One of the most significant advantages of STM over traditional models like LDA is its ability to include document-level covariates of interest into the topic model, allowing the analysis of the relationships between topics and external variables (Roberts et al., 2019).

STM requires as input the definition of the number of topics (Roberts et al., 2013). One method for identifying the optimal number of topics is to run several iterations of the model with varying numbers of topics (Wallach et al., 2009). In the current study, we selected the held-out likelihood as an indicator of the best-performing model (Wallach et al., 2009). The held-out likelihood is a measure that estimates a model's generalizability by assessing its ability to predict topics for unseen data (Yi and Allan, 2008). The basic idea is to hold out some fraction of the words in a set of documents, train the model and use the document-level latent variables to evaluate the probability of the held-out portion (Roberts et al., 2019). The higher the held-out likelihood, the better the model is in terms of its predictive power. This approach is widely supported in the literature, particularly in studies involving the analysis of UGC (Mastrogiamomo et al., 2021).

The values obtained from the calculation of the held-out likelihood for models with varying numbers of topics (from 5 to 20) can be seen in Fig. 1. As this figure shows, the iteration that obtained the highest held-out likelihood was the model with 14 topics. The analysis of models comprising more than 20 topics yielded no relevant improvement in results. Hence, 14 was identified as the optimal number of topics.

Once determined, the topics were labelled and mapped in

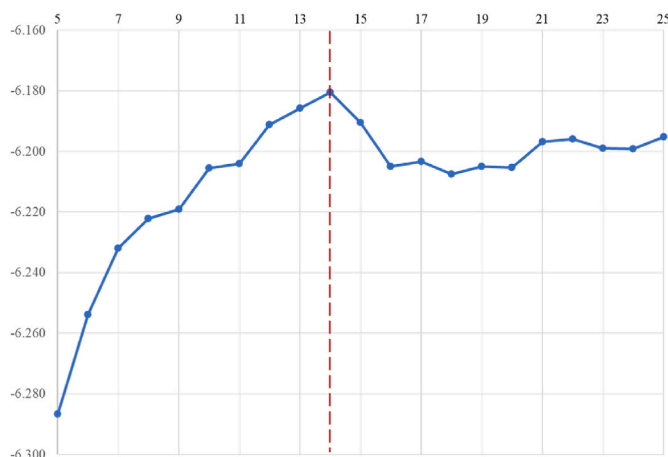


Fig. 1. Held-out likelihood for different numbers of topics.

accordance with the established practices (Debortoli et al., 2016; Roberts et al., 2019). The main output obtained through the STM is a document-level distribution of the topic weights associated with each topic in the corpus. In the first place, these topics were labelled manually to reflect their content and identify the service attributes associated with each topic. In this case, the labels proposed were based on each topic's most representative reviews, as well as the topic's highest probability (which are the words with the highest probability within each topic) keywords and frequency-exclusivity (FREX) words (weights words by degree of overall frequency and degree of exclusivity). A validation procedure was set up to test the reliability of the defined labels. The validation approach included comparing the generated topics with a subset of manually labelled data and assessing the coherence of the topics (Barravecchia et al., 2022). The results were satisfactory, indicating a good reliability of the generated model. According to Roberts et al. (2019), these are valid approaches to select an adequate label for each topic.

3.3. Categorization of topics

We calculated the *mean topic prevalence* (MTP) of the identified topics in the STM (Barravecchia et al., 2020). The MTP is calculated as:

$$MTP_t = \frac{\sum_{i=1}^N TP_{i,t}}{N}$$

where N is the number of reviews considered in the analysis and $TP_{i,t}$ is the topical prevalence of the topic t in the review i. Note that the sum of MTPs for all identified topics is equal to 1. To infer whether the importance of the topic was on the rise or declining we, next, plotted means of topic probabilities by year. Along with the mapping of topics into meaningful dimensions we also use the term *mean dimension prevalence* (MDP) with is a sum of MTPs in the corresponding dimension.

3.4. Regression

In order to identify the impact of obtained topics on user recommendation (rating) we used Ordinal Logistic Regression (ordinal regression) (Aman and Smith-Colin, 2022; Debortoli et al., 2016; Lucini et al., 2020). This choice was justified by the nature of the dependent variable, measured on a 5-star Likert scale. The independent variables were the weights of topics (identified by STM) associated to each review. Ordinal regression enabled us to determine which of the SQ aspects (independent variables) have a statistically significant effect on user satisfaction (user rating, dependent variable).

To understand if the model is overfitted or not, we used a logistic regression classifier. We randomly divided the sample into two subsamples: a training (80%) and a testing (20%). The results showed an accuracy of 76.56% for the testing sample, and an accuracy of 84.48% for the training set. The fit was acceptable to show the validity of the model, and the small difference between the training and testing sets indicated that there is no risk of overfitting.

3.5. Perceptual mapping

Perceptual mapping is a popular tool among marketers and researchers that allows the representation of consumer perceptions towards different (competing) objects – brands, products, service providers. The attribute-based approach to perceptual mapping consists of obtaining indirect measures of consumer perceptions of (dis)similarities of objects. Attributes that are used for this goal are usually meaningful for consumers and valid for differentiation between objects. For this reason, using topics obtained through STM to map perceptions of consumers towards types of car-sharing and car-sharing service providers is meaningful. Correspondence analysis (CA) was used in this analysis as it allows working with frequencies (Churchill and Iacobucci,

2005). By performing CA, we reduce dimensions and examine them in a two-dimensional space. Inertia is a weighted average of the chi-squared distances to the centroid (weighted average position) (Greenacre, 2017; Johs, 2018). Inertia ratio measures the amount of information accumulated by each dimension.

4. Analysis and findings

4.1. Descriptive analysis

The data were web-scraped from different platforms, the Apple Store, the Google Play Store (aiming to obtain reviews about the online pre-purchase experience and app-related service issues), Google Reviews, Facebook, Trustpilot, and Yelp! (aiming to obtain reviews evaluating the rest of the service aspects related to the consumption and post-consumption stages) (Table 2). The reviews selected were from English-speaking countries (the United Kingdom (N = 3666), the United States (N = 3532), Canada (N = 161), and Australia (N = 21)), although most of the reviews were not country specified (N = 9918). The average review length was 75 words, or 389 characters.

In total, 17,386 reviews for 16 different mobility providers (e.g., Ubeeqo, Zipcar, Turo) were extracted, the oldest from January 2014 and the newest from April 2021. We ensured that these platforms existed during the research period, and that the mode of operation had not changed. The German free-floating platforms ShareNow and Car2go were merged in 2018 under the brand SHARENOW. The data for these platforms were collected and presented separately. All the reviews included a numeric rating (from 1 to 5), which was also used for the analysis. Around 36% of the reviews (6,282) were from a station-based service, 33% from a free-floating platform (5764 reviews), and 31% (5340 reviews) from a mixed type of platform. Furthermore, all the reviews included a numeric rating (from 1 to 5), which was also used for the analysis. Fig. 2 shows the distribution of reviews by rating, provider, and type of platform. As can be seen in Fig. 2, the most common rating score was 1 (followed closely by 5), and the providers with the highest number of reviews were Zipcar, Turo, and Car2go.

4.2. Service quality aspects mentioned (RQ1)

To answer the first research question, structural topic modelling with mean topic prevalence was used to understand the key SQ dimensions. Further, the relation between service aspects and satisfaction was analyzed.

4.2.1. Structural topic modelling and mean topic prevalence

Following Debortoli et al. (2016), we engaged with existing theories to take stock of the automatically identified topics to label and arrange them in dimensions in relation to the nature of the encounter. This comprehensive conceptualization allowed us to underpin our empirical findings while adding sense and extending implications using the *mean topic prevalence* (MTP) of the identified topics in the STM (Fig. 3). Appendix A shows the labels and top 10 keywords and top 10 FREX words for each topic.

Overall quality emerged from Topics 3 (Value for money) and 14 (Stable experience). Specifically, Topic 3 focuses on user perception of

value, including convenience of use and comparisons with other services (especially pricing). Topic 14 describes long-term user experiences, typically based on multiple transactions. Here, stability is a positive attribute, while declining quality is a reason for discontinuing the service. By analyzing representative reviews from these topics, we linked the identified issues to SQ constructs: perceived customer value (Topic 3) and continuous improvement (topic 14). As Akhmedova et al. (2020b) suggest, continuous improvement can be an antecedent to perceived service quality, while perceived customer value is the outcome (Akhmedova et al., 2020a).

Topic 3 (Value for money) was the topic with the second highest MTP (MTP = 0.111), suggesting that practical/economic considerations are important to shared mobility users. The role of value for money was relatively stable across the period with a slight decline between 2016 and 2020, but with a surge in the last year (2021).

App efficiency was reflected in 4 topics: Topic 1 (App technical issues), 11 (App updates and improvements), 6 (App user registration), and 8 (App car reservation). Topic 1 and 11 reflected the (lack of) technical quality, while topics 6 and 8 reflected ease of use (in the registration and reservation processes, respectively). From representative reviews of Topic 1, it was found that incidents related to app errors, such as failures to load the platform, synchronize, to log in, are quite common and seemingly very annoying. Topic 11 describes issues mostly related to app updates and the inefficiency of the updated version. Topic 6 refers to ease of user registration on the App. Users outline some incidents during registration, including issues when validating the driving license and adding payment methods. Topic 8 refers to the efficiency of the car search and ease of the reservation process.

App efficiency had relatively high MTP. As can be observed in Fig. 3, all graphs show a declining trend, suggesting that the quality of the digital encounter used to be a key topic in 2014, but is possibly losing its importance nowadays in the eyes of consumers.

Payment reliability was reflected in Topic 7 (Payment incidents). Topic 7 describes incidents related to penalties or charges applied to the user without a formal reason or the ability to appeal. Users express their inability to contact support in these cases. Relevant reviews for Topic 7 report incidents that collectively undermine the credibility of the platform in terms of fairness and reliability of charges. The weight of Topic 7 has been steadily rising since 2014, but with a slight decline in 2021.

Rental quality was reflected in 3 topics, numbers 4 (Parking area), 10 (Handing over), and 9 (Car conditions). Topic 4 is related to the parking area. Relevant reviews uncover customer inconveniences related to finding the car and returning the vehicle (inflexible system and lack of up-to-date information on availability). Existing car rental SQ scales do not cover issues related to parking, and we propose three attributes based on this topic. Topic 10 is related to handing over the car before usage. The reviews uncover technical incidents related to fuel tank payment, unlocking the car, and a flat battery upon receipt, among others. Topic 9 is related to conditions of the car and incidents while using the car. Among the relevant reviews, complaints about lack of car hygiene upon receiving the vehicle are particularly frequent.

Quality of interaction with peer provider or host was partly covered in Topic 12 (Sharing experience). Relevant reviews outline host friendliness, interaction with the host, and experience with the host. The reviews relevant to this topic often combine a summary of the consumer's experience (one-time, first-time users) with an indication of intention to spread positive WOM. While these elements might be less pronounced in B2C models, they can still be relevant to understanding broader user experiences. Topic 12 (Sharing experience) had the highest overall mean topic prevalence (MTP = 0.141), which furthermore almost tripled in the last two years (Fig. 3).

Platform responsiveness was covered broadly in Topics 5 (Car reservation support), 13 (Payment support), and 2 (Car usage support). Topic 5 describes incidents that required contacting customer support to cancel, rebook, or refund a service, and to resolve incidents related to extra charges. Time is important: users are discontented when

Table 2
Sources of data set.

Reviews mainly related to the mobile app. (N = 8859)		Reviews related to the overall customer journey. (N = 8527)			
Play Store (N = 6183)	App Store Apple (N = 2676)	Trustpilot (N = 5646)	Yelp (N = 2742)	Google (N = 88)	Facebook (N = 51)

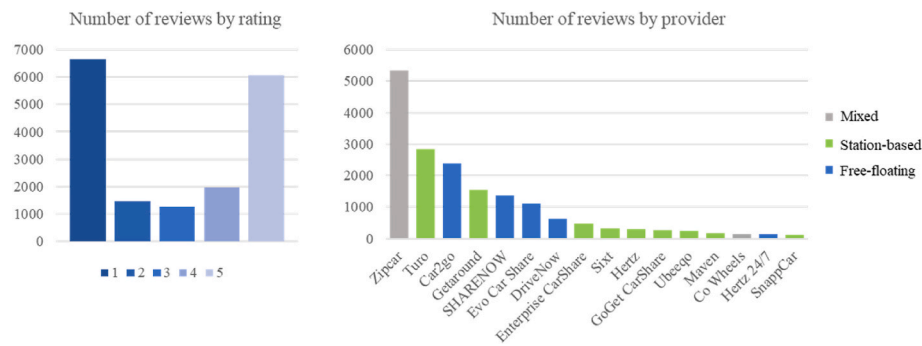


Fig. 2. Data set characteristics: number of reviews by rating and provider.

Note: Although some platforms offer both station-based and free-floating services, the reviews typically pertain to one model or the other. However, it is not possible to distinguish between them during the analysis.

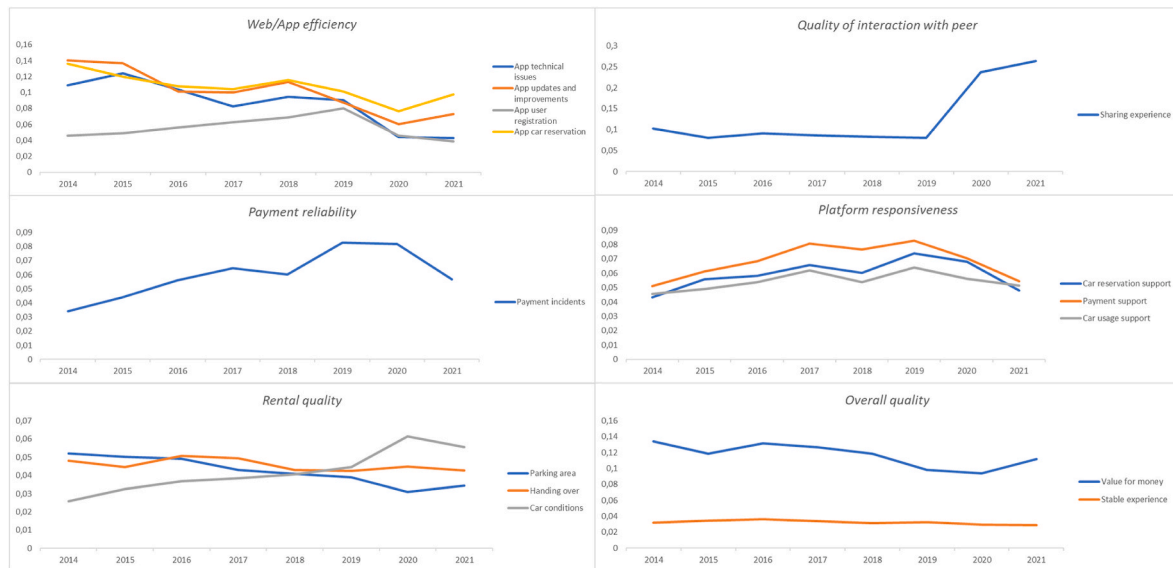


Fig. 3. Mean topic prevalence (MTP) by year.

complaints are not resolved quickly. Topic 5 corresponds to platform responsiveness during car reservation (i.e., topic 8). Reviews relevant for Topic 13 reveal incompetent customer service related to payment, excessive waiting time, and absence of compensation for the platform's errors. Topic 13 corresponds to responsiveness during payment processing (Topic 7). Reviews relevant for Topic 2 are related to users reaching out to the platform when they experience car rental incidents. These incidents are perceived most negatively when support does not

resolve issues quickly and efficiently. Topic 2 corresponds to car usage (broadly topics 4, 10, 9).

4.2.2. Service aspects and user satisfaction

STM alone only provided descriptive results (Debortoli et al., 2016). To obtain explanatory results, linear regression is deemed necessary (Debortoli et al., 2016) and is often used with reviews and rating data (Aman and Smith-Colin, 2022; Debortoli et al., 2016; Lucini et al.,

Table 3
Results of the Ordinal logistic Regression.

Dimension	Topic	Label	Coeff.	Std. error	t-value	P value
Web efficiency quality	Topic 1	App technical issues	-4.792	0.526	-9.15	0.000
	Topic 11	App updates and improvements	-1.270	0.516	-2.47	0.014
	Topic 6	App user registration	-2.692	0.543	-4.99	0.000
	Topic 8	App car reservation	1.158	0.523	2.23	0.027
Payment reliability	Topic 7	Payment incidents	-13.628	0.696	-19.36	0.000
Rental quality	Topic 4	Parking area	-	-	-	-
	Topic 10	Handing over	-	-	-	-
	Topic 9	Car conditions	-3.195	0.550	-5.80	0.000
	Topic 12	Sharing experience	22.498	0.658	33.63	0.000
Quality of interaction with peer	Topic 5	Car reservation support	-6.148	0.572	-10.72	0.000
	Topic 13	Payment support	-6.156	0.597	-10.28	0.000
	Topic 2	Car usage support	-	-	-	-
	Topic 3	Value for money	3.876	0.545	7.14	0.000
Overall quality	Topic 14	Stable experience	-	-	-	-

2020). The goal was to infer which of the quality attributes have the highest association with customer satisfaction. The results are reported in Table 3. Almost all topics appear to have a negative sign, suggesting a negative or decreasing contribution to satisfaction. Topics that contribute positively to satisfaction are numbers 8 (App car reservation), 12 (sharing experience) and 3 (Value for money). It can be inferred, with caution, that quality attributes associated with these topics act as satisfiers or delighters. A t-value was used with the goal of examining the strength of the relationships between each independent variable and the outcome variable (user rating). Exploring the t-values, we find that Topic 12 had the highest t-value at 33.63 ($p < 0.001$), suggesting a very strong association. Similarly, Topic 3 had a strong association, with a t-value of 7.14 ($p < 0.001$). Meanwhile, the association between Topic 8 and user rating was not as high, with a t-value of 2.23 ($p < 0.1$) (see Table 4).

Assessment of the topics with a negative or decreasing contribution to satisfaction suggested a very strong (negative) association for some topics. It can be inferred (with caution) that these topics are strong dissatisfiers. Topic 7 (payment incidents) had the strongest negative association with satisfaction, with a t-value of -19.36 ($p < 0.001$). Next were the topics related to evaluation of the platform responsiveness: Topic 5 (car reservation support) and Topic 13 (payment support) had corresponding t-values of -10.72 ($p < 0.001$) and -10.28 ($p < 0.001$), respectively. It can be inferred that platform responsiveness is expected by users, and when this expectation is not met, this becomes a source of strong dissatisfaction. Similarly, Topic 1 (app technical issues) has a t-value of -9.15 ($p < 0.001$), from which it can be inferred that vehicle hygiene factors act as dissatisfiers when expectations are not met (Li et al., 2020; Park et al., 2020). Among the factors related to rental quality, only the car conditions (Topic 9) were significantly associated with satisfaction, with a negative t-value of -5.80 ($p < 0.001$).

Voorhees et al.'s conceptualization of customer journey (Voorhees et al., 2017) was used to map key SQ aspects (Fig. 4). Value-enhancing service aspects are potential satisfiers or delighters that are important to differentiate service from competitors, and are **marked in green**, while potential dissatisfiers – aspects that can induce a sense of frustration when absent, potentially having a stronger negative effect on users when absent than the positive effect of value-enhancers when present – are marked in red.

Table 4
Contribution of the article to research on SQ in Car-sharing.

SQ attribute	Existing conceptualizations		Current research
	OSE	CS	
Value for money	V	X	V
Stable experience	V	X	V
Ease of use/Efficiency	V	V	-
App technical issues	X	X	V
App updates and improvements	X	X	V
App user registration	X	V	V
App car reservation	X	X	V
Vehicle availability	-	V	X
Reliability	V	V	-
Payment incidents	V	V	V
Tangibles	V	X	-
Parking area	X	V	V
Handing over	V	X	V
Car conditions	V	X	V
Car aesthetics	X	V	X
Community	-	V	-
Sharing experience	V	X	V
Responsiveness	V	V	-
Car reservation support	X	X	V
Payment support	X	X	V
Car usage support	X	X	V
Sustainability	V	V	-

Note: OSE – other sharing economy, CS – Car-sharing.

4.3. Variation of key service quality factors among different platform models (RQ2)

To respond to RQ2, comparison of average topic weights and perceptual mapping were performed for the station-based and free-floating models. Each technique on its own has limitations but taken together the analysis is expected to provide holistic information about heterogeneity and its underlying factors for each model.

4.3.1. Comparison of station-based and free-floating services

MTPs were compared between the two models and the results are reported in Fig. 5, with the most significant differences outlined in Fig. 6. The discussion of quality attributes related to web efficiency quality in reviews from free-floating platform users amounts to 51%, while that of station-based accounts amounts to 21% (Fig. 5). In a similar vein, App technical issues, app car reservation, and app updates and improvements have smaller median and interquartile ranges (IQR) than that of the free-floating system (Fig. 6). Taken altogether, this suggests that web efficiency quality is a key issue for free-floating services.

Contrarily, quality of interaction with peers (sharing experience) seems to be more critical for the station-based model, as the proportion of corresponding discussion accounts for 25% (vs 8% in the free-floating model). It can also be concluded that payment reliability and rental quality were also slightly more important for the station-based model (8% and 14% for station-based vs 4% and 10% for free-floating, respectively).

4.3.2. Mapping of topics in relation to car-sharing models and providers

We performed perceptual mapping to explore further SQ factors related to different models of car-sharing. As can be seen in Fig. 7, D1 and D2 have inertia ratios of 71.2% and 28.8%, respectively, altogether accounting for 100% of the information. In the case of Fig. 8, D1 accumulates 57.1% and D2 – 29.7%, together accounting for 86.8%, suggesting in both cases (Figs. 7 and 8) that the information is summarized in a very comprehensive way. Figs. 7 and 8 are also consistent among them: in both cases, D1 represents comments about app technical issues, app user registration, app car reservation, parking area, car usage support, value for money, parking area and app updates and improvements, while D2 captures comments about car conditions, handing over, and sharing experience.

Analyzing the relative importance of topics for the car-sharing business model (Fig. 7) and for car-sharing specific providers (Fig. 8), we can see that the results are consistent, with Fig. 7 adding further information. As can be seen in Fig. 7, topics that form part of the App/web efficiency dimension (1, 11, 6, 8) are likely to be discussed in relation to the free-floating car-sharing model. In addition, parking area is linked by an acute angle to the free-floating model (going through the centroid), suggesting that service attributes stemming from these topics are potentially more relevant to free-floating users. Looking at Fig. 8, it can be observed that free-floating providers (except for Hertz) are situated in proximity to the same topics. It can be observed that the Evo car share is different from the average free-floating provider in terms of app updates and improvements.

Further, analysis of Fig. 7 shows that the station-based model (specifically Turo, which is a P2P model) is likely to be discussed in terms of sharing experience and car conditions. As can be seen, Turo is different from the average station-based provider in terms of its relation to Topic 12 – sharing experience. Other station-based providers seem to be less different from each other.

5. Discussion and conclusions

5.1. Key findings

Regarding the first research question (RQ1), its aim was to identify

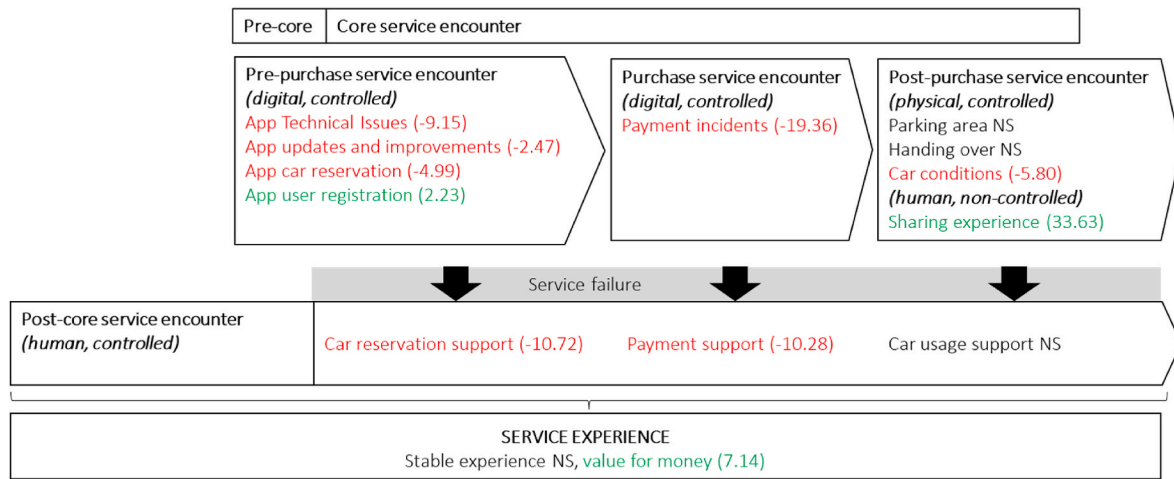


Fig. 4. Summary of the findings using Voorhees et al.'s (2017) conceptualization of customer journey
 Note: in brackets is the t-value from the ordinal logistic regression (see table 4), NS = not significant (t-value threshold ± 1.645).

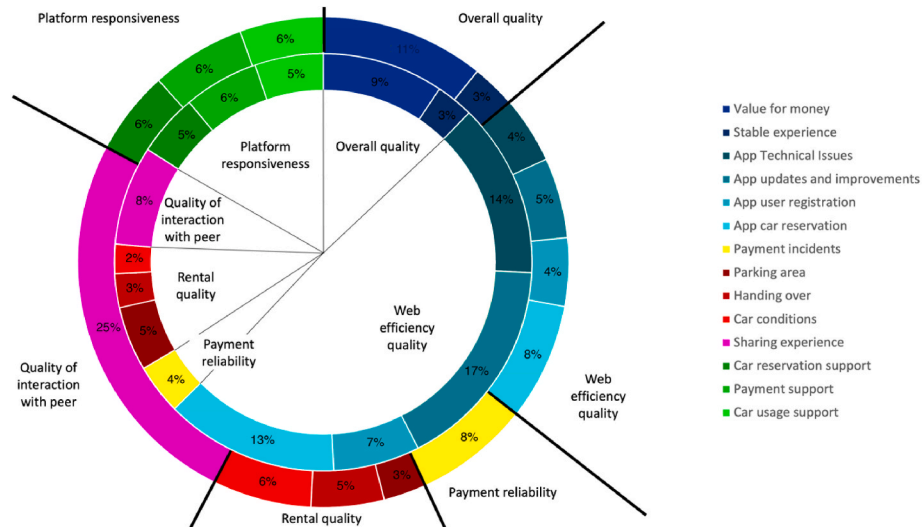


Fig. 5. Mean topic prevalence (MTP) comparison (free-floating vs station-based model)
 Note: Inner circle: free-floating business model; Outer circle: station-based business model.

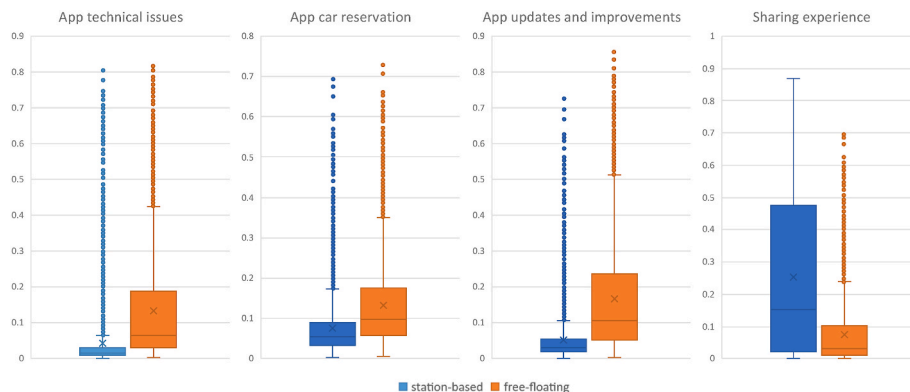


Fig. 6. The most significant differences among free-floating and station-based models in terms of Mean topic prevalence (MTP).

the key SQ attributes of shared mobility services (according to user-generated content). Through topic modelling (using STM) the present work identified 14 Topics related to SQ attributes. MTP revealed that not all service dimensions are equally important for the peer user and that

user sensitivity to one or another quality aspect has been evolving in the last few years. Specifically, interaction with peers (sharing experience) has almost tripled in the last two years.

There are two possible reasons for this recent unexpected change.

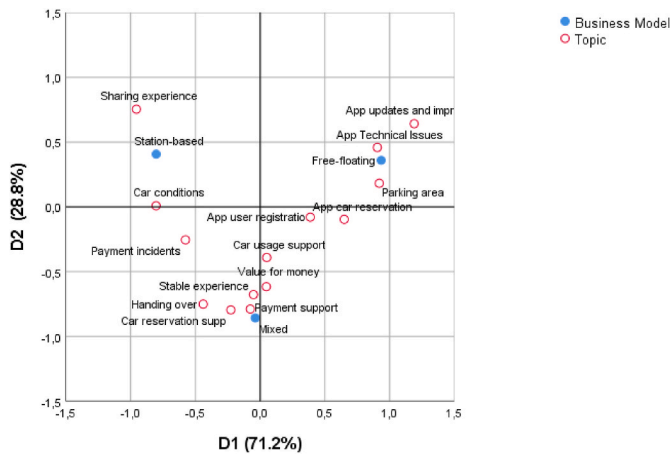


Fig. 7. Perception map of association between topics and business models.

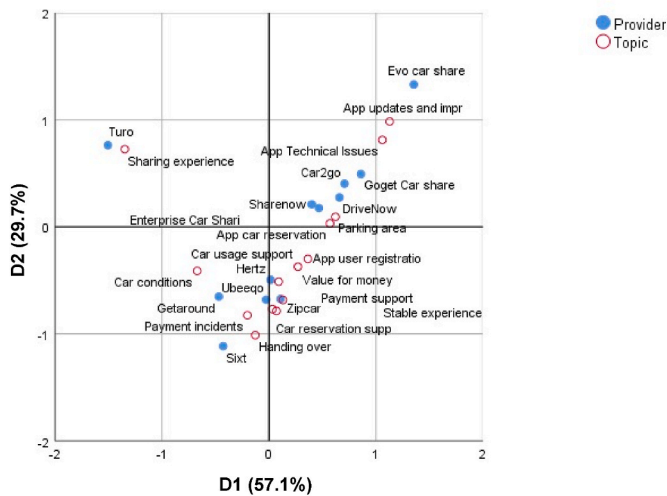


Fig. 8. Perception map of association between topics and service providers.

The first is that interaction with peers has gained in importance in recent years, possibly as a result of the COVID-19 lockdown and corresponding changes in consumer preferences observed and documented in the literature, such as a higher social orientation (Brammer et al., 2020; Hossain, 2020; Seetharaman, 2020). Even before the COVID-19 outbreak, interaction among peer service providers and customers was seen as a critical issue (Wu et al., 2017), requiring specific trust-building efforts from both the platform (Basili and Rossi, 2020) and peer service providers (Ert and Fleischer, 2020). Without confidence that the peer service provider is adept and willing to guarantee mutual safety, the use of platforms requiring physical interaction would not be possible, even assuming that the service provider is competent. Second, the sharing economy business model is still evolving (Faraji et al., 2024), and the role of interaction among actors in the extended ecosystem of actors (users, platform, peer-providers, manufacturers, users' friends and family members, non-users, government, society at large, sustainability) is growing, especially in P2P sharing economy models. Even B2C models often involve significant customer-customer co-creation (e.g., filling the tank and cleaning the car for the next user) (Wirtz et al., 2019).

Contrary to the importance of the social dimension, our analysis did not identify explicit references to environmental concerns in the UGC. While previous research (Rabadán-Martín et al., 2025; Wang et al., 2024) found that consumers often discuss sustainability in user-generated content, the research focus differed from those in the current study. In addition, previous research suggested that

sustainability is a key attribute for SQ and satisfaction in micro-mobility (Manirathinam et al., 2024). However, current findings suggest that environmental considerations are not a primary driver of user feedback in the car-sharing context. This finding is particularly intriguing given the growing public awareness of environmental issues. On the one hand, it is possible that the absence of environmental concerns in reviews indicates a gap in consumer knowledge or a lack of effective communication by car-sharing platforms regarding their environmental impact. On the other hand, it is possible that users take for granted that these new mobility models are more sustainable (Hartl et al., 2018). In either case, companies must enhance the value of their environmental contributions and consider implementing strategies to educate users about their environmental impact and incentivize environmentally friendly behavior.

Overall, this research makes a significant contribution by focusing specifically on the car-sharing context, setting it apart from other studies that explore sustainability topics through UGC analysis (e.g., Rabadán-Martín et al., 2025; Wang et al., 2024). Additionally, it advances the field by utilizing the unstructured format of UGC, which offers richer insights into user perspectives through an exploratory approach—unlike traditional survey-based confirmatory sustainability research in car-sharing (e.g., Hartl et al., 2018).

The differences between station-based and free-floating were analyzed to respond to the second research question (RQ2). The results of the perceptual mapping suggest that attributes related to the App efficiency dimension are more relevant in free-floating models, while attributes related to car conditions and sharing experience appear to be more significant for station-based models. Similarly, quality attributes related to App efficiency account for 51% of MTP in free-floating platform user reviews, as opposed to just 21% in the case of station-based platforms. Contrarily, sharing experience has a higher MTP (25%) in station-based platforms (vs 8% in free-floating).

5.2. Theoretical implications

This research dives deep into the key dimensions of quality management of digital ecosystems, contributing to the SQ management literature by deepening knowledge on the key SQ dimensions. The attribute-based assessment of perceived service quality (PSQ) in the management literature dates back almost four decades, when Parasuraman et al. (1985) introduced five dimensions of PSQ, namely reliability, responsiveness, assurance, empathy, and tangibles. Since then, there have been many attempts to define SQ in different sector contexts (Parasuraman et al., 1985). In practical terms, they have provided generalized dimensions (characteristics) as a guidance for practitioners. To the best of our knowledge, only a handful of studies analyzed SQ in sharing economy (Akhmedova et al., 2021), including Airbnb (Ju et al., 2019) and mobility platforms such as Didi (Zuo et al., 2019), Uber (Sthapit and Björk, 2019) and Go-jek (Hamenda, 2018), and few studies have analyzed SQ in shared mobility platforms (Csonka and Csiszár, 2016; Guglielmetti Mugion et al., 2019; Molnar and Correia, 2019; Wireko-Gyebi et al., 2024). Consistent with (Faraji et al., 2024), this research confirms the eminent role of the digital dimension (especially relevant for the free-floating model) and trust (dimensions of reliability and responsiveness), which are new to car-sharing research. Additionally, the social dimension – sharing experience – was found to have increased its share in the last years. Contrary to what was expected based on (Manirathinam et al., 2024; Mattia et al., 2019), environmental sustainability was not mentioned as a separate topic. Future research could take a confirmative research design to confirm the current findings.

The findings suggest that the role of actor engagement in the sharing economy, specifically in CS, is growing. Given the high and positive role of the dimension of interaction, it can be inferred that CS providers might need to focus SQ on this dimension (Islam et al., 2019). The importance of reciprocity in user engagement can be inferred, which is

especially aligned to the social network theory. In this regard, a user network is a mix of links through which network actors obtain resources from other actors, stimulating trust and reciprocity. Engaged users are more likely to contribute by leaving the car in a good condition, treating the common good (the car) with care, optimizing their trips to reduce negative environmental effects, actively encouraging others to adopt environmentally sustainable practices, answering questions, writing reviews, and rating service quality. This reciprocity-driven engagement underscores the social exchange dynamics within the platform economy ecosystem. Non-engaged peers will not spend time performing actions beyond the transaction. Accordingly, there are important linkages between service quality, quality of interaction and social network theory (Coleman, 1990), the S-D logic and service ecosystem perspectives (Vargo et al., 2023; Islam et al., 2019).

5.3. Practical implications

In summary, the relevance of this study lies in its ability to inform CS platforms about where to focus their service quality efforts. As noted by (Wu and Xu, 2022), the majority of CS optimization research is focused on either profit maximization or cost reduction, and only a handful of research is concerned with building a multifactor model accounting for other variables, such as sustainability. As Sopjani et al. (2019) observe, the transition to a circular economy requires not only the availability of sustainable product-service systems but also the active participation of consumers in sustainable practices. Consumer choices play a crucial role in the transitioning of the mobility sector to a sustainable and circular economy. It is important that CS platforms build an ecosystem of engaged users who choose to act reciprocally and benevolently in the interests of other actors in the ecosystem (including society at large and the environment). Accordingly, platforms can develop specific practices that would favor engaging consumers in co-creation, with a focus in environmental and social sustainability. Table 5 proposes to focus on value-enhancing opportunities, relevant for each model.

One way to innovate the quality of the app, which is the high priority for free-floating model, is to introduce sustainability into CS apps is to use different digital nudges (e.g. goal setting, social comparison (CO2 tracking (Hoffmann et al., 2024), set the goals for personal CO2 reduction, comparison with the average (Daniel et al., 2022), etc.), simplification (make sustainable options more easily available)) to push users into selecting more sustainable options (Berger et al., 2022). Another way to improve service quality of the app is to introduce complex mobility solutions (Biancuzzi et al., 2024; Ma et al., 2018) or multimodal portfolio (Carbonara et al., 2024). The app technical quality can be improved by opening API of the app to crowd solutions and innovate from technological complementors. To this end (Carbonara et al., 2024), and provides possible strategies for digital service innovation, while (Saeedikiya et al., 2024) provides recommendations strategic service innovation specific for mobility sector.

To innovate rental quality which has moderate priority to both models while aiming at sustainability, CS apps can introduce user-based relocation can reduce CO2 emissions and increase profitability of free-floating model (Kim et al., 2022; Wang et al., 2021). Free-floating business models need to aim for increase of individual car lifespan (Montoya-Torres et al., 2023).

To benefit from the interaction among users, which is high priority for station-based models, CS platforms can introduce complementary P2P services, such as P2P repair (Ertz et al., 2019), P2P cleaning, transporting parcels/pets P2P, which can increase overall competitiveness of the platform (Carbonara et al., 2024; Saeedikiya et al., 2024). As discussed in the previous section, the reciprocity-driven behavior is a strong motivator to adopt sustainable consumption practices (Wang et al., 2019), contributing to both: sustainable environmental and social practices and platform competitiveness. Overall, building a community of users engaged around sustainability – such as nudging users in generation of the content – environmental tips for travel, cost-saving tips,

Table 5

Reimagining the SQ through possible practices and strategic focus in the car-sharing service based on the findings of the research.

Dimension	Possible practices and strategic focus to increase sustainability and competitiveness	Station-based model	Free-floating model
App	- Adopt an ecosystem approach: offer open APIs, SDKs, code libraries, and reference designs to foster innovation from complementors; enable integration with other apps and mobility models for enhanced flexibility and usability. -Encourage more sustainable choices: highlight the environmental impact of renting smaller vs. larger cars, promote CO2-reducing routes and traffic avoidance, offer off-peak discounts, enforce penalties for improper parking, and reward returns that minimize relocation needs.	Moderate	Very high (key priority)
Payment	-Data collection and analysis for efficiency	High	High
Rental	-Extend car lifespan by performing car inspections, repairs. -Minimize relocations through targeted reservations and drop-off zones. -Conduct vehicle inspections to improve fuel-efficiency (e.g., tire checks). -Encourage fuel-efficient driving (e.g., points for smooth driving, limited A/C use).	Moderate	Moderate
Interaction	-Build an ecosystem, fostering trust, communication and rewarding active participation. -Offer complementary services: P2P repairs, cleaning, and parcel/pet transport.	Very high (key priority)	High
Responsiveness	-Support, optimization of protocols	Moderate/High	Moderate/High

maintenance tips from peers would increase the overall value of the platform, again contributing to platform competitiveness through sustainability (Chen et al., 2024).

5.4. Limitations and future research

The study is not without limitations, which open avenues for future research. First, the evolving nature of consumer preferences, as outlined by Levitt's total product model (Levitt, 1985), implies that SQ attributes may change over time. Consequently, the findings of this study may require periodic updates to stay relevant. Second, while the use of STM offers a systematic approach to identifying key SQ aspects, the subsequent categorization of topics into dimensions and attributes involves a degree of researcher interpretation. This subjectivity could potentially influence the results. Third, the focus on English-language reviews limits the generalizability of the findings to non-English speaking markets. Additionally, the reliance on a specific set of car-sharing platforms may not fully capture the diversity of the car-sharing landscape. Last, the focus on app-related topics might be influenced by the data source (the App Store and the Play Store). Future research could explore a wider range of platforms, including government-provided services, and incorporate data from other sources for a more comprehensive understanding of user experiences.

CRediT authorship contribution statement

Anna Akhmedova: Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis. **Natalia Amat-Lefort:** Validation, Methodology, Formal analysis. **Federico Barra-vecchia:** Validation, Software, Methodology, Formal analysis, Data curation. **Luca Mastrogiacomo:** Validation, Supervision, Project administration.

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.

APPENDIX A

TABLE A1
Labelling of identified topics and their 5 highest probability keywords

Dimen-sion	Topic	Label	Top 10 highest prob keywords	Top 10 FLEX words	Representative review	MTP	MDP
Overall quality	Topic 3	Value for money	car, price, use, conveni, drive, citi, rate, around, hour, cost, cheaper, expense	cheaper, price, conveni, citi, own, rate, expens, van, cheap, compar, smart, occasion	<i>I have a membership in both [XXX] and [XXX]. I use [XXX] for intown forays, I use [XXX] when i need to go further. That is because they include 180 miles within a 24 h period. [XXX] has a new plan now though that might rival the economicality of using [XXX] for long distance. In any case ...</i>	0.932	1.190
	Topic 14	Stable experience	use, year, life, actual, time, now, thing, expect, probably, get, work	life, expect, communiti, program, chanc, actual, world, certain, real, cycle, work	<i>For reference, I have been a [xxx] member since 2008 12 years. Early on I sold my car and used [xxx] exclusively as my car rental service in Boston. Most years I d spend about 3000 4000/year in cars, so I was definitely using it pretty frequently. About 5 years ago ...</i>	0.258	
App efficiency	Topic 1	App technical issues	app, time, try, error, use, open, log, crash, load, work, fix, keep	log, crash, login, password, load, uninstal, open, error, useless, constant, screen, reinstal	<i>Its not responding I tried uninstalling and installing again but the app isn t getting in sync with the [XXX] servers I guess and its just giving an error saying Something went wrong</i>	0.692	2.810
	Topic 11	App updates and improvements	app, work, update, map, improve, slow, features, use, function, version, fix, please	version, interface, function, improve, update, radar, features, connect, release, develop, latest, feedback	<i>The New update was the worst, everything takes forever to load. Regret updating it. Last version was a lot more efficient and user friendly. The new update looks nice visually but does not function the same so it is pretty worthless.</i>	0.812	
	Topic 6	App user registration	account, card, sign, email, website, credit, licens, inform, phone, day, payment, driver	licens, payment, regist, sign, verifi, registr, info, valid, account, card, applic, approv	<i>I cannot even sign up It said all of my email addresses have been used Sign in to finish application or reopen account didn t work I passed step1 by using brand new email and then error driver s license number has to be unique pop up So I guess they want to get new driver s license number too</i>	0.447	
	Topic 8	App car reservation	car, app, location, available, book, trip, reservation, time, find, see, option, show	availability, search, list, select, date, car, wish, option, navig, accuracy, reliability, view	<i>I wish the app would let me put in my preferred time and then show me available cars instead of showing me the cars first Usually the time is my first priority not the car it seems counterintuitive</i>	0.859	
Payment reliability	Topic 7	Payment incidents	compani, charg, email, receiv, money, call, account, pay, month, refund, day, contact	refus, receiv, scam, suspend, lie, driv, depar, disput, money, collect, paid, email	<i>charged me 100 pounds for a penalty charge5 months after I had rented the car.without giving evidence of the penalty after I asked for it.took 20 pounds off my account without reason refused to give it back don t ever rent from [XXX] thieves</i>	0.481	0.481
Rental quality	Topic 4	Parking area	park, find, area, lot, walk, spot, home, garag, car, block, locat, street	park, spot, space, area, street, garag, walk, anywhere, zone, home, block, lot	<i>Home area color needs to change The home area is the exact same color as bodies of water on the map This makes it hard to find the home area in places that are surrounded by water and the home area is broken up into small precise distinct locations ...</i>	0.339	1.041

(continued on next page)

TABLE A1 (continued)

Dimen-sion	Topic	Label	Top 10 highest prob keywords	Top 10 FLEX words	Representative review	MTP	MDP
Quality of interaction with peer	Topic 10	Handing over	gas, hour, call, late, pick, card, minute, start, return, tank, fill, wait	gas, fill, station, tank, truck, battery, office, late, receipt, fuel, return, remote	<i>This past week I needed a car in a hurry. I am fortunate to live around the corner from a [XXX]. I rented a Mini (which I absolutely fell in love with) and went to my evening meeting. In my rush I misplaced the card key and couldn't get in the car. After searching for while, and with much frustration ...</i>	0.365	
	Topic 9	Car conditions	damage, report, rent, owner, renter, dirty, clean, tyre, drive, smell, driver, smoke	tire, smoke, damage, report, smell, renter, scratch, dirty, seat, repair, interior, safety	<i>The car was dirty. Dog hair everywhere. [XXX] said they deep clean the cars every two weeks but clearly not as there was a sticker on the window from February that was still left over. Given the times were in, I would have expected [XXX] to clean the cars thoroughly but that is not the case.</i>	0.336	
	Topic 12	Sharing experience	user, experience, host, time, recommend, rent, definite, clean, trip, pick, process, friend	efinit, awesom, host, amaz, excel, high, communication, efficient, simple, recommended, seamless, accommod	<i>Amazing host, extremely patient and flexible. I recommend His Experience was spotless and beautiful I enjoyed driving it Host was a pleasure renting the car from, made everything so easy.</i>	1.023	1.023
	Topic 5	Car reservation support	time, reserv, hour, minut, book, call, cancel, anoth, wait, trip, end, hold	cancel, min, anoth, wast, minut, hold, hour, spent, wait, reserv, arriv, ruin	<i>Just don't Use [XXX] instead Very unreliable I ve just spent 15 min next to a car not being able to lock it or to cancel the reservation And all that time waiting for support to answer my call A call that of course is not free</i>	0.473	1.455
	Topic 13	Payment support	servic, custom, fee, charge, use, month, problem, year, membership, company, care, call	custom, servic, fee, membership, hidden, subscript, year, rude, loyal, month, annual, care	<i>Zero customer service that led to me being charged 70 Initiated a chargeback</i>	0.545	
Platform responsiveness	Topic 2	Car usage support	help, issue, call, support, phone, custom, problem, servic, team, understand, staff, experience	help, staff, support, team, resolv, issue, reach, happi, understand, solv, answer, experienc	<i>[XXX] consistently has the worst most incompetent customer service of any major company I've dealt with Unfortunately problems are abundant and customer service cannot help</i>	0.435	

Note: MTP – mean topic prevalence, MDP – mean dimension prevalence; Names of platforms were substituted by “[XXX]”.

Data availability

Data will be made available on request.

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