🏆 reviewed paper

Fostering Gender-sensitive Mobility: Recommendations in the Context of Carsharing

Linda Dörrzapf, Sonja Gruber, Ornella Marovic

(DI Dr. Linda Dörrzapf, TU Wien, MOVE, Karlsgasse 11, 1040 Wien, linda.doerrzapf@tuwien.ac.at)
(Mag. Sonja Gruber, Büro Sonja Gruber, Sarasdorfer Straße 7, 2462 Wilfleinsdorf, office@sonjagruber.at)
(BSc. Ornella Marovic, MO.Point- Mobilitätsservices GmbH, Niederhofstraße 30/11, 1120 Wien, ornella.marovic@mopoint.at)

1 ABSTRACT

Individual mobility behavior is influenced by various factors. Gender roles for example, have led to significant differences between the mobility patterns of women and men. Compared to men, women engage more in care work, are more likely to work part-time, and are less frequently able to access a private car. Women often take more frequent but shorter travel trips, longer trip chains, and fewer trips for personal reasons (Kawgan-Kagan & Popp 2018). In order to ensure fair mobility for different user groups, urban areas offer an increasing number of mobility options for navigating without a private car – be it on foot, by bike, using public transport, or other mobility services such as car-sharing. The latter especially, is becoming more prevalent in cities but tends to be used more predominantly by men rather than women. Placing the sole blame on car-sharing operators would be too simplistic. Often, it is regulatory or planning conditions that make it challenging to design car-sharing attractively for all genders. Car-sharing is still a niche product that too few people are aware of, and the location, proximity and service offerings play a crucial role, which are still inadequate. Reasons for this include the limited availability of parking spaces in both public and private spaces (e.g., underground garages), especially in cities. For women, proximity to the workplace and residence is particularly significant. Moreover, car-sharing is perceived as too expensive and complicated to be truly attractive, especially considering that women are often more economically disadvantaged than men and have more complex routes due to caregiving responsibilities.

This contribution addresses recommendations for action regarding car-sharing, targeting politics and operators, and specifying them through the lens of gender-sensitive mobility. Furthermore, gaps are identified where research on mobility and gender should continue to advance.

Keywords: gender, planning, recommendations, carsharing, shared mobility

2 INTRODUCTION AND STATE-OF-THE-ART

The discourse on mobility planning is increasingly incorporating gender issues. Gender as a social construct, assumes that a person finds themselves in different life circumstances, leading to varying opportunities. When discussing mobility in the context of gender, the focus is often on the disadvantaged mobility chances and inequalities faced by women due to associated roles. Despite women's increasing participation in the labor market, they still predominantly assume household duties and care for children and dependent relatives (Bundeskanzleramt 2021; Schneebaum & Mader 2013, Dribe & Stanfors 2007). This has led to a phenomenon known as the "Gender Mobility Gap," which is particularly evident in parenthood. Reasons for this include sociodemographic factors and responsibilities such as caregiving tasks, resulting in different mobility patterns for men and women (Dörrzapf, et al. 2023, Kawagan-Kagan & Popp 2018).

In the context of mobility sharing, especially in the case of car-sharing, inequalities become evident. Car-sharing, considered a key component of sustainable multimodal mobility, has the potential to replace multiple private cars, saving space and resources in public areas. However, studies indicate that users of various (E-)car-sharing services currently concentrate on specific sociodemographic population groups, representing the "classic" early adopters, which are a majority of male users, above-average educational levels and younger users (Amirnazmiafshar & Diana 2022, Hülsmann et al. 2018, Stadt Wien 2015)

Carsharing is still a niche product. A representative survey shows that only 5.9% of men and 1.2 % of women are heavy users of carsharing in Austria. In total, 10.6% of men and 6.6% of women have had an experience with carsharing. Most of them live in metropolitan areas; in rural areas, the density of use is even lower due to the lack of supply. In the case of station-based car sharing, however, this can vary between locations. While at one location in a small town the gender ratio is balanced, at other urban locations more than two thirds are men. Possible reasons for a more balanced distribution of users in the smaller municipality could be that people from rural areas are more accustomed to driving cars in contrast to city

dwellers. It is assumed that the shared vehicles in the small town serve as a replacement for a second car (Statement MO.Point, 2024).

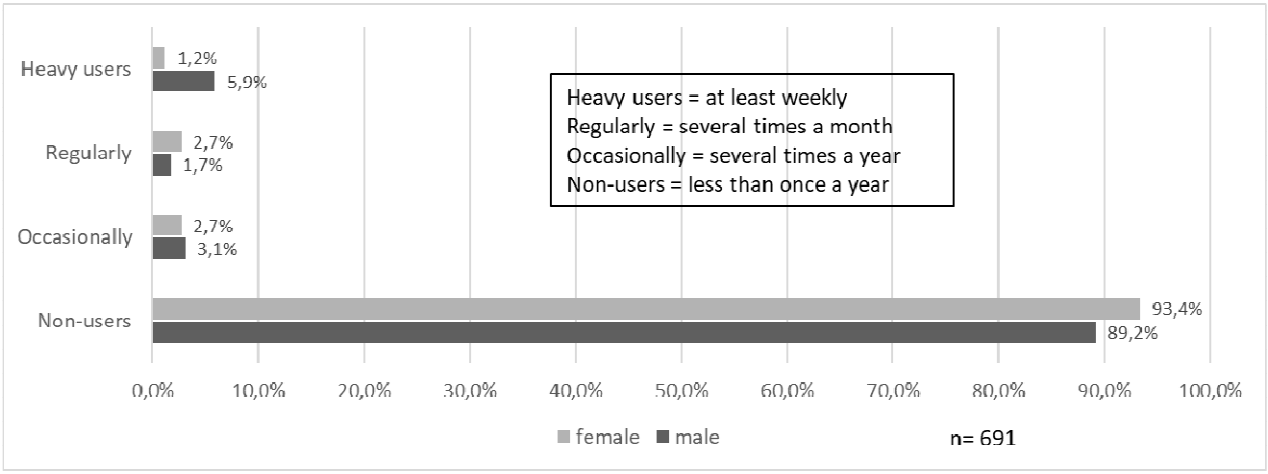

Figure 1: Frequency of carsharing use (own illustration, GECAR project survey, 2023)

For women, the reasons expressed against car sharing are somewhat different than for men. Men and women differ significantly in "Don't trust myself/don't like driving other people's vehicles" and "Afraid of operating other vehicles". Costs play an equally important role, even if the literature assumes that men pay more attention to cost and women more for frequency of the service and the environment (Sansonetti & Davern 2021). Owning a car is both the main reason against car sharing, but also the greatest potential for abolishing car ownership.

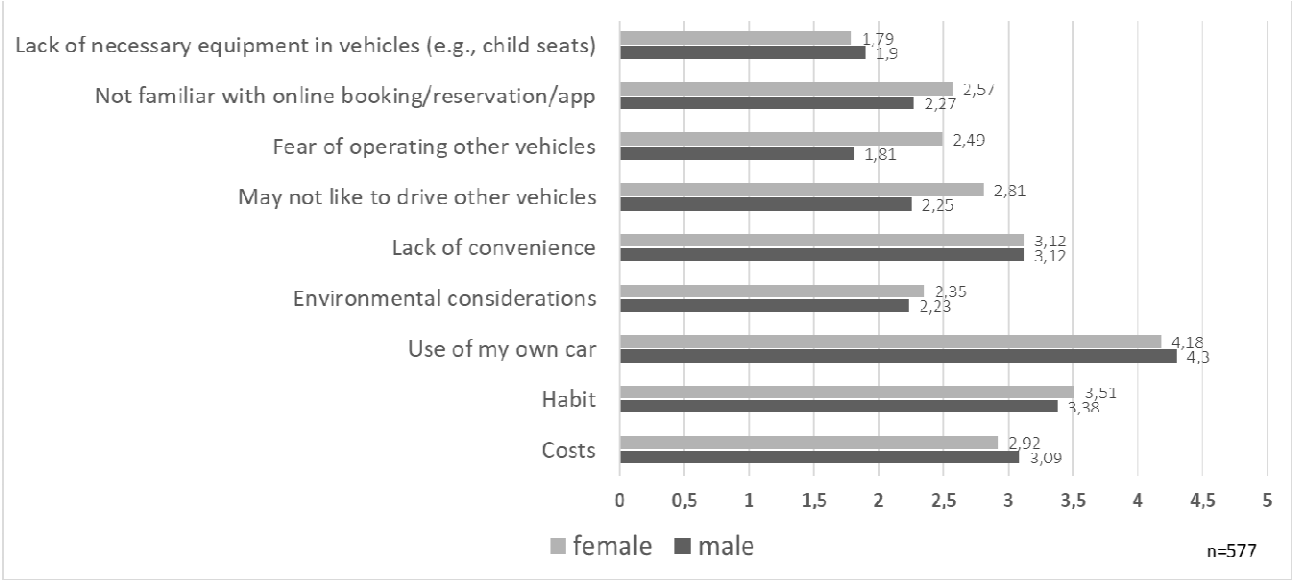

Figure 2: Reasons against car sharing among men and women (own illustration, GECAR project survey, 2023)

The reasons for choosing carsharing are also diverse. Women and men do not differ significantly in all areas, meaning that these variables do not have any major significance for carsharing users. Nevertheless, it is clear that men consistently rate carsharing more positively than women. Flexibility and cost efficiency are most important for both genders.

3 GOALS OF THE PROJECT AND METHODOLOGICAL APPROACH

In the research project “Gender-sensitive (E-)carsharing”, gender-specific (non-)usage behavior and barriers to the use of E-carsharing services in Austria were investigated. The project focuses on potential future target groups for E-carsharing, individuals who currently do not use the service but meet the basic requirements to integrate E-carsharing into their daily lives. In terms of gender-specific usage needs, the project places women in different life situations at the center of its research interest. Derived from the findings, gender-

sensitive measures for various (E-)carsharing services are subsequently developed in collaboration with (non-)users and operators.

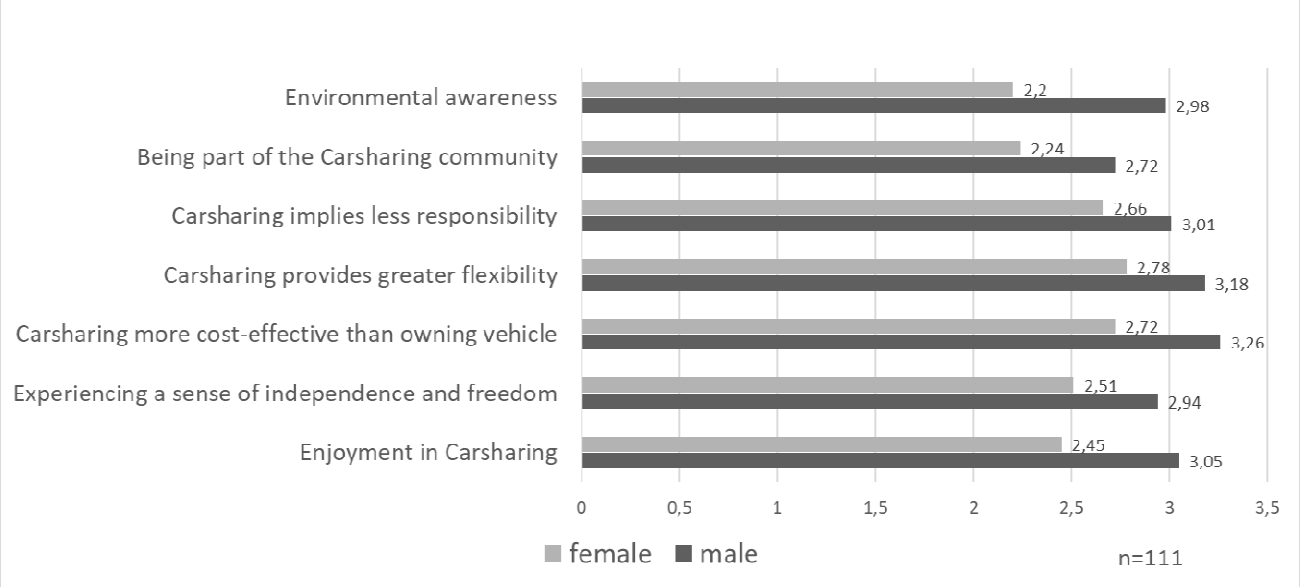

Figure 3: Reasons for car sharing among men and women (own illustration, GECAR project survey, 2023)

The formulated recommendations from this project operate under the assumption that reducing private car ownership is a central goal of (E-)carsharing. Therefore, the primary target groups are individuals contemplating the elimination of their existing private vehicle or considering carsharing as an alternative to purchasing a car. carsharing is viewed as a substitute for private cars and not as an alternative or competitor to using public transportation, bicycles, or walking, aligning with the predominantly car-critical stance of the women in the GECAR accompanying groups.

Within the research project GECAR – Gender-sensitive E-carsharing, co-creation groups were established by the project team in both Vienna and Bregenz. In Vienna and Bregenz, women in various life situations were recruited. In Bregenz, women who are members of the association Maronihof were also part of the group. These groups actively accompanied the research project throughout its entire duration through focus group workshop sessions. During these sessions, participants had the opportunity to contribute their knowledge, experiences, and ideas regarding improvement suggestions related to E-carsharing, to provide feedback on available services, and to test both offers during test phases.

A group comprising women was established to generate recommendations for carsharing operators and explore alternative ways of vehicle sharing, such as private carsharing. The groups included a total of 21 women between the ages of 28 and 61 years old. Slightly more than half of the participants had their own car in the household.

Location based carsharing		
Specification	Commercial carsharing, several locations in the urban area	Carsharing as association, mostly one location in the neighborhood
User group	Large, unspecified user group	Small user group (30-40 persons)
Available vehicles	Different vehicle types, predominantly e-cars	Different vehicle types (3-5 in the “pool”)
Network	No social network	People know each other, central contact person
Example in the project	MO.Point	Maronihof
Location	Vienna, AT	Bregenz, AT

Table 1: Two location-based carsharing use cases in the project

The cooperation partners MO.Point and the Maronihof association were involved in the project. In Bregenz, the Maronihof operates as an organized association, primarily serving residents of a specific neighborhood. The Maronihof consists of around 40 families and has four distinct cars, three of which are provided by

private owners. Many of the Maronihof users are women (Source: Workshops conducted as part of the research project). MO.Point, as a station-based carsharing provider, is engaged in neighborhood/ residential-based shared mobility services (E-Cars, E-Bikes, E-Scooters, etc.) in Vienna and offers carsharing for all interested users as well as closed residential/ business complexes, where only residents have access to the vehicles.

4 RESULTS AND RECOMMENDATIONS

4.1 Women's assumptions and needs regarding carsharing

Carsharing is perceived as a complex endeavour, with the carsharing landscape in Vienna being particularly convoluted and presenting high entry barriers. The location of carsharing services in close proximity to one's residence or workplace is deemed significant. Additionally, the desire for a seamless combination with other sharing options is evident. It is assumed that there is a limited selection of vehicle types available within the carsharing framework. Registration processes are often restricted to a single individual, with no provision for changing drivers.

However, it is important to note that despite these challenges, carsharing is generally acknowledged as an environmentally friendly alternative to owning a personal vehicle. This recognition positions carsharing as a sustainable option in contrast to traditional car ownership.

There is a high demand for information among women, encompassing topics such as sharing practices, operating automatic vehicles, and charging electric cars. Women have expressed a need for precise and detailed information in advance as well as a desire for well-coordinated platforms for carsharing that ensure coherence across different services. Emphasizing cost savings compared to owning a personal vehicle is crucial, as women often perceive carsharing as an expensive mobility option. Additionally, the proximity of carsharing locations to residential or workplace areas is considered important by women when choosing such services.

Based on insights from the GECAR research project, the following recommendations are proposed for enhancing women's access to (E-)carsharing:

4.2 Overarching Recommendations

The project encountered challenges as many concerns raised by women could not be addressed by the operators. Consequently, overarching recommendations, crucial for the further diffusion of the carsharing principle, are proposed at the political level. While the Austrian Sharing Strategy partially incorporates these recommendations, it lacks explicit consideration of gender-specific issues. From the perspective of the accompanying group, key priorities include: Firstly, a need to expand (E-)carsharing locations, ensuring a broader coverage to make these services easily accessible in daily life. This strategic expansion aims to make carsharing more relevant, particularly for women.

Simultaneously, efforts should be directed towards extending the infrastructure for electric vehicle charging in both urban and rural public spaces. This expansion is pivotal in positioning electric vehicles as a practical alternative to traditional combustion engine cars. Additionally, making private charging stations, such as those at hotels, publicly accessible contributes to a more widespread adoption of electric vehicles.

Addressing the need for convenient parking is crucial, especially for E-carsharing. Providing an adequate number of parking spaces in public areas, with a particular focus on underground facilities, ensures seamless access to carsharing services.

Tailoring carsharing offerings to the specific use cases of women is essential. This involves establishing cost-effective carsharing models that act as a "bridge" between urban and rural areas. This approach is particularly relevant when the car is needed primarily for overcoming distances rather than on-site requirements. Actively promoting these tailored offerings can boost adoption.

Lastly, illustrating the various benefits of transitioning from private, potentially outdated vehicles, to carsharing is key. Emphasizing cost savings through tools like cost calculators and real-life examples, highlighting CO_2 reduction using a Carbon Footprint calculator, and underlining the convenience of avoiding vehicle maintenance responsibilities, including service and tire changes, will play a vital role in promoting the advantages of carsharing.

4.3 Promotion and awareness – Putting Women as the Target Audience of Carsharing into Focus

A positive self-assessment regarding driving electric and automatic cars is essential to consider (E-)carsharing as a viable option. This requires knowledge and experience with this form of mobility, as well as general awareness of the offerings and their conditions (e.g., registration, booking, etc.). To embed such experiential knowledge broadly throughout the population, it makes sense to do this at various levels in a user-friendly manner. One possibility is to integrate information and opportunities that promote trying out carsharing could prove useful during the process of obtaining a driver's license, particularly for reaching future generations of drivers. Information sessions at institutions like community colleges could contribute significantly to broadening general knowledge and awareness of carsharing.

To make carsharing more appealing, there should be a deliberate focus on highlighting moments when it becomes particularly interesting for women. This could include scenarios such as transporting heavy goods or embarking on rural excursions. By showcasing these specific use cases, the marketing materials can effectively communicate the practicality and relevance of carsharing in diverse situations that women may encounter in their daily lives.

Promoting carsharing in combination with other sharing services, such as (cargo) bikes, can also significantly enhance its attractiveness. Aligning with the growing aspiration for environmentally conscious and multimodal transportation among many women and other population groups, this approach positions carsharing as part of a broader sustainable lifestyle. Emphasizing the synergy between different sharing services reinforces the idea that carsharing complements other eco-friendly modes of transportation, contributing to a holistic and environmentally responsible lifestyle.

4.4 Use and selection of vehicle

Firstly, it is crucial to offer a diverse range of vehicle types tailored to different occasions and needs. This includes multi-seaters for family outings, compact city cars that require minimal parking space, vans, and robust cars suitable for traveling with children, even if it involves some dirt. This variety ensures that women, among others, can choose a vehicle that aligns with their specific requirements at any given time.

Additionally, providing precise and detailed information about electric and automatic cars is essential. Women need to thoroughly familiarize themselves with various aspects, such as the vehicle's operation, charging process duration, and range in different seasons. This information should be easily accessible on both the website and the app, enabling users to make informed decisions.

Recognizing the potential limitations of digital access, it is advisable to have compact and clear information available within the vehicle itself. This analog form of information ensures that users can access essential details even when there is no internet connection, or the phone is unavailable.

Moreover, offering detailed information about specific vehicle features is crucial. This includes details on child seats for different age groups, vignettes, parking permits, parking tickets, and the size of the cargo space. Providing comprehensive information on these aspects contributes to a seamless and convenient carsharing experience.

Furthermore, ensuring an easy navigation system operation is paramount. Storing the "home location" of the vehicle in the navigation system enhances ease of use, and an overview of publicly accessible charging stations for electric cars nearby is particularly helpful. These features collectively contribute to a user-friendly and efficient carsharing experience, addressing the diverse needs and preferences of users, including women.

4.5 Locations and Accessibility

Clear and prominent markings should be established upon entering the garage and along the path to the parking space. Ideally, these markings should be well-lit and strategically positioned near the entrance for easy visibility. This ensures that users can easily navigate through the garage and locate their designated parking space with confidence. Additionally, providing this information digitally through the app is essential, but analog alternatives should also be available. In scenarios where the internet connection may be unreliable in an underground garage for example, analog information ensures accessibility, contributing to a seamless and reliable experience for users. Furthermore, ensuring sufficient space for straightforward parking and

exiting is paramount. Adequate space minimizes the risk of accidents and facilitates a smooth flow of vehicles within the underground parking facility.

4.6 Booking Platforms

Firstly, there should be good coordination and coherence between various platforms providing information, such as the booking app, website, and analog informational materials within the vehicle. Consistent and harmonized information is essential to minimize "drop-off moments" where users may encounter confusion or uncertainty and stop the registration or booking process. Additionally, if email confirmation is required during the registration and booking process, there should be clear notices in the web or app to guide users smoothly through the necessary steps. This helps in ensuring a transparent and straightforward onboarding process for users. Facilitating a change of drivers is another key consideration. The option for additional registered individuals to drive the vehicle is important, particularly during family outings or challenging traffic situations. This flexibility enhances the practicality and adaptability of carsharing services. Platforms should undergo regular reviews to identify potential "drop-off moments" and areas where improvements can be made. This proactive approach ensures ongoing optimization of the user experience, addressing any potential pain points in the carsharing process. Cost transparency in billing is crucial. Including a note indicating that the lowest tariff will always be charged ensures clarity and transparency in financial transactions related to carsharing services. Recognizing the importance of personal contacts for accessing the service, there should be a mechanism to involve friends and family members more actively. This social aspect enhances the user experience, creating a sense of community and safety, making the carsharing service more accessible and enjoyable for users.

To summarise, it can be said that there are various recommendations that apply at different levels of carsharing use. In principle, awareness and the availability of carsharing are very important. However, these recommendations reach a limit, as availability and especially locations for carsharing are part of a larger political decisions.

5 DISCUSSION – IS PRIVATE CARSHARING A VALID OPTION?

Within the groups and in collaboration with the Maronihof association, the possibilities of private carsharing for a small, delimited group were repeatedly discussed. In Bregenz, in the fall of 2023, a trial of private carsharing involving six individuals was conducted. This experiment consisted of two phases, with each phase involving the rental of cars from a dealership. The first test vehicle was an electric car; however, none of the six participants could find a suitable charging location. For the second test phase, due to the absence of charging infrastructure, a conventional combustion engine car was rented, placed in a public parking space in the neighbourhood accessible to all participants. Originally, a free app linked electronically with a key box was used for booking. However, the app was perceived as confusing for short time intervals (e.g., 30 minutes). As the key box could be used without the app, and the billing was already based on an hourly basis, the booking app was discontinued. Instead, participants began using Google Calendar for scheduling, and key handovers were arranged through leaving keys or coordinating via phone calls. Two women left the group during the second test phase, and three other participants did not have a need for a car during the trial period.

In Vienna, private carsharing was a recurrent topic, although there were no specific initiatives from the group participants. Nevertheless, the awareness of the subject was heightened. In cities, commercial carsharing is already on a good path. However, in rural areas, there continues to be a higher need for self-organization regarding mobility. These rural areas are characterized by a dependency on cars, high motorization rates, vast distances, and limited public transportation options. Additionally, facilities for local services, amenities, and employment are not uniformly distributed, and the population density is lower. As a result, mobility opportunities decrease – limiting options for moving from one place to another without a private car and impacting possibilities for social participation. Substantial research and implementation efforts are still required in addressing these challenges – especially initiatives to foster private carsharing and carpooling.

6 CONCLUSION

In conclusion, the research project "Gender-sensitive (E-)carsharing" sheds light on the intricate intersection of gender and shared mobility, particularly in the context of carsharing. The existing gender mobility gap and

disparities in the adoption of carsharing services among different demographic groups, predominantly favoring men, highlight the need for targeted interventions.

The project's primary goals were to investigate gender-specific (non-)usage behavior and barriers to the use of (E-)carsharing services in Austria, with a focus on potential future target groups. Through co-creation accompanying groups in Vienna and Bregenz, women in various life situations actively contributed to the research by sharing their experiences and insights.

The results emphasize that carsharing is perceived as a complex but environmentally friendly alternative to owning a personal vehicle. Women express a high demand for information, particularly regarding sharing practices, electric and automatic vehicle operations, and charging procedures. The gender-specific usage needs of women were central to the project, leading to the formulation of gender-sensitive measures for (E-)carsharing services.

The overarching recommendations highlight the importance of expanding (E-)carsharing locations for broader coverage, making services easily accessible in daily life, especially for women. Infrastructure enhancements, such as extending electric vehicle charging points and ensuring sufficient parking spaces, are crucial. However, these challenges can not only be tackled by carsharing operators and there is a need for policy strategies.

Promotional efforts should focus on positive self-assessment and awareness-building regarding driving electric and automatic cars. Highlighting moments when carsharing becomes particularly relevant for women, such as transporting heavy goods or rural excursions, can enhance its appeal. Combining carsharing with other sharing services like bikes aligns with the growing trend towards environmentally conscious and multimodal transportation. The research also delves into the viability of private carsharing initiatives, with practical trials conducted in Bregenz. While private carsharing poses challenges, particularly in terms of infrastructure and user experience, the awareness of the subject in Vienna and the acknowledgment of the higher need for self-organization in rural areas provide valuable insights for future initiatives.

In summary, the project contributes valuable insights and recommendations for making (E-)carsharing more gender-sensitive, inclusive, and accessible, addressing the unique needs and concerns of women in diverse life situations. Ongoing efforts in research, implementation, and promotion are essential for achieving a more equitable and sustainable mobility landscape.

7 ACKNOWLEDGEMENT

The project "Gender-sensitive (E-)Carsharing" (duration 10/2021 – 02/2024) is funded through the research funding program FEMtech by the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation, and Technology (BMK), represented by the Austrian Research Promotion Agency (FFG). Project partners include TU Wien (Research Area MOVE), Büro Sonja Gruber, MO.Point Mobility Services GmbH, and Kairos - Institute for Impact Research and Development.

8 REFERENCES

KAWAGAN-KAGAN, I. & POPP, M.: Sustainability and Gender: a mixed-method analysis of urban women's mode choice with particular consideration of e-carsharing, Transportation Research Procedia,Volume 31, 2018, Pages 146-159,

BUNDESKANZLERAMT: Frauen und Männer in Österreich. Zahlen, Daten, Fakten, Wien, 2021

SCHNEEBAUER, A. & MADER, K.: The gendered nature of intra-household decision making in and across Europe. Department of Economics Working Paper Series, 157. WU Vienna University of Economics and Business, Vienna, 2013.

DRIBE, M. & STANFORS, M.: Does Parenthood Strengthen a Traditional Household Division of Labor? Evidence from Sweden, National Council on Family Relations. Journal of Marriage and Family Volume, 71, 1, 33–45, doi: 10.1111/j.1741-3737.2008.00578.x, 2009.

AMIRNAZMIAFSBAR, E. & DIANA, M.: A review of the socio-demographic characteristics affecting the demand for different car-sharing operational schemes, Transportation Research Interdisciplinary Perspectives, Volume 14, 2022.

HÜLSMANN, F., WIEPKING, J., ZIMMER, W.: share – Wissenschaftliche Begleitforschung zu car2go mit batterieelektrischen und konventionellen Fahrzeugen - Forschung zum free-floating Carsharing, Freiburg, 2018.

STADT WIEN: Carsharing Wien – Evaluierung, 2015.

SANSONETTI, S. & DAVERN, E.: Women and transport, study requested by the European Parliament's Committee on Women's Rights and Gender Equality (FEMM), EU 2021.

DÖRRZAPF, L., GRUBER, S., MAROVIC, O.: Gendersensibles Carsharing – Nutzungsbarrieren und Maßnahmen, REAL CORP 2023, Proceedings; M. Schrenk, V. V. Popovich, P. Zeile, P. Elisei, C. Beyer, J. Ryser (ed.), Ljubijana, 2023.