User expectations and implications for designing the user experience of shared vehicles

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User Expectations and Implications for Designing the User Experience of Shared Vehicles

Saif A. Al Khamissi

Eindhoven University of
Technology
Eindhoven, Netherlands
s.a.al.khamissi@student.tue.nl

Bastian Pfleging

Eindhoven University of
Technology
Eindhoven, Netherlands
b.pfleging@tue.nl

Abstract

Shared mobility is one of the main focus of mobility companies and start-ups in recent years. Despite the fact that many cities have some form of shared vehicles, it is still a niche market with the potential to become a sustainable business. In this paper, we investigate the limitations and possibilities of shared vehicles to make them more appealing to users. A combination of a literature survey, online survey, and interviewing individuals and stakeholders provide directions for future solutions. Our findings reveal that current shared vehicles services are at the beginning, where stakeholders focus on developing frameworks and regulations to deploy current services. However, the future of shared vehicles lies in the experiences provided in and around the vehicle, which might result in the development of new and more specific vehicles for certain users and contexts. The outcome is an invitation to discover and discuss the experiences of shared vehicles.

Author Keywords

Shared vehicles; shared mobility; user experience.

CCS Concepts

• **Human-centered computing** → Interactive systems and tools

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Introduction

Shared vehicles or shared vehicle services provide individuals “the benefits of private cars with-out the costs and responsibilities of ownership” [6]. These services can mainly be divided into three types: stationary services like peer-to-peer, free-floating services like car2go services, ride hailing like Uber and Lyft, and ride-sharing such as BlaBlaCar.

The shared vehicle market, mainly ride hailing, is snowballing in the last decade, due to lower prices and flexibility. In a projection for 2030, shared vehicles will form a 10% share of the personal vehicle market with an expected revenue of 1.5 trillion US dollar [8].

On the other hand, shared vehicles have a massive impact on improving the quality of life, especially in crowded areas [4]. For example, reducing the car-ownership in the Netherlands by 30% and replacing it with shared vehicles will a) decrease the total driven kilometers by 20%, b) reduce CO₂ consumption by 8% to 13% and, c) save 120.000 m² in parking spaces [4]. Despite those benefits, shared vehicles are still a niche market and personal vehicles still dominate the market, with about two billion vehicles expected by 2040 [7].

The contribution of this paper is an investigation of what makes personal vehicles preferred by users, despite the benefits of shared vehicles and we explore how to make shared vehicles more attractive to future users. One way to overcome these challenges is to understand the overall experience of using shared vehicles in comparison to the experience of owning a vehicle. Additionally, we provide recommendations how the users’ expectations of mobility can help to develop and design a better experience in favor of shared vehicles.

Related Work

Several studies have recognized that there are barriers which prevent potential users from having a profound experience which affects the usage of shared vehicles. Those barriers can be divided into two segments, user’s barriers and systematic barriers.

User’s Barriers

- Trust: A previous study shows that 64% of the Dutch population are not willing to share their items, and 32% do not trust the quality of shared items [1].
- Adaptation: Adaptations of technology and the additional steps that comes with shared vehicle (like payment methods, registrations, insurances, process, ...) can affect negatively the usage of shared vehicles [1].
- Emotional barrier and car culture: Two out of three people in the EU have an emotional connection to their car. That makes them prefer using their vehicle instead of a shared one [2].

Systematic Barriers

- Target groups/scenarios: Shared vehicles are too limited and do not serve a wide range of population, scenarios of use, and specific locations. This does not match with users’ expectations, which makes the own car more convenient for many users.
- Design for sharing: Current shared vehicles do not provide an ideal experience: Drivers of shared vehicles reported that the shared car’s interior and settings do not suit their personal needs, that cars are damaged, or do not fulfil hygienic needs [3, 10].

The Experience of Car Sharing

To our knowledge, no study has identified the key solution in overcoming those barriers, especially the emo-

Online Survey Data (N=44):

Participant Gender

- 50% Female
- 43% Male
- 7% Unanswered

Education:

- 52% Bachelor
- 36% Master
- 11% Mix

Place of Living:

- 43% Urban
- 25% Town
- 18% Sub-urban
- 14% Countryside

Car Usage:

- Commuting
- Shopping
- Family activities

Mobility Usage:

Walking, biking, public transport and personal vehicle are the most popular way for transportation in a city.

Figure 1: The usage of mobility types per area per person

tional barrier and the systematic barriers. However, according to prior work [5, 9] providing the users with better and superior experiences will increase the growth of shared vehicles. Evidence can be found in a McKinsey survey which shows that 63% of individuals who used non-taxi ride-hailing plan to increase their usage of these services in the upcoming years due to convenience and pleasant system experiences [3]. We believe that unique and better experiences of shared vehicles that fulfil the user's expectations are a key factor to motivate individuals to make the transition from using a personal car to using a shared car.

Online Survey

To understand the preferred transportation methods among individuals, experiences, and expectations, and to prepare our in-depth interviews, we distributed an exploratory online survey (see left). While not presenting the details in this paper, the main findings are that many car owners reported that they use a car instead of other means of transportation due to an increased feeling of safety and personal preferences. Furthermore, personal vehicles, public transport, biking, and walking are preferred ways of transportation (see Figure 1). In contrast, shared vehicles are not yet famous among the participants.

Interviews with Stakeholders and Users

To discover what refrains people from using shared vehicles and what is their expectation for future mobility, we conducted in-depth interviews using the Delft design methods [11] with four stakeholders, and four industrial design master students from the Netherlands. The stakeholders are representatives of a Dutch province and of a larger city, a smart mobility expert at a Dutch University, and the head of design of a leading company related to shared mobility.

Procedure

We conducted individual interviews of approximately one hour each. The interview consisted of a set of open-ended questions to increase the level of engagement. Different drawing templates and inspirational pictures were used to help participant visualize their experiences, needs, and expectations for shared vehicles and mobility in general. We recorded all interviews, transcribed them, and conducted a thematic analysis to identify common topics and distil our insights.

Results

Our analysis shows that there are several user needs which current shared vehicles do not fulfil:

- **Freedom:** Stakeholders and participants agree that the feeling of freedom and safety is an essential part of choosing the type of mobility service. Participants mentioned that shared mobility lacks the perception of individual freedom even when the costs are cheap: "Keeping a car provides a feeling of freedom". The complexity and duration of vehicle reservation, waiting time, and the availability of a vehicle lower the feeling of freedom. This creates a sense of dependency in contrast to using a personal vehicle.

Figure 2: Abstract visualizations for the aimed private and social experience in a shared vehicle as described by the participants.

According to the experts, “nothing can compete with the freedom provided by owning a car”.

- **Private interaction:** By considering the vehicle as a personal space, participants prefer using their own vehicle due to the level of privacy it gives. This personal space enables them to express themselves freely without limitations. The need for privacy tends to increase during daily commutes, where participants tend to avoid social interaction with others and focus mainly on personal rituals and activities. However, participants would not mind sharing a short ride with strangers if their privacy is ensured.
- **Social interaction:** In contrast to the users’ private needs, participants are willing to use or share a car within a small group of friends or family members. It is expected that future vehicles can facilitate different social activities on trips shared by friends and family members. This kind of activities /experience is likely to happen in the time of events, festivals, etc.
- **Future Expectations:** Future mobility is expected to be full of (fancy) technology, fun, and adaptive to user needs.

The interviews show that stakeholders are focusing on developing regulations and accessibility as one of the stakeholders stated that “we are at the beginning of shared mobility”. Being at the early stages, the focus is to develop regulations, services, and optimize the services for cities. That resulted in focusing on the needs of cities and partly overlooking the users’ expectations.

Discussion

Despite the small sample of the participants in both the survey and the interview, the findings of this study show that the focus of the industry/cities is different to what users expect. That limits the accessibility of po-

tential users and keeps the personal vehicle in the lead. In other words, current shared vehicle services do not completely fulfil the users’ requirements and expectations of the aimed freedom nor do they provide an adaptive environment which facilitates private or social activities in the context of a shared vehicle. We envision that developing a shared vehicle service based on user experiences will result in a broad spectrum of different types of shared vehicles in order to provide more specific experiences to different users and contexts (See Figure 2). This can help individuals to make the transition from using personal vehicles to the use of shared vehicles. It requires the development of a new type of vehicle interior and user interface, which is adaptive in physical and digital aspects. The shared vehicles’ interior will play a crucial role in providing a supercar experience that cannot be found in a personal vehicle. We firmly believe that the expectations and needs will highly depend on location, age, culture, and education. Future research is required to discover the influence of those factors. This paper highlights the gap between the experience design of current sharing solutions and actual user needs. This opens the field for future research activities with the goal to improve the user experience of shared mobility.

Conclusion

We strongly believe that focusing on user experience and user expectations will create a better proposition for shared vehicles. This generates novel opportunities for designers and developers to create more diverse experiences for different contexts and users. This paper does not provide a specific solution yet, but it highlights potential areas for improvement in order to increase the experience of shared mobility.

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