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Unlocking Shared Mobility in Rural Communities: Investigating Factors Influencing Resident Attitudes and Aligning Provider Capabilities with Community Needs

Lea Johanssen (S4484797)

Rijksuniversiteit Groningen - University College Fryslan

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Supervisor: Dr. Berfu Unal

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ABSTRACT

The concept of shared mobility enables sustainable consumption and enhances community cohesion. However, shared mobility is still primarily limited to the urban context, which enhances the issue of poor connectivity, increased car ownership and higher exclusion from society in rural communities. Introducing rural shared mobility can strengthen the socioeconomic fabric but requires a shift in mobility behaviour. This qualitative study explores shared mobility as a means of sustainable development by identifying factors influencing the acceptance of rural shared mobility, utilizing the COM-B model. Additionally, the study aims to determine whether residents' needs could be met by shared mobility providers. Significant motivators included cost efficiency, life circumstances, social influence and support, residents' environmental consciousness, and perceived benefits. Conversely, aversion to change, independence, accessibility, technological challenges, and symbolism were identified as critical barriers. The research also identified crucial requirements for an effective implementation, including psychological incentives, communication, support for implementation, and infrastructure. Although these findings are essential for sustainable implementation and relevant to sustainable entrepreneurship, shared mobility providers lack the capacity to tailor their services to each location individually. Therefore, it is essential for all stakeholders to be actively engaged in creating a bottom-up approach to the development of rural shared mobility.

Keywords: Shared mobility, sustainable entrepreneurship, rural communities, acceptance, mobility behaviour

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INTRODUCTION

With increased pressure on sustainability and environmental issues, governments, business corporations, and communities adapt their strategies and practices to integrate sustainability into decision-making and lifestyles (Banister, 2008; Martin & Shaheen, 2016). The Sharing Economy is a revolutionizing example, defined as the peer-to-peer sharing of goods, services, and resources (Curtis & Lehner, 2019). It facilitates cost efficiency, enhances community cohesion, and promotes sustainable consumption and development (Mi & Coffman, 2019). A prominent component of the sharing economy and the focus of this research is shared mobility services. Shared mobility refers to shared transportation systems used simultaneously as a group or individually over time, such as bike-sharing, ride-pooling, carsharing, etc. (Banister, 2008). Shared mobility is already extensively implemented in urban areas; however, it is still missing in most rural areas, which enhances the issue of poor network coverage, low attractiveness, increased car ownership and higher exclusion from society in rural communities (Schaefer et al., 2022). The lack of inclusivity can significantly affect rural communities' societal and economic participation (European Network for Rural Development, n.d; Schaefer et al., 2022). Therefore, governments express interest in introducing shared mobility in rural communities to strengthen their socioeconomic fabric by promoting employment, social inclusion and local development (European Network for Rural Development, n.d.; Province of Groningen, n.d.).

Nonetheless, the shift from car ownership to a sharing mode of transport requires the user to change habits, playing a significant role in the individuals' mobility behaviour (Burghard & Scherrer, 2022; Schaefer et al., 2022). The decision to adopt or reject an innovation, such as shared mobility, is influenced by various factors (Burghard & Scherrer, 2022). These factors include the innovation's perceived benefits and drawbacks compared to current alternatives, the extent to which it corresponds to the adopter's needs, experiences, and

values, and how difficult it is to comprehend and apply the innovation (Rogers, 1962). Furthermore, external factors like availability, accessibility, affordability, quality, and familiarity impact people's willingness to use shared mobility services. Individuals' decisions are influenced by internal factors, such as trust, cultural differences, transportation habits, technological ignorance, and the perceived value of owning a car (Burghard & Scherrer, 2022; Möhlmann, 2015; Schaefer et al., 2022).

Therefore, this research aims to identify factors influencing the acceptance or rejection of shared mobility services within rural communities by utilizing the Capability, Opportunity, and Motivation framework for behaviour change (COM-B; Michie et al., 2019). The research aims to bridge the gap between urban and rural communities, discern the essential requirements for the successful and sustainable implementation of shared mobility services, and explore ways to foster shifts in rural communities' behaviour towards greater adoption and satisfaction. Additionally, the research examines the supply perspective by engaging with shared mobility service providers and evaluating their capabilities and aspirations to address rural communities' needs effectively. Thus, the research aims to answer the following research questions: *"What factors influence the resident's attitudes to accept and join a shared mobility scheme?"* and *"How can the attitudes of rural communities towards shared mobility be matched with the abilities and wishes of existing shared mobility providers?"*

First, this research paper will provide an in-depth literature review providing crucial background information on the sharing economy, the concept of shared mobility, and its acceptance based on the rural context. Secondly, the theoretical framework will be introduced, followed by the methodology used in the research. Next, the paper will elaborate on the research findings and discuss key results based on the theoretical background, followed by limitations and recommendations. Finally, the paper will conclude with the study's primary outcomes.

LITERATURE REVIEW

The Sharing Economy

Sharing behaviour among communities, collectives, and corporations has been visible for centuries (Curtis & Lehner, 2019). Due to economic, societal, and technological drivers, new ways of collective consumption, such as through the sharing economy, increasingly find applications in the private, public, and non-profit sectors (Möhlmann, 2015). The sharing economy has become a growing market over the past 30 years, enabling collaborative consumption among people. Today, the sharing economy is of large scale and connects millions of users and businesses. In organized systems or networks, collaborative consumption occurs when users engage in sharing activities such as leasing, lending, trading, bartering, and exchanging of products, services, transit options, real estate, or cash (Šestáková & Plichtová, 2019; Tham et al., 2023). However, the larger scale of the sharing economy leads to challenges and crosses various boundaries, including marketing, consumer behaviour, sociology, geography, management, innovation, and law (Hamari et al., 2016).

Many influential theoretical frameworks, such as Hardin's Tragedy of the Commons (1968) and the Logic of Collective Action by Olson (2007), posit that humans are inherently self-interested. However, they also suggest that under certain conditions, individuals stand to gain from collaborative consumption with others. Still, people seem apprehensive about sharing with others if specific institutional arrangements dictating cooperative actions are unmet. Their behaviour is based on rational reasoning, seeking the maximization of utility and cost savings or the minimization of transaction costs.

The book *Governing the Commons* by Ostrom (2015) discusses the challenges of shared resource management, providing empirical evidence for the success of sustainably aimed shared resources managed by a community. She also highlights the importance of clear principles shaping the success of the community's shared economy. Congruent rules, clear

boundaries, and community membership, among others, help to build mutual trust and enhance community engagement and their willingness to participate in shared doings. Nonetheless, the reluctance against shared resources amongst people can hinder the success of this sustainable innovation of a sharing economy. Research has shown that factors influencing the likelihood of choosing a sharing option are familiarity and utility, whereas factors affecting the satisfaction and attitude towards shared options are cost savings, familiarity, trust, and utility (Möhlmann, 2015; Šestáková & Plichtová, 2019). The research also highlighted that the respondents were mainly driven by rational reasons, primarily serving their self-benefits when using collaborative consumption services (Möhlmann, 2015; Šestáková & Plichtová, 2019). Despite challenges, individuals have greatly depended on collaborative consumption over the years. Thus, the sharing economy has established a great platform for collaborative market opportunities, which has led, amongst others, to the rise of shared mobility.

Shared Mobility

Concept of shared mobility

Shared mobility greatly contributes to the sharing economy, providing collective and sustainable modes of transportation. Shared mobility generally refers to modes and services offered in addition to the traditional bus-based, route-based public transportation systems (Machado et al., 2018). It includes community or volunteer programs, carpooling, carsharing, demand-responsive transportation (DRT), shared taxis, etc. (European Network for Rural Development, n.d). Mobility and support services, such as reservations, payment processing, traveller information, and operations management, fall under shared mobility services.

Amongst the many options that fall under the umbrella term of shared mobility, this paper will primarily focus on carsharing, *"A service that provides members with access to an automobile for short term – usually hourly – use"* (Shared Use Mobility Center, 2018).

Shared mobility can support sustainable economic, environmental, and societal development (Zhu et al., 2023). According to the former United Nations Secretary-General Ban Ki-Moon, *"Sustainable transport is fundamental to progress in realizing the promise of the 2030 Agenda for Sustainable Development and achieving the 17 Sustainable Development Goals. Sustainable transport supports inclusive growth, job creation, poverty reduction, access to markets, the empowerment of women, and the well-being of persons with disabilities and other vulnerable groups. It is also essential to our efforts to fight climate change, reduce air pollution and improve road safety"* (United Nations, 2016). The benefits of shared mobility can affect several levels, such as the individual, the environment, and the transportation infrastructure (Psarra et al., 2021; Zhu et al., 2023). On an individual level, shared mobility offers consumers greater mobility and accessibility without the need for private car ownership (Hyland & Mahmassani, 2020). The costs of privately owned vehicles, including maintenance and externalities, can be burdensome for the individual (Schaefer et al., 2022). Thus, shared mobility can be cost-efficient in the long run.

Additionally, depending on the location and execution of shared mobility, it can provide flexibility and convenience for the individual user (Zhao & Malikopoulos, 2022). On the environmental level, shared mobility has positive effects by reducing the number of vehicles on the road, lowering the total emissions and contributing to the Sustainable Development Goals (Banister, 2008; Goldman & Gorham, 2006). On the transportation infrastructure level, shared mobility can help avoid heavy traffic and reduce the need for multiple privately owned cars per household (Burghard & Scherrer, 2022). The use of shared mobility in larger cities may lead to more environmentally friendly modes of mobility, such as walking and biking, as shared vehicles could reduce the overall use of private cars (Goldman & Gorham, 2006).

Shared mobility in urban versus rural areas

Despite its significant growth, shared mobility remains a niche service, as it is primarily focused on the urban context. Urban areas have a higher population density and development, which makes it more appealing for shared mobility suppliers to establish a market (Schaefer et al., 2022). Conversely, rural areas, characterized by lower population density and limited development, may not initially exhibit significant demand for shared mobility services, especially considering that public transport options are often limited and fail to adequately meet the needs of residents (Hut et al., 2021). Furthermore, rural areas usually require longer travel distances to reach necessities such as schools, shops, healthcare, and work, which involves using a vehicle (Hut et al., 2021; Schaefer et al., 2022). Therefore, the fragmented character of rural areas and the high dependence on personal cars present obstacles to adequate public transportation management, resulting in disparities in opportunities compared to urban areas (Seemann & Knoechel, 2017). Hence, rural areas often face the issue of poor network coverage, low attractiveness, poor accessibility, and higher social exclusion (Schaefer et al., 2022). The lack of inclusivity can affect rural communities regarding societal participation, earning potential, and economic contribution (European Network for Rural Development, n.d; Schaefer et al., 2022).

Introducing shared mobility in rural areas can promote employment, social inclusion, and local development and thus strengthen their socioeconomic fabric (Poltimäe et al., 2022; Schaefer et al., 2022). By increasing accessibility through mobility initiatives, a village's economic and social connectivity increases, whereas the number of privately owned vehicles decreases (Psarra et al., 2021; Schaefer et al., 2022). Furthermore, by connecting residents with shared transportation options, shared mobility services can promote social interaction and community engagement while building a sense of cohesion and belonging (Poltimäe et al., 2022).

Challenges of rural shared mobility

Despite the advantages of rural shared mobility, various usage and business feasibility challenges impede the services' viability in rural areas. Rural areas have a lower population density than urban regions, making it challenging to utilize and attain shared mobility services in rural communities (Mounce et al., 2020). The demand is much lower; thus, shared mobility services are not economically incentivized to offer the supply of their services in rural areas. Additionally, the efficiency of shared mobility services may be compromised by the lack of suitable infrastructure for sustainable implementation, such as adequate roads, station-based or free-floating parking possibilities, and electric vehicle charging stations (Poltimäe et al., 2022; Psarra et al., 2021). Travel times between destinations are longer in rural communities, as they are dispersed over larger geographic areas. Longer travel distances and increased fuel use have an adverse effect on the environment by increasing air pollution and greenhouse gas emissions, countering a sustainable implementation (Martin & Shaheen, 2016). Furthermore, long distances may result in higher expenses, which are exposed to the consumer after each ride, in contrast to the hidden and less obvious costs of car ownership, making shared mobility less appealing to the users (Seemann & Knoechel, 2017).

Additional challenges of implementing shared mobility in rural areas concern these communities' demographics and behavioural characteristics. Rural populations are, on average, older and might have a lower socioeconomic status than their urban counterparts; thus, there is a greater need for affordable and accessible transportation options (Hut et al., 2021). Socioeconomic disadvantage can challenge shared mobility services' acceptance, usage, and cost-effectiveness in rural areas (Hut et al., 2021; Seemann & Knoechel, 2017). Furthermore, using shared mobility services requires physical and cognitive abilities, often including technological understanding. However, considering the demographics of rural communities, a

lack of knowledge and awareness might lead to limited usage due to less exposure to shared mobility concepts (Poltimäe et al., 2022).

Concerning behavioural characteristics, successfully implementing shared mobility services in rural areas requires a shift from car ownership to a sharing mode of transport by changing habits. Daily habits play a significant role in the individual's mobility behaviour and determine the acceptance or rejection of shared mobility services based on their abilities to meet the community's needs (Schwanen et al., 2012).

The Acceptance of Rural Shared Mobility

While the evident social, environmental, and economic benefits of shared mobility strongly advocate for its introduction in rural areas, ensuring a sustainable and successful adoption necessitates a shift in residents' mobility behaviour (Schwanen et al., 2012). This shift from car ownership to sharing a mode of transportation requires consumers to change their habits, which play a crucial role in their mobility behaviour (Burghard & Scherrer, 2022). Although the aim for rural areas may not be to eliminate private car ownership but rather to reduce the need for multiple cars per household potentially, achieving this change still necessitates a shift in behaviour.

Multiple theories have explored the socio-psychological factors that influence the acceptance or attitudes towards adopting new innovations, with some explicitly focusing on shared mobility and car sharing. However, these theoretical frameworks, particularly in the context of shared mobility or the sharing economy, have predominantly been developed based on the urban context. Therefore, there is a gap in introducing rural shared mobility and a lack of knowledge on the factors influencing rural residents’ attitudes to accept and join a shared mobility scheme.

According to Rogers model of the Diffusion of Innovation (1962), the decision to adopt or reject an innovation is influenced by several key factors. These include the perceived relative advantages and disadvantages of the innovation compared to existing alternatives, its compatibility with the adopter's values, experiences, and needs, and the complexity of understanding and using the innovation. Additionally, the model emphasizes the importance of trialability, which refers to the ability to test the innovation before deciding to adopt it, and observability or visibility, which pertains to the ease of observing the innovation and its consequences. In the context of the sharing economy, the Rogers model identified factors that closely correspond with those influencing the likelihood of choosing a sharing option. For instance, utility and familiarity are correlated with the sharing option's perceived advantages and compatibility with people's needs and values. Similarly, trialability reflects the chance to weigh the advantages of sharing before committing to it, while complexity in comprehending and utilizing the sharing option correlates with ease of use. These similarities demonstrate the applicability of well-known theoretical models, such as the Rogers model, to studying consumer behaviour concerning new phenomena, like the sharing economy and shared mobility.

Furthermore, the challenge to enhance an individual's willingness to join a shared service scheme can be determined by intrinsic motivators, including enjoyment and extrinsic motivation, such as economic belief and reputation (Burghard & Scherrer, 2022; Schaefer et al., 2022). According to Möhlmann (2015), various characteristics positively influence users' satisfaction and intention to participate in collaborative consumption. These characteristics include utility, familiarity, trust, cost savings, and high-quality services. When consumers see cost savings, are familiar with the service, have faith in the platform and its users, and believe they are receiving high-quality services that meet their needs, they are more likely to engage in collaborative consumption platforms.

Additionally, Whittle and colleagues (2019) investigated how consumers make travel-related decisions using social and psychological methods. They found that various factors influenced people's travel decisions, including autonomy, time and money constraints, hedonistic desires, health concerns, social interactions, and environmental factors. The study also demonstrated the importance of practical and financial considerations and emotional, experiential, and social factors on transportation decisions, as well as the importance of established habits and familiarity with various modes and transportation technologies in establishing psychological behaviours. These results highlight the complex interactions among physical, cultural, and psychological factors that affect people's decisions about their mobility behaviour.

Consumers' attitudes are decided on an overall assessment of a product or service based on behavioural, affective, and cognitive information, determining their willingness to use shared mobility (Silvestri et al., 2024). According to Lane (2005), essential attributes that enhance consumers' willingness to engage in car sharing are convenience, affordability, personal freedom, environmental benefits, and improved productivity. These factors can differ across location, time, values, and income level for the individual and within a community. Individuals with a lower income and a lack of knowledge regarding the benefits of shared mobility might not recognize its cost efficiency (European Network for Rural Development, n.d; Lane, 2005). These individuals might be more concerned with the one-time and continuous transportation expenses than with the possible long-term savings and benefits that shared mobility options may provide.

Furthermore, environmental concerns are influencing factors for engaging in shared mobility but seem to have a relatively low impact on the consumer (Lane, 2005). While environmental benefits primarily drove early adopters, as shared mobility became more established, the sustainable intentions lost their traction to economic and practical advantages

(Lane, 2005; Zhu et al., 2023). Additionally, individual characteristics and circumstances significantly influence the individual's decision-making (Schaefer et al., 2022; Whittle et al., 2019). Individuals with a strong emphasis on symbolism and status might perceive the image of their own car as highly important as it represents wealth, financial achievements and freedom, autonomy, self-expression, and appearance (Whittle et al., 2019). The emotional symbolism of owning a car, serving as an expression of identity, is relatively common in the European cultural context (Cohen, 2019). Thus, cultural differences are important to consider when considering factors influencing the decision-making of shared mobility.

THEORETICAL FRAMEWORK

The COM-B Model for Behavior Change

The theoretical framework for this research on rural shared mobility is the COM-B Model for behaviour change (Michie et al., 2019). The framework comprises three components essential to behaviour: opportunity, capability, and motivation (Michie et al., 2019). According to this framework, an individual must feel psychologically and physically capable of performing a particular behaviour; they must have the physical and social opportunity to engage in the behaviour, as well as feel motivated to carry out the behaviour over other competing actions (Michie et al., 2019; West & Michie, 2020). The COM-B model acknowledges that various factors impact behaviour and that altering one or more of these elements can lead to changes in behaviour. All three components influence behaviour change but are also impacted by the change; this indicates that the model is interactional and that altering behaviour also affects the factors that determine behaviour, allowing for long-term behaviour change (Michie et al., 2019).

Capability

The capability component of the COM-B model refers to the knowledge, skills, and abilities required to employ a specific behaviour (Michie et al., 2019; West & Michie, 2020). It consists of two elements: psychological capability, including knowledge, psychological strength and skills, and physical capability, including physical strength and skills (Michie et al., 2019). Individuals might lack the physical or psychological capabilities to engage in certain behaviours. In the context of shared mobility, the individual might not believe to be capable of engaging with the service's technology. This lack of belief can harm their motivation to engage in a given behaviour, such as using shared mobility in rural areas. Therefore, assisting and supporting individuals in their psychological and physical skills required to engage in a particular behaviour is essential.

Opportunity

Opportunity defines the external conditions that allow a specific behaviour to be carried out (Michie et al., 2019; West & Michie, 2020). This involves physical opportunities the environment provides through time, location, resources, and social opportunities resulting from social factors, such as cultural norms and values (West & Michie, 2020). Especially in shared mobility, rural areas face challenges of physical opportunities as car sharing is either unavailable or limited. The introduction of rural shared mobility can enhance the feeling of physical opportunity through accessibility, reliability, and efficiency. Additionally, as more people engage in shared mobility in rural areas, social norms might shift, enhancing social opportunities.

Motivation

The component motivation refers to the conscious and unconscious cognitive processes influencing decision-making and behaviour (West & Michie, 2020). Motivation can be distinguished between reflective and automatic, the former being reflective processes evaluated based on experiences, whereas the latter refers to desires and impulses (Michie et al., 2019). If capability and opportunity are not efficiently supported or provided, and the initial motivation is relatively low, it will most likely remain limited. Thus, regarding shared mobility, the other two components must be considered to spark motivation amongst residents and ensure successful implementation.

The Current Study

Studies on factors influencing individuals' behaviour to engage in shared mobility are primarily based on the urban context. There are only a few rural-based studies for shared mobility utilizing frameworks such as the Theory of Planned Behaviour or the Unified Theory of Acceptance and Use of Technology (Burghard & Scherrer, 2022; Schaefer et al., 2022). However, these studies lack an understanding of how these factors influence future needs and inform actionable strategies.

The COM-B Model allows for determining what is needed for a desired behaviour to occur, serving as a foundation for creating interventions. Thus, utilizing the COM-B Model, the current study t aims to discern the essential requirements for the successful and sustainable implementation of shared mobility services in rural areas and explore ways to foster shifts in rural communities' behaviour towards greater adoption, considering shared mobility suppliers' perspective.

METHODOLOGY

Research Design

This study employs a qualitative research approach involving semi-structured interviews with participants. Qualitative data collection allows for deriving interpretations from respondents' talk, promotes understanding and change, and allows for in-depth information (Mashuri et al., 2022). It provides a deeper understanding of research paradigms, aligning with researchers' beliefs and considering various assumptions when conducting research (Oranga & Matere, 2023). Furthermore, using semi-structured interviews allows for flexibility in adjusting changes and constructing or reconstructing knowledge (Flinders, 1997). Overall, the qualitative approach prioritizes the opinions of research participants, utilizes rich data collection, and allows for a deeper comprehension of research phenomena (Mashuri et al., 2022; Oranga & Matere, 2023). For the scope of this study, the field research was conducted in the municipality of Westerwolde, which was selected as the research site within the Province of Groningen. This decision was informed by various demographic factors such as population personas, economic prosperity indicators, household vehicle ownership rates, proximity to essential services, and the availability and accessibility of public transport.

Participants and Procedure

For this research, seven semi-structured interviews were conducted with four members from the rural community of Wedde, the municipality of Westerwolde, and two shared mobility companies. The rural community members were mainly participants from the village council of Wedde. The interviews were conducted primarily online and via phone, lasting approximately 30-45 minutes, and audio-recorded with the permission of each participant. One interview was followed up with questions via email.

The participants were recruited through snowballing and gatekeepers, including this research's supervisor and the Province of Groningen. Additionally, participants were recruited through the researchers' involvement in the interdisciplinary project SMiLES[1]. This project focused on how shared mobility can be designed to cater to the unique needs of rural communities in the Province of Groningen to ensure equal opportunities for all. Through the SMiLES project, the researcher had access to a diverse pool of potential participants, providing valuable insights into this Sustainable Entrepreneurship Project. Moreover, the data collected within the SMiLES project served a dual purpose, contributing to this research project's objectives and enriching the outcomes of its endeavour.

Materials

Semi-structured interview guideline

The semi-structured interviews differed for the rural residents and shared mobility suppliers. All participants received an introduction including the aim of the study and confidentiality aspects. For the residents, the interview guide was divided into five topics. First, they were asked about background information, such as their mode of transportation and understanding of shared mobility. Then, questions were asked about motivators and hurdles of using shared mobility, needs regarding shared mobility, and factors that could enhance the willingness to use shared mobility.

Shared mobility suppliers were asked about their experiences with rural shared mobility and their understanding of rural communities' attitudes. Next, they were asked about their capabilities to cater to rural communities' needs, as well as possible challenges and opportunities. Lastly, the participants were questioned regarding a bottom-up collaborative

[1] "SMiLES | Rijksuniversiteit Groningen," SMiLES, n.d., https://en.smiles-living-lab.nl/provincie-blij-met-frisse-ideeen-student.

approach and future possibilities of rural shared mobility. See Appendix B for the complete interview guides.

Data Analysis

The collected data underwent a comprehensive analysis process to extract valuable and actionable insights. First, the audio-recorded interviews were transcribed using Microsoft Word, followed by a coding framework using the concepts, themes, and patterns that were found to recur. The qualitative data was systematically classified into first and second order themes. Additionally, iterative coding and ongoing comparison were used to identify interactional connections. The identified themes were compared with existing findings and applied to the COM-B model. Software ATLAS.ti for qualitative data analysis was used to facilitate the coding process and enhance the accuracy of the analysis. Understanding the coded data to produce significant insights and conclusions pertinent to the study objectives constituted the last phase of analysis. Throughout the data analysis process, the researcher paid close attention to ensuring the validity and trustworthiness of the results.

Ethical Considerations

The ethical guidelines governing the treatment of participants and the responsible handling of their data are fundamental to the planning and execution of this study. The interviews were conducted primarily online and audio-recorded with the participant's permission. Participation was voluntary at all times, and the participants were asked to consent before participating in this research. Furthermore, the respondent had the right to opt out at any point and time during the interview or choose not to answer questions without any consequences or providing a reason. The participants' identities were kept anonymous, and collected data was handled confidentially following the Dutch code of conduct and Campus Fryslân's requirements. Thus, the participant's identity cannot be linked to other data by anyone

else. This research did not collect personally identifiable data unless prior written permission has been given. The participant's personal data was generated through audio recordings and transcribed and anonymized after the interview. The audio recordings were disposed of immediately after the data was transcribed. The transcribed data will temporarily be stored in the Y-drive of the University of Groningen server for up to 5 years according to GDPR rules of the University of Groningen. The data of each participant was handled confidentially and anonymized. The transcript of the interviews was analyzed by the researcher, and the transcript of each interview was only accessible to those involved in this research.

RESULTS

This section presents the results of this research and is divided into five categories: the mode of transportation, motivators for using and implementing shared mobility, barriers for using or implementing shared mobility, the needs for successfully implementing shared mobility, and the shared mobility suppliers' perspective. A complete list of themes per category and supporting quotes can be found in Appendix A.

Mode of Transportation

This section aims to provide information on participants' (rural residents) current mode of transportation and their initial understanding and attitude towards shared mobility. All participants' current mode of transportation was either biking or going by a privately owned car. Most participants mentioned owning at least two vehicles for a household of two to three people. The participants' initial attitudes towards shared mobility were overall positive; one respondent noted, *"It's really fantastic those cars, it's like a taxi, and they are all electric"* [P1]. Even though none of the participants had personal experience with shared mobility, they

received their knowledge through positive examples in larger cities and platforms such as YouTube. Participant 5 mentioned, *"We used to have a shared car with other neighbours in our former place where we lived"* and thus was familiar with the concept of a shared vehicle. Their perceptions on the implementation of shared mobility in Wedde seemed enthusiastic, although car sharing was highly preferred over bike sharing, as there was no demand for additional bikes. Participant 1 mentioned, *"You will never have the total community get enthusiastic; 10% would be, in my opinion, great success".*

Motivators for Using and Implementing Shared Mobility

The interviews with the residents in Wedde identified ten motivators, which can be grouped into six overarching themes. The first and most reiterated motivator was cost efficiency and consideration. Participant 4 mentioned, *"The most important is to reduce your costs".* Additionally, participant 5 elaborated on how the costs could serve as financial incentives for residents who expressed less enthusiasm towards shared mobility as they mentioned, *"Perhaps if they see how much it's fair, the less costs perhaps they are more enthusiastic… it's a little idealism and a lot of money; the money is always a big argument for a lot of people".* The second motivator concerns the current life circumstances of the residents in Wedde. The different life situations can influence the dependence on a privately owned vehicle and the willingness to adjust to a shared mobility option. Participant 1 mentioned *"Most people they don't work anymore and don't use the car anymore".* Whereas retirement and smaller households might be able to align daily tasks with shared mobility, younger families might be more dependent on private car ownership. The third identified theme was social influence. Participants mentioned that positive examples of rural shared mobility and community engagement through the local newspaper and information evenings could motivate the use of shared mobility: *"I think it will help if there are good examples from people who use*

it, and they can tell other people here in Wedde it is really simple" [P4]. In addition, they said, *"The main success is to make it easy, and if your neighbour does it, people are going to think, ok if he can, I can".* Another reoccurring motivator observed was environmental awareness. Participant 5 mentioned, *"There are a lot of more sustainable people who I think are enthusiastic about the idea".* However, it is essential to mention that participants had a good and positive understanding and attitude towards shared mobility as a more sustainable mode of transportation.

Furthermore, having an electric shared vehicle seemed to be a great motivator, as one participant mentioned, *"When there is no shared mobility, you will never in your life drive an electric beautiful electric car, and now you can do"* [P5]. The last motivator identified concerns the perceived benefits for the individual. Even though the participants did not necessarily perceive this as a personal motivator, but rather for less enthusiastic people, participant five mentioned: *"I think information is the first thing, and very practical information, not what beneficial for the world just make it very personal and individual, so what are the benefits for you personally".*

Barriers to Using and Implementing Shared Mobility

The collected data revealed twelve barriers to using and implementing rural shared mobility, which can be grouped into seven themes. The first barrier identified was the aversion to change, which includes general resistance, discomfort with change, environmental apathy, lack of awareness, and habits. Participant 2 elaborated on the general resistance of other people as they mentioned, *"The first answer you get is well, in my case, it wouldn't be an option…it's a mindset",* and *"I don't think there are any rational arguments given".* One participant emphasized the barrier of change as they commented, *"Every change you ask from a human person is difficult, no matter what kind of change or what kind of people"* [P1]. Furthermore,

daily habits seemed essential to residents in Wedde, challenging the adaptation of shared mobility. Participant 4 mentioned, *"Most people want to live their lives the way they used to"*. The second theme regards the independence and self-interest of residents, which create a barrier to the successful implementation and use of rural shared mobility. Participant 5 said, *"I think most people don't change to share",* and participant 4 elaborated, *"There are people who want to write their car by themselves…"*.

Additionally, one participant briefly highlighted the concern of privacy symbolizing autonomy and independence, suggesting that shared mobility platforms might jeopardize these aspects. The third reoccurring barrier concerns accessibility and reliability. Participants mentioned that to implement shared mobility successfully, residents must not feel limited in their freedom to move: *"The reliability and viability will be the most mentioned; everyone wants to use your car whenever they want"* [P5]. Moreover, the symbolic aspect of car ownership was a significant barrier to adopting shared mobility. Although participants did not relate to this barrier, they mentioned that other residents might identify with it: *"For some people, it's quite a step to get rid of the car because you think it says something about who you are"* [P4].

Barriers mentioned less frequently yet seemed significant for a successful and sustainable implementation of rural shared mobility concerned technological challenges. Participants highlighted that using an app can create a barrier, especially for older residents. Furthermore, one participant mentioned the objection to political influence, emphasizing that *"it's a lot of right-wing politics here in the north… they are more conservative"* [P5]. This political stance can impact the acceptance of green innovations such as shared mobility, potentially creating a barrier.

Needs for Implementing Shared Mobility

Besides the motivators and barriers to the implementation and adoption of rural shared mobility, this research identified a variety of crucial considerations for introducing this innovation. The identified needs can be categorized into five themes, entailing various sub-themes.

Participants' first theme of needs concerns the psychological incentives creating a mind shift amongst residents. Participant 1 highlighted, *"It's a psychological barrier you have to make".* Additionally, participant 4 mentioned the need to change habits and *"People have to make a mind shift".* These results align with the aversion to change mentioned among the identified barriers. The second theme addresses the need for communication and social influence. All participants stressed the importance of influencing the residents in Wedde to increase their willingness to use shared mobility: *"It is necessary to convince people that we have to make other decisions; the old school way is no longer sustainable; that takes time"* [P4].

Additionally, participants mentioned a community garden project, which started with the initiation of only a few residents but significantly increased community engagement via word of mouth and the local newspaper. Participant 5 highlighted, *"I always write in the little paper for the village about sustainability things, so it's very easy for me to inform everybody, and I get reactions sometimes and a lot of people like it, so that doesn't mean that they share it, but they read it and slowly changing their attitudes about sustainability".* Therefore, community influence is needed for the success of rural shared mobility. Moreover, one participant emphasized the need to disconnect the topic of sustainability from a specific political perspective to highlight its relevance to all. They argued, *"It's not very good to connect it with a specific political party; it's a non-politic issue, so it's a benefit for everyone, right and left"* [P5].

The implementation and adaptation of rural shared mobility appeared to be additional requirements. Participants emphasized the need for accessibility, reliability, assurance, and safety. Furthermore, it was mentioned that facilitating a clear introduction is essential to prevent overwhelming hesitant residents. Participant 4 emphasized, *"It must be easy because a lot of people are afraid if they have to do something with the phone, an app or something like that, so you have to make it as easy as possible".* According to the residents, a first implementation should require approximately two vehicles, as an overload might lead to an immediate rejection. Furthermore, participants suggested a seasonal adjustment in supply, as the demand for cars increases in the winter, but in summer, residents prefer using their bikes.

The last theme of needs concerned the infrastructure and governmental support. Implementing an innovation such as shared mobility requires collaborative actions between residents, municipalities, and stakeholders. Participant 5 highlighted, *"The politics have to come from the down to up and from up to down; both sides said they have to meet somewhere".* Furthermore, to increase community engagement, one participant emphasized, *"They have to promote it and make it really visible…"* [P4]. From the municipality's perspective, there appeared to be a strong willingness to provide support. Infrastructure adjustments to facilitate charging possibilities for shared electric vehicles seemed to be a priority. They mentioned, *"We have like a charging point at a formal house of municipality, and we are also working on an extras electric charging point, but the waiting time is very long"* [P3].

Shared Mobility Suppliers' Perspective

Based on the residents' responses on motivators, barriers, and needs, shared mobility suppliers were asked about their perspectives, perceived opportunities and challenges, and actions on rural shared mobility. The findings for this section were themed according to the

identified needs: communication, infrastructure and support, implementation and adaptation, and psychological incentives, as discussed in the previous section.

The companies' missions lie in improving residents' livelihoods and reducing the number of cars on the street. However, as participant 6 highlighted, *"A huge reason not to share a car is owning one… the majority of the people living in rural areas own a car…".* Thus, the implementation and adaptation of rural shared mobility may face greater challenges than in urban areas due to the higher car ownership numbers. Furthermore, the company stressed the need to keep the placed vehicle in use; otherwise, it would be removed after 6-12 months. Additionally, as residents mentioned seasonal supply variations according to the demand, participant 6 stressed that it is *"Operationally not feasible".* Rural residents expressed electric vehicles as a preferred choice and motivating factor. On the contrary, the participant outlined, *"People often find electric driving daunting…older people find it daunting to work with charging cable and automatic transmission…despite being more expensive, the preference is still for gasoline cars"* [P7]. Nonetheless, the company wants to expand its electric vehicles sustainably.

Regarding the need for infrastructure and support, participant 7 mentioned, *"A central location is always considered, such as near a train station, customers can also submit requests, and these are taken into account."* In addition, they mentioned that their vehicles must be parked around visible locations and are primarily station-based, which requires the users to pick up and return the car to the same location. The station-based approach may allow for reliability and assurance as the vehicle can always be found at the same location. Nonetheless, residents might have difficulty accessing the car due to a larger geographical distribution in rural areas. Furthermore, the respondent emphasized the challenge of change in infrastructure and the need for better solutions for charging stations. Electric vehicles should not be charged between 4 pm and 7 pm due to overstrained power grid. Participant 7 said, *"It's not the*

solution; the goal should be to reduce car ownership". Thus, the charging issue seems to be an overall barrier, but through the support of the municipality and community engagement, charging possibilities per village can be made accessible.

The respondents emphasized the importance of support and communication with the municipality. *"It helps when the municipality is enthusiastic"* [P6], which can enhance awareness, understanding and community engagement. The respondents could not provide an answer regarding psychological incentives or initiatives to increase the willingness to use shared mobility in rural areas.

Based on the conducted interview, the findings suggest that current shared mobility suppliers aim to expand their services in line with their mission to reduce car ownership. Yet, there seems to be limited opportunity to adjust to the resident's needs, but rather universal solutions across all locations.

DISCUSSION

This research aimed to identify factors influencing residents' attitudes to accept and use a shared mobility scheme and the abilities of shared mobility suppliers to meet rural communities' needs. The study identified several motivators, barriers, and needs from the resident's perspective and classified suppliers' current abilities. This section will analyze the gap between relevant factors influencing acceptance, drawing from existing literature on the urban context, and compare them with the identified factors in the rural context of Wedde. Moreover, the results will be analyzed using the COM-B framework, examining the perspectives of residents and suppliers. Lastly, limitations and recommendations will be provided.

The Urban-Rural Gap

As discussed in the literature review, current studies on the acceptance and willingness to use shared mobility are primarily based on the urban context. However, this research has identified similarities between influencing factors. Based on the Model of Diffusion (Rogers, 1962), aspects related to personal benefits, experience, needs, ease of use, trialability, and visibility are important in increasing the willingness to use shared mobility. Similarly, this research identified personal benefits as strong motivators for embracing shared mobility. Moreover, the ease of use, accessibility, reliability, and social influence manifested through visible positive examples emerged as crucial to enhancing users' motivation. However, technological challenges were mentioned as barriers related to ease of use, which provides a deeper understanding of influencing factors than the existing literature.

Furthermore, according to Lane (2005), convenience, affordability, personal freedom, environmental benefits, and improved productivity enhance the willingness to engage in car sharing. Consistent with this perspective, the findings of this study underscore the significance of factors such as cost efficiency, environmental awareness, and personal benefits as key motivators. However, all respondents identified as environmentally conscious, yet highlighted the lack of understanding of sustainability amongst other residents. Thus, the environmental motivator may not hold significant weight in the broader context, consistent with existing findings suggesting a decline in environmental awareness since shared mobility was first introduced (Lane, 2005).

In addition, literature has shown the impact of individual circumstances and interests and the emphasis on symbolism in adopting shared mobility (Schaefer et al., 2022; Whittle et al., 2019). In accordance with these findings, this study also identified life circumstances as a motivating factor. Furthermore, independence, self-interest, symbolism, and cultural factors present significant barriers to accepting shared mobility, varying across location and time.

This study reveals several parallels with factors influencing acceptance observed in urban contexts. Strong similarities were found in the significance of cost efficiency, environmental awareness, and perceived benefits as motivating factors. Additionally, expressed needs such as ease of use, accessibility, and reliability further align with existing theories. Barriers such as independence, self-interest, and symbolism also highlight parallels to the urban context. However, distinct from existing literature, residents from rural Wedde strongly emphasized the importance of social influence, community engagement, and municipal support to enhance acceptance and motivation to use shared mobility. These factors, absent in current theories, may underscore the stronger community bonds in rural areas, influencing trust and support for implementing new innovations such as rural shared mobility.

Nonetheless, this research also identified barriers, such as aversion to change and technological challenges, which do not seem significant in the urban context. Rural areas might have a stronger aversion to change due to their limited exposure and reliance on familiarity. Thus, comfort in tradition may challenge the implementation of an innovation. Furthermore, although a strong community bond can support the acceptance of shared mobility, this tight-knit can also lead to resistance due to the fear of disrupting existing social structures.

To conclude, this study revealed both similarities to existing urban-based literature and additional influencing factors specific to rural contexts. These findings lay a foundation for bridging the gap between rural and urban perspectives on shared mobility.

The COM-B Model

This study aimed to identify and categorize factors affecting residents' behaviour by utilizing the COM-B model. The influencing factors for acceptance and use of rural shared mobility appeared from the interviews and were mapped onto *Figure 1* to illustrate their relationship within the COM-B model.

Capability

The theoretical framework chapter discusses the fact that capability can be psychological and physical. According to the results, residents' positive attitudes and environmental awareness towards rural shared mobility positively influence their psychological capability to engage in the desired behaviour eventually. However, their assumption about possible barriers for others, such as the aversion to change and loss of independence and autonomy, might negatively influence the psychological capability hindering the desired behaviour. Therefore, a positive attitude and environmental awareness can increase individuals' psychological capability by fostering a perspective open to rural shared mobility. Furthermore, perceived advantages and a mind shift toward shared mobility and sustainability can improve psychological capacity, enhancing residents' openness to change.

Regarding physical capability, technological challenges and the lack of ease of use (implementation) can negatively influence residents' capability to engage in shared mobility. However, according to findings by West & Michie (2020), gaining personal experience can overcome physical challenges and improve psychological capability by fostering familiarity and confidence. Furthermore, a study by Yardley et al. (2015) explores the so-called person-based approach, which focuses on tailored approaches to overcome physical challenges in the context of health-related behaviours. The study discusses how psychological capability and confidence can be enhanced by interventions meant to increase personal experience and familiarity with a behaviour, which aligns with the COM-B model and the study's findings.

Opportunity

Social and physical opportunity is essential together with capability to make a behaviour possible. Social influence, community engagement and enthusiasm create a

supportive social environment that promotes the opportunity to accept and use shared mobility. The findings suggest that political considerations such as supportive policies can further strengthen social opportunities and enhance physical opportunities. Relevant physical opportunities include a market for shared mobility services, sufficient infrastructure and support, and accessibility. As Wedde currently does not employ any shared mobility services, these components still negatively influence residents' opportunities to engage in shared mobility. Therefore, creating physical opportunity is crucial; otherwise, residents might be unable to use shared mobility services efficiently, even if they are capable and motivated.

Motivation

An individual's motivation is influenced by opportunity and capability and energizes and directs behaviour. The acceptance and use of shared mobility seem hindered by deeper reflective motivations, such as aversion to change, the desire for independence and autonomy, and the symbolism of car ownership. On the contrary, adopting shared mobility can be encouraged by the desire for sustainability, cost efficiency, and considering individual circumstances. Yet, the results have shown that life circumstances can positively and negatively affect using shared mobility, based on the dependency on a private vehicle and the flexibility to change daily habits. Impulses such as positive examples and community engagement can increase automatic motivation. Thus, external influences can drive the desire to use shared mobility, which may evolve into automatic habits in the long run.

Influences between factors

The COM-B model suggests an interactional relationship between capability, opportunity, and motivation. Capability and opportunity set the foundation for facilitating the anticipated behaviour and influence the individuals' motivation. Therefore, motivation can

help to direct the behaviour, as well as impact the individuals' capability (psychological) to engage in a behaviour. The findings of this study suggest similar interactional relations influencing residents to accept and use shared mobility.

By reducing change aversion and enhancing shared mobility's perceived benefits, a positive attitude (psychological capability) towards shared mobility can influence the individuals' reflective motivation. Similarly, overcoming technical challenges may increase one's capability and motivation to use shared mobility services. Conversely, reflective motivations such as environmental awareness, sustainable desires, and cost efficiency can drive residents to overcome physical and psychological challenges, enhancing their capability to engage with rural shared mobility. Additionally, automatic motivations, such as positive examples and community support, can reduce psychological barriers and enhance participation in shared mobility.

Capability and opportunity affect each other as physical capability can be enhanced by improved infrastructure and support (physical opportunity), which makes shared mobility options more easily accessible and user-friendly. Furthermore, social opportunities, such as community engagement and social influence, can improve psychological capability by reducing perceived barriers and providing support.

Lastly, through positive reinforcement and examples, a supportive social environment (social opportunity) can strengthen automatic motivation. Moreover, physical opportunities, such as accessibility and infrastructure, can affect reflective motivation by making shared mobility a practical and convenient alternative to private car ownership.

With a better understanding of these interactional relationships, interventions can be created to focus on motivators and barriers, increasing the acceptance and engagement of rural shared mobility.

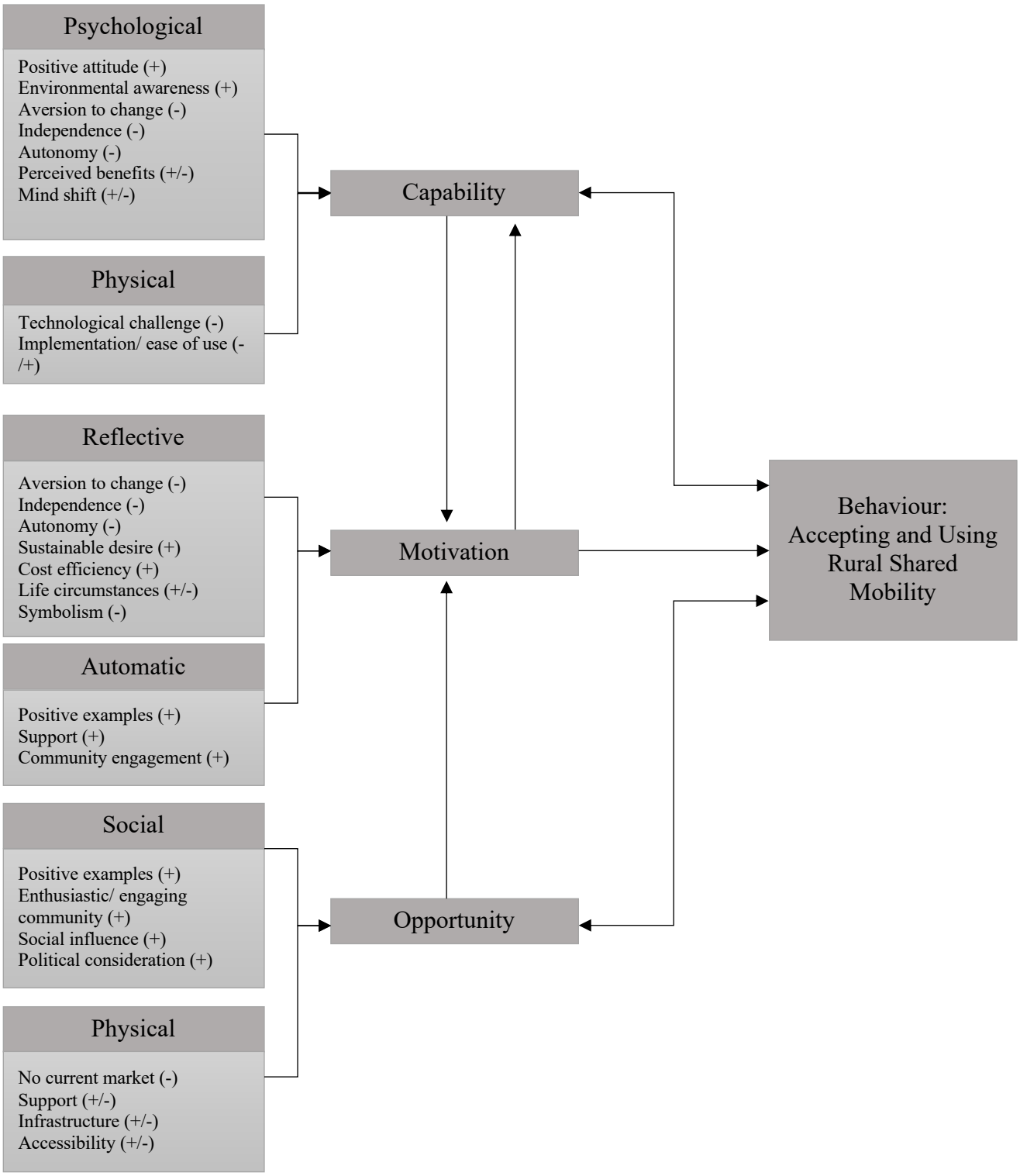

Figure 1. *Factors influencing acceptance and use of rural shared mobility utilizing the COM-B model*

Relevance to Sustainable Entrepreneurship

The concept of shared mobility has established a market for sustainable entrepreneurship, creating environmental, social, and economic value. Therefore, insights into factors influencing acceptance and engagement for rural shared mobility are vital for sustainable entrepreneurship.

The shared mobility suppliers' findings highlight their mission of reducing negative environmental impacts. By reducing the number of private vehicles on the street and attempting to shift towards primarily electric vehicles, suppliers contribute slowly and sustainably to decreasing carbon emissions, addressing environmental awareness and sustainable development factors. Moreover, ensuring accessibility and an adequate infrastructure contributes to social equity by bridging the gap between urban and rural areas. The goal of social equity can be further supported by positive social influence and community engagement. However, the results suggest that shared mobility suppliers are currently very limited in their ability to adjust to rural communities' needs. The prevalence of private cars in rural areas creates a barrier for shared mobility suppliers, making establishing a market in these regions challenging. Furthermore, suppliers lack strategies to include and incentivize rural communities and instead adopt a universal approach, as tailoring strategies to individual communities is not operationally or economically feasible. Nonetheless, understanding and utilizing perceived benefits and cost-effectiveness from the rural perspective can promote economic sustainability for both suppliers and rural users.

By strategically addressing the identified factors through the COM-B model, shared mobility providers can expand their services to rural areas and increase acceptance and engagement. Nevertheless, due to their limited operational capacity, shared mobility providers cannot be solely responsible for implementing and adopting rural shared mobility. The support and enthusiasm from the local municipality and community engagement are essential for

acceptance and use. Therefore, a bottom-up approach where all stakeholders contribute to a sustainable implementation should be considered, allowing for a collective collaboration. This strategy can encourage a more equitable and sustainable transportation ecosystem in rural areas while supporting market expansion for shared mobility and the larger objectives of sustainable entrepreneurship.

Limitations and Future Recommendations

This research entailed several limitations that could have affected the study's outcomes. First, the research location was primarily based on the municipality of Westerwolde, specifically the village of Wedde. Although the village has not yet implemented shared mobility services, the community has already expressed interest in introducing this innovation. Therefore, their perception and attitudes towards accepting shared mobility might have been biased. Hence, the results cannot be generalized across all rural communities in the Province of Groningen, and the diversity of values, needs, and resources needs to be considered for each village.

Furthermore, participants recruited via gatekeepers might be biased due to their greater involvement in the village council and advocacy for shared mobility, potentially compromising the representativeness of the entire village population. In addition, residents expressed a positive attitude towards shared mobility. Therefore, potential barriers to adopting rural shared mobility were primarily based on their assumptions regarding other residents' attitudes. Thus, the research lacks first-hand opinions regarding the resistance and barriers to accepting rural shared mobility. Lastly, shared mobility providers do not currently operate in rural areas, meaning their perception of meeting residents' needs and potential strategies to adapt to rural conditions are unknown. Overall, implementing rural shared mobility is still an untouched topic

for all the participants. Therefore, all findings are limited to assumptions and expectations and are yet to be explored.

Further research should be considered to empirically validate the factors determined in this study based on participants' assumptions and expectations. Furthermore, for a sustainable implementation of rural shared mobility, all stakeholders should provide regular feedback. Hence, the residents' needs can be better met without neglecting suppliers' operational capacities. A bottom-up approach is strongly encouraged, as this will enable rural communities to participate and engage in the implementation of rural shared mobility. This approach can relieve suppliers of the need to implement significant operational changes in each location solely to satisfy residents' needs but also ensures that all parties contribute to the goal of engaging with rural shared mobility. To establish this bottom-up approach, the local municipalities play a crucial role in supporting, connecting, and encouraging residents and suppliers.

CONCLUSION

This study aimed to explore the topic of rural shared mobility as a means for sustainable development, seeking to bridge the urban-rural gap by identifying factors that influence the acceptance and engagement with shared mobility among rural residents. Additionally, the research sought to determine whether the needs and expectations of residents could be met by shared mobility providers. The findings highlighted various motivators, barriers, and needs influencing residents' acceptance and willingness to use rural shared mobility. Significant motivators encompassed cost efficiency, life circumstances, social influence and support, residents' environmental consciousness, and perceived benefits. Nonetheless, participants suggested that aversion to change, independence and self-interest, accessibility, technological

challenges, and symbolism of car ownership can create crucial barriers for rural residents. Therefore, the research identified notable needs that need to be considered, including psychological incentives, communication and social influence, support for implementation and adaptation, and infrastructure and support. Although these findings are crucial for the sustainable implementation of rural shared mobility and relevant to sustainable entrepreneurship, the factors identified can vary across location and time. Currently, shared mobility providers lack the capacity to tailor their services to each location individually. Therefore, it is essential for all stakeholders to be actively engaged in creating a bottom-up approach to the development of rural shared mobility.

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APPENDICES

Appendix A. Coding Tables

Motivators for using/ implementing shared mobility

Example Quotes	1st order of themes	2nd order of themes
"Yeah, the financial aspects of it, that's very important for people" (P2)	Costs (monthly costs of private vehicle, Petrol)	Cost efficiency/ consideration
"The most important is to reduce your costs" (P4)	Cost reduction	
"I think it's cheaper than an old private car and it's always a new a good condition, yeah you know you don't have to consider whatever you have to do with the car to make sure it's always driving, yeah so it's easy" (P5)	Cost-effective, no liability	
"And perhaps if they see how much it's fair, the less costs perhaps they are more enthusiastic.. It's a little idealism and and a lot of money the money is always a big argument for a lot of people" (P5)	Financial incentives	
"With the most people are going with the car and here in Wedde are most people. They they don't work anymore because they don't use the car every day" (P1)	Life circumstances	

"I think it will help, of there are good examples from people who use it and they can tell other people here for example in Wedde ok it is really simple. You only have to do this and this. Then you step in your car you drive you park that's it you pay" (P4)	Positive examples	Social influence
"Paper and information evening" (P4)	Local paper and information evenings	
"Your neighbour tells you from it's really simple i do it so if I do it, you can also do it" (P4)	Social environment	
"I think the only the main reason for success is to make it easy, and if your neighbour does it, people are going to think, ok if he can, I can" (P4)	Influence from direct environment	
"The advantages of a little village, there are short lines between politics and the people who live here so if we have an initiative, it's easy to get into politics" (P5)	Strong community reach (people to politics)	
"But there are a lot of more sustainable people who I think are enthusiastic about this idea" (P5)	Environmentally conscious	Environmental awareness
"There are a lot of green people here, also there's mostly imported people from the West"	Green thinking (outsiders)	

"For me a car is only a big problematic piece of metal in my garden, I would like to get rid of, but most people don't have the same attitude, I'm afraid" (P1) "The main argument for starting shared mobility getting rid of your second car"	Reducing car ownership	
"My favourites are electric vehicles" (P5)	Electric vehicles	Electric vehicles
"Yeah. And that's the reason when there's no shared mobility, you will never in your life drive in an electric beautiful electric car. And now you can do." (P1)	Using an electric vehicle	
"I think information that's the first thing, and very practical information not what it is and what beneficial for the world or whatever just make it very personal and individual, so what are the benefits for you personally" (P5)	Personal benefits	Perceived benefits

Barriers for using/ implementing shared mobility

Quotes	**1st order of themes**	**2nd order of themes**
"The first answer you get is well, in my case it wouldn't be an option … it's a mindset" (P2) "I don't think there's any rational arguments given"	General resistance	Aversion to change

“Every change you ask from a human person is difficult, no matter what king of change of what kind of people” (P1)	Discomfort with change	
“And in places like Wedde there are many people who are older and they think okay but what can I do, nothing” (P4)	Generational gap, environmental apathy	
“Maybe in a larger city there is more awareness than in the small villages” (P4)	Lack of awareness	
“Most people want to live their lives, the way they used to it… and they want to hold their own car in case of emergency” (P4)	Assurance, habits	
“I would also like to add that the big companies like (company name) or something they don’t see like a market yet because otherwise it would already been there” (P3)	No established market/ exposure in those regions	
“There are people who want to write their car by themself, I think a lot of people have to get used to the idea” (P4)	Independence	Independence and self-interest
“I think most people don’t change for to share” (P5)	Self-interest bias	

"I agree with the technology, but my privacy is a very holy thing so I will not share any data about myself" (P5)	Privacy, security	
"I think if you say to them it's better for the environment they say yes that's true, but if i needs a car I want to have access to a car right at that moment" (P4)	Accessibility and reliability	Accessibility and reliability
"The reliability, viability will be the most mentioned, everybody want to use your car whenever they want" (P5)	Reliability viability	
"Technology, for the older people yes" (P4)	Technology	Technological challenges
"For some people it's quite a step to get rid of the the car because you think it say something about who you are" (P4)	Symbolism	Symbolism and cultural factors
"Some people it is an image car" (P5)	Symbolism	
"It's a lot of right wing politics here in the north, except for Groningen city. They are more conservative" (P5)	Political bias/ influence	

Needs for successful and sustainable implementation of shared mobility

Quotes	**1st order of themes**	**2nd order of themes**
"It's a psychological barrier you have to take" (P1)	Psychological challenge	Psychological incentives and mindset shift
"People have to make a mind shift" (P4)	Shift mindset	
"Just a change in habits" (P4)	Change habits	
"You have to convince them by asking how may days in a week do you use your car, when it's only once a week then shared mobility would be a very good option" (P1/P2)	Convince the individual	Communication and influence
"We need an influence" (P2)	Influence	
"We started a community gardening in our village and it's the first action was in the village paper" (P1)	Community engagement, word of mouth	
"I always write in the little paper for the village here, and I always write about the sustainability things, so it's very easy for me to inform everybody and I get reaction from it sometimes and a lot of people like it, so that doesn't means	Local papers	

that they share it really but they read it and slowly changing their attitudes about sustainability" (P5)		
"It is necessary to convince people that we have to make other decisions, the old school way is no longer sustainable, that takes time" (P4)	persuasive communication for sustainability	
"It's not very good to connect it with a specific political party, it's a non political issue or should be non political issue so it's a benefit for everyone, right and left." (P5)	Non-political	
"Yeah I think when we started with two cars, three cars in the village of Wedde then I think there are people slowly get rid of them own cars" (P2)	Amount of vehicles	Implementation and adaptation
"I think it needs a lot of introduction" (P4)	Introduction	
"You can get a bigh party or a big firm that puts 10 cars and they won't be used, so start small" (P5)	Start small adjust to communities needs	
"It must be really easy to get access to your car, no difficult app or other procedures and the place the car is parked" (P4)	Easy	
"It must be easy because a lot of people are afraid if they have to do something with the phone, an app or something like that, so you have to make it as easy as possible" (P4)	Ease of use	

“I see that many people in the warmer season use their bike but if it’s really cold, it reains they want to use their car (adjust seasonal demand)” (P4)	Seasonal demand and supply adjustments	
“But it should be around the corner and not too far” (P5)	Accessibility	
“Have to share it with others so you have to schedule it so that you know” (P5)	Logistics and reliability	
“You need it a whole day, or perhaps two, I don’t know how it works” (P5)	User requirements	
“What do you have to fill in what are the risks?” (P4)	Assurance	
“We have like a charging point at a formal House of municipality House and we are also working on an extra electric charging point, but the waiting time is very long” (P3)	Municipality support to facilitate suitable infrastructure	Infrastructure and support
“ They (The municipality) have to promote it and have to make it really visible, and not only on their website but they have to be visible” (P4)	Municipal support	
“I think we have to invest if a local garage is interested” (P4)	Local stakeholders	

"If you have a question, there is a quick answer to your question" (P4)	Support	
"The politics has to come both from the down to up and from up to down, both sides said they have to meet somewhere" (P5)	collaborative governance	
"The local politics are very important, I think to make charging stations and perhaps give a sustainability subsidy	Politics	Political consideration

Shared Mobility Suppliers' Perspective

Needs	**Example Quotes**	**Notes**
Communication	"It helps when the municipality is enthusiastic" (P6)	Support and community engagement
Infrastructure and support	"However, electrification presents a challenge. Currently, there is a request not to charge between 4 pm and 7 pm. With everyone having an electric car, the power grid cannot handle it. Yet, electric cars are still subsidized. Asking people not to charge between 4 pm and 7 pm is not the solution; the goal should be to reduce car ownership." (P7)	

	“A central location is always considered, such as near a train station. Customers can also submit requests, and these are taken into account. It is important that the car-sharing location is highly visible. Besides train stations, areas near a square or supermarket are also interesting. A new location also depends on the municipality.”	
	(Company name) cars are 'station-based' - you always pick up and return the car to the same location	Limited operational capability for residents needs
Implementation and adaptation	“Operationally not feasible” (seasonal demands) (P6)	
	“A huge reason to not share a car, is owning one. The majority of the people living in rural areas own a car. Some rural municipalities are experimenting with regulating parking, but on a very small scale.” (P6)	Barrier
	“Our mission is to improve livelihoods by decreasing the number of cars on the street.” (P6)	
	“It is essential for (company name) that the car-sharing vehicle is utilized enough by residents;	

	otherwise, it will be removed after 6–12 months" (P6)	
	"People often find electric driving daunting due to range anxiety and the use of charging cables. Despite being more expensive, the preference is still for gasoline cars. (Company name) aims to grow electrically but wants to do it steadily and sustainably" … "Older people find it daunting to work with a charging cable and automatic transmission" (P7)	Different to the motivating factor for residents, similarity to technological challenge
Psychological incentives	/	No strategies provided

Appendix B. Interview Guides

Rural Residents Interview Guide

Introduction

- Greet the interviewee
    - Welcome, thank you for participating in this research, we really appreciate you being here today
- Explain the purpose of the interview/ study
- Confidentiality and anonymity
    - Participation is voluntary at all times, and the participant will be asked to consent before participating in this research. Furthermore, the respondent has the right to opt out at any point and time of the research or choose not to answer questions without any consequences or providing a reason. The participants' identities will be kept anonymous, and collected data will be handled confidentially following the Dutch code of conduct and the Universities regulations. Thus, the participant's identity cannot be linked to other data by anyone else. This research will not collect personally identifiable data unless prior written permission has been given.

Background questions

1. Can you tell me a bit about your experience living in *(Village)* and your typical mobility needs?
2. How frequently do you currently use public transportation or private vehicles for your mobility needs?
    1. Do you own a private vehicle/ more than one private vehicle?
3. Are you aware of the concept of shared mobility services?

1. Explain what shared mobility means (car sharing, ride pooling, community sharing, bike sharing etc.)
2. Have you ever used shared mobility services (perhaps in urban areas)?
    1. If yes, what were your experiences? What did you like/ dislike? What did you use it for?

Motivators for using shared mobility

1. What factors would motivate you to consider using shared mobility services?
    1. If you had used shared mobility before, what motivated you to use them?
    2. What are the main benefits you perceive in using shared mobility options?

Hurdles to using shared mobility

1. What are the main obstacles or challenges that prevent you from using shared mobility services?
    1. Can you name examples from your own experiences, if applicable?
2. Do you have general concerns about the implementation of shared mobility services in your community?
    1. Are there any concerns you have regarding safety or reliability of shared mobility options in rural areas?

Needs and wishes regarding mobility

1. What specific mobility needs do you have that are not currently being met by existing transportation options?
2. Would you like to have shared mobility services in your community

3. In an ideal scenario, what features or services would you like to see in shared mobility options tailored for rural communities like *(Village)*?
    1. Also considering the different types of shared mobility services (car-sharing, ride-pooling, community sharing etc.), which one would be most feasible and accepted in your opinion?
4. Do you think this ideal scenario would increase your use of shared mobility services and reduce private car use, perhaps car ownership?

<u>Enhancing willingness to use shared mobility</u>

1. What do you think could be done to improve the accessibility and availability of shared mobility services in *(Village)*?
2. Are there any community-based initiatives or support systems that could encourage residents to adopt shared mobility options?
3. How important do you think it is for local authorities to support and invest in shared mobility solutions for rural areas like *(Village)*?
    1. Do you have any suggestions and expectations from your municipality/ the Province of Groningen for the implementation of shared mobility services?

<u>Conclusion</u>

- Summarize key points discussed during the interview
- Ask if there are any additional thoughts or concerns the interviewee would like to share
- Thank the interviewee for their time and participation

Shared Mobility Suppliers Interview Guide

Introduction

- Greet the interviewee
    - Welcome, thank you for participating in this research, we really appreciate you being here today
- Explain the purpose of the interview/ study
- Confidentiality and anonymity
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Background questions

1. Can you provide an overview of your shared mobility services?
    1. What types of shared mobility services do you offer (e.g. ride pooling, car sharing, bike sharing)
2. How long have you been operating, and what regions are you primarily operating in?
    1. Do you have operating services in urban and rural areas?

Understanding rural communities attitudes

1. In your experience, what are some common attitudes or perception of rural communities towards shared mobility services, in comparison to urban communities?
2. Have you observed any unique challenges or preferences specific to rural areas regarding shared mobility adoption?
3. Where do you see challenges in implementing shared mobility in rural communities and meeting their needs?

Capabilities and wishes of shared mobility providers

1. What are some key capabilities or features that your company offers to cater to the needs of rural communities?
    1. This might need an explanation or insights in what rural communities need
    2. Do you see differences in the needs amongst different rural communities?
2. How flexible are your services in adapting to the specific requirements or preferences of rural areas?
3. What strategies does your company employ to align with the desires and expectations of rural communities in terms of shared mobility?

Challenges and opportunities

1. From your perspective, what are the main challenges shared mobility providers face in meeting the needs of rural communities?
    1. Again, do you see differences in different rural communities?
2. Are there any untapped opportunities or innovative approaches your company is exploring to better serve rural areas?
    1. Do you want to expand your services in rural areas?

Collaboration and community engagement

1. How does your company engage with rural communities to better understand their needs and preferences?
2. Do you collaborate with local governments or community organizations to enhance shared mobility services in rural areas?
    1. What do you expect or need from governmental authorities for the implementation of your services in rural communities?
3. Are there any successful case studies or initiatives where your company effectively matched rural community attitudes with your services?

Future possibilities

1. In your opinion, what does the future of shared mobility in rural areas look like?
2. How do you envision shared mobility providers evolving to better accommodate the needs and wishes of rural communities in the coming years?

Conclusion

- Summarize key points discussed during the interview
- Ask if there are any additional thoughts or concerns the interviewee would like to share
- Thank the interviewee for their time and participation