Available online at www.sciencedirect.com

ScienceDirect

Procedia Computer Science 238 (2024) 255–264

Procedia Computer Science

www.elsevier.com/locate/procedia

The 15th International Conference on Ambient Systems, Networks and Technologies (ANT)
April 23-25, 2024, Hasselt, Belgium

Leveraging Stakeholder Meeting and Stated Preferences to Design Optimal Mobility-as-a-Service Subscription Bundles

Salwa Salam[a], Shahram Tahmasseby[a,b]* Anas Mohammed[b], Wael Alhajyaseen[a,b]

[a]*QatarTransportation and Traffic Safety Center, College of Engineering, Qatar University, PO BOX 2713*
[b] *Department of Civil and Environmental Engineering, College of Engineering, Qatar University, PO BOX 2713*

Abstract

MaaS (Mobility-as-a-Service) emerges as an innovative solution to urban transport challenges, offering a unified, user-focused platform that combines various modes of transport. Implementing TDM (Travel Demand Management) strategies and well-structured pricing models can counteract excessive reliance on ride-hailing services and ensure equitable pricing for different users. A comprehensive survey is essential to understand public preferences for MaaS, incorporating stakeholder input, social inclusiveness, and the influence of Arabian and Islamic culture. A stakeholders' meeting was held to emphasize a participatory approach to MaaS's success. Post-meeting, a questionnaire was distributed to capture stakeholders' feedback for MaaS in Qatar. The study highlights the influence of Qatar's unique socio-cultural context on transport preference, emphasizing the need for a custom-made MaaS solution. A Stated Preference (SP) survey was designed, drawing insights from stakeholder discussions. Employing discrete modeling techniques, including preset subscription-based and menu-based SP scenarios, the survey examines participants' preferences regarding MaaS, offering insights into how varying costs, ride options, pre-set bundle, and MaaS menu preferences shape subscription choices. With the aforementioned approach, this study contributes to the existing literature and provides valuable insights and novelty to facilitate the design of an SP survey questionnaire based on the stakeholders' viewpoints and concerns, ultimately supporting the successful implementation of MaaS in Qatar.

Keywords: Mobility-as-a-Service; Travel demand management; Qatar; Methodological approach; Diverse Society; Stated Preference Survey

* Corresponding author. Tel.: +974 4403 7406; fax: +0-000-000-0000 .
E-mail address: stahmasseby@qu.edu.qa

10.1016/j.procs.2024.06.023

1. Introduction

In the last few years, Mobility-as-a-Service (MaaS) has surfaced as a solution to tackle the intricate transportation challenges confronting the urban environment. MaaS seamlessly integrates diverse modes of transport into a user-centric platform, providing travelers with unparalleled convenience, flexibility, and sustainability [1, 2]. The MaaS approach emphasizes modularity in the system, allowing for easy incorporation of new modes as they emerge. Significant weightage is assigned to societal factors to ensure the MaaS model aligns with local cultural, economic, and demographic nuances. Moreover, MaaS can tackle key challenges in urban mobility, such as alleviating traffic congestion and reducing air and noise pollution, by encouraging the adoption of more sustainable transport choices. The implementation of MaaS, which offers bundled travel services based on customer needs, requires close cooperation between various players in the transport market [3]. Understanding ride-hailing trip patterns, such as travel time and the location of users, can help policymakers and transportation administrators regulate the ride-hailing industry within MaaS frameworks [4]. Implementing Travel Demand Management (TDM) alongside the thoughtful design of MaaS bundling and pricing schemes can counteract the inclination toward ride-hailing and establish fair pricing structures to meet the diverse needs of various user groups. Equitable pricing mechanisms can be formulated to prevent ride-hailing services from disproportionately affecting disadvantaged communities, particularly those residing in neighborhoods with a higher percentage of residents of color or individuals below the poverty line [5, 6]. Additionally, MaaS bundles can be a useful tool for managing mobility even in medium-sized cities, provided that users have biosecurity and privacy concerns and in locations that experience extreme weather conditions [7].

Crucial to the design of MaaS bundles and their pricing is the active engagement of stakeholders, ensuring an investigation into their specific requirements. [8-10]. By involving both potential end-users and a diverse set of stakeholders, such as operators and policymakers, a human-centered approach can be adopted, which is based on design anthropology [11]. This approach allows for the production of ethnographic insights and the translation of these insights into design probes for workshops [12]. Stakeholders' perspectives and preferences can be captured through choice models and stated preference surveys, providing valuable information for transportation planners and policymakers. By engaging stakeholders, their motivations, concerns, and expectations can be understood, leading to informed decision-making processes when implementing MaaS schemes.

In a diverse society such as Qatar, while low-income residents predominantly utilize public transport (PT), Qatari citizens and specific high-income resident groups heavily rely on private cars. Laborers' transportation depends on their workplace, resulting in low perceived behavioral control. Additionally, weather, culture, and poor infrastructure pose challenges to walking, unlike other Western countries [13]. Therefore, integrating MaaS into Qatar's transportation network, alongside TDM strategies, should consider Qatar's unique social context, marked by a car-centric culture, weather-related transport preferences, and the differing needs of expats and locals. Therefore, conducting a study on MaaS in Qatar, a Gulf nation with rich Arabian and Islamic heritage and a highly diverse population, will advance our understanding of effective MaaS implementation in countries with similar traits. This research aims to contribute not only to the academic community by developing a methodological and human-centric framework for MaaS studies but also to guide future research endeavors with a focus on minimizing adverse impacts on transportation sustainability.

By instating effective motivation and regulation within the MaaS ecosystem, along with strategic product bundling, MaaS holds the potential to advance a diverse range of sustainability objectives. This contains the reduction of greenhouse gas (GHG) emissions and the diminishing reliance on private car usage [14]. Furthermore, the aim is to develop a robust methodological framework capable of assessing the impact of supportive transportation policies, encompassing regulations, governance, and the organization of the public transport system. This will also take into account operational aspects such as fare structures and revenue distribution, thereby enhancing the efficiency and effectiveness of the transportation system. Regarding the structure of this article, in Section 2, we detail our methodology, while Section 3 highlights insights from a stakeholder meeting. Section 4 discusses survey design and data collection. Section 5 presents concluding remarks, followed by study limitations in Section 6, and future research directions in Section 7.

2. Methodology

Within the scope of our research, it is imperative to conduct a survey aimed at determining public preferences for MaaS. This methodology integrates stakeholder feedback, cultural considerations, and behavioral modeling to comprehensively assess user preferences and their willingness to pay for MaaS offerings. The approach has necessitated convening a critical stakeholder meeting, highlighting the significance of stakeholder engagement in the effective implementation of MaaS. Remarkably, insights gleaned from MaaS implementations in Europe and other global contexts accentuate the essential role of government engagement in safeguarding customer interests and achieving enduring societal objectives [15]. Stakeholders' view is influential on the trajectory of the implementation of MaaS. The insights garnered from stakeholders are employed to develop a Stated Preference (SP) questionnaire, a tool designed to understand and measure the interest of the people of Qatar in adopting MaaS.

The survey design is enriched by valuable feedback from stakeholders, contributing to the evaluation of the propensity of Qatar residents to embrace MaaS. The resulting detailed discussion thoroughly explores the intricacies of the questionnaire design. The primary objective is to provide accessible and dependable subscription options, aiming to encourage a shift towards public transportation and, in turn, reduce reliance on private cars while considering social diversity and their needs. The methodology involved in this study is presented in Fig. 1.

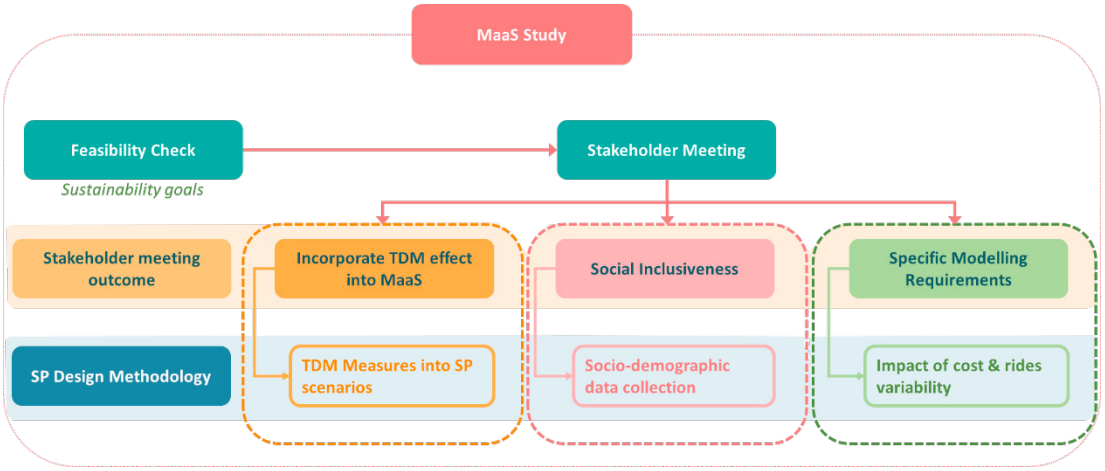

Figure 1. Overview of the Study Methodology Approach

3. Stakeholder Meeting: Key Insights and Outcomes

As the foundational step in Qatar's journey towards MaaS, the engagement of influential stakeholders was deemed essential, as previously highlighted. By integrating the diverse needs and perspectives of these stakeholders, a more inclusive and effective solution can be crafted. The active involvement of stakeholders in the planning process significantly improves the prospects of implementing initiatives that resonate with their priorities and concerns. This inclusive approach cultivates a sense of ownership and accountability among stakeholders, fostering increased participation and commitment toward the realization of sustainable mobility goals.

Hence, a brainstorming session with various stakeholders in Qatar was arranged on 1st December 2021 aiming to tackle the following research question:

- In what ways can the integration of MaaS contribute to sustainable transportation management, facilitating a transition from private transport to environmentally friendly alternatives and promoting the uptake of public transport within the MaaS subscription model?

Diverse authorities participated in the meeting, including representatives from the Ministry of Transport (MOT), the Public Works Authority (Ashghal), the rail sector (Qatar Rail), Mowasalat (taxi and public bus operator in Qatar), e-mobility (LOOP), dockless bicycle services (Pick & Ride), the Qatar Mobility Innovations Center (QMIC), and a toll-based mobility solution provider (Emovis). The meeting focused on developing comprehensive frameworks and

models to forecast MaaS demand and evaluate its performance. We considered the complex interactions among supply, demand, infrastructure, and regulatory frameworks. Additionally, the session examined the potential impacts of MaaS on travel behavior and transportation systems.

After concluding the meeting with stakeholders, a questionnaire was disseminated to gather feedback regarding their aspirations for the success of MaaS in Qatar. The ensuing pillars among others form the foundation and structure of stakeholders' perspectives on the key success factors for MaaS in Qatar: (1)Operating MaaS, (2)MaaS Profitability, (3)Data Sharing and Privacy, (4)Business Development, (5)Ticketing integration, (5)Contribution to Technology development, (6)Common Understanding (between service providers, government, and tech companies).

A noteworthy conclusion drawn from the meeting underlines the imperative of integrating TDM with the implementation of MaaS. This strategic integration seeks to facilitate a transition from private transportation to more sustainable alternatives, particularly by advocating for the inclusion of public transport rides within the MaaS subscription framework. The predominant goal is to elevate the subscription rate to MaaS, aligning with the broader objective of promoting and facilitating the adoption of sustainable transport options. These insights not only address the research question but also contribute to an enhanced understanding of the dynamics surrounding MaaS implementation, aiding in the effective management of sustainable transportation. Guided by these insights, the survey questionnaire was thoughtfully designed. Moreover, the interplay between public and private transport characterized by intricate dynamics shaped by variables such as travel time, cost, parking availability, and other supportive TDM measures such as telecommuting and flexible working hours were incorporated within SP Games as a holistic approach that integrates demand management strategies with the implementation of MaaS.

Qatar’s commitment to sustainability is apparent in the proposed shift of the public bus fleet to E-buses. Highlighting the importance, it is emphasized that a robust demand management strategy should precede the implementation of 'MaaS,' with a focus on initially establishing 'Transportation as a Service. This detailed discussion explains the complex strategies and important considerations needed for smoothly combining TDM into MaaS, ultimately improving transportation services. When the principles and features of MaaS and TDM are integrated, transportation planners can forge a more streamlined, user-focused, and sustainable transportation system. This amalgamation facilitates the smooth consolidation of diverse transportation alternatives from various providers, furnishing users with a convenient and unified interface for planning and accessing transportation services [16].

4. Survey Design and Implementation of Data Collection Methods

The SP survey was crafted to target specific demographic segments within Qatar's population of 2.846 million (based on the 2020 census data). The questionnaire aimed at capturing insights from Qatari citizens, non-Qatari skilled professionals (Expats), non-Qatari non-workers, and non-Qatari laborers. The exclusion of non-Qatari laborers without cars was deliberate, recognizing their limited ability to alter transportation modes due to their short-term engagements and minimal transportation needs, particularly in elementary occupations.

To streamline target population determination, we utilized urban density metrics based on total population and employment for area classification in primary commuting trips. The survey design considered the socio-economic conditions and current travel behaviors of the respondents, ensuring a detailed exploration of MaaS preferences that align with the diverse characteristics of the surveyed population.

4.1. Survey Design

Below are questions derived from the stakeholder meeting, and the SP survey questionnaire is designed to effectively address and offer insights into these queries:

- How might various TDM measures impact the subscription rate for MaaS and influence users' choices when selecting MaaS subscription packages?
- In what ways does Islamic and Arabian culture influence social population groups in Qatar, including families, relatives, and colleagues, leading to a tendency to share the same transport mode or engage in joint trips?
- How to reflect and measure the stakeholders' perspectives on the key success factors for MaaS in Qatar by including customized questions?

- How to design SP games that capture diverse population needs in MaaS bundles and pricing but at the same time fulfill data requirements to develop the MaaS demand model?

Considering the aforementioned survey questions, the questionnaire had to be structured, incorporating hypothetical MaaS packages within various TDM scenarios. These scenarios encompass toll roads, parking restrictions, fuel taxes, and other non-financial measures, including teleworking and flexible working hours. It's worth noting that certain TDM measures, such as flexible working hours and parking restrictions, are already in place in Qatar. Furthermore, the survey explores attitudes towards qualitative factors like the acceptability of ride-sharing and the impact of weather variations, both of which can significantly influence the subscription rate for MaaS packages.

The survey initiation process unfolds in a carefully structured sequence, commencing with the vital step of obtaining participant consent.

The SP questionnaire was divided into six sections as given below in Fig. 2. These sections must be completed sequentially. Respondents could not skip any section without providing all the required information. Notably, this study exclusively engages in face-to-face (in-person) surveys to uphold the integrity of the data collected.

Figure 2. Sections of the SP Survey Questionnaire

4.1.1. Introduction to MaaS (Video)

At the beginning, a short video, under three minutes long, was displayed to participants. This video played a crucial role in explaining the MaaS idea to them. By comparing it to familiar subscription services like Spotify and Netflix, the video clearly showed how MaaS works, emphasizing the choice to subscribe rather than sticking to one mode of transportation. The idea was reinforced by the simple process of getting one bill for all transportation methods, making it easy and straightforward for users [17]. The video also pointed out that MaaS services are quick and responsive in real-time, making sure participants understood the immediacy of this new way of getting around.

4.1.2. Current Travel Pattern

The second segment of the survey comprised an examination of the availability and utilization of various transport modes, as outlined in Table 1. Subsequently, participants were presented with details regarding transport services and associated charges in Qatar, as outlined in Table 2.

Table 1. Utilization and Availability of Transportation Modes

An example of a column heading	Inquiries Related to Transportation Modes	Utilization of Subscriptions and Mobile Applications
Availability of Cars	Sharing Vehicles with Family Members	Frequency of Service Utilization
Number of Cars in the Household	Sharing Vehicles with Non-Family Members	Applications Used for Travel Planning
Types of Personal Cars	Frequency of Transportation Mode Utilization	
Number of Owned Bicycles/E-scooters	Average Daily Travel Time by Transportation Mode	

4.1.3. MaaS Pre-Set Bundle preferences

In the Pre-set bundle, there were three distinct scenarios featuring pre-determined subscriptions with associated costs. Each scenario included two subscriptions, accompanied by a “none” option. Within each scenario, a TDM measure was implemented, and respondents were required to select among the presented options. The attribute levels

encompassed a spectrum of typical cost values per transportation mode in Qatar, mirroring familiar scenarios and facilitating the exploration of cost-based effects. This approach aimed to gather insights into respondent preferences regarding pre-set subscription bundles and their willingness to adopt TDM measures under various cost scenarios.

Table 2. Available Transport Services and Charges in Qatar

Mode	Standard Cost
Personal Car	QR1/km (Compact Sedan Car)
Personal Car	QR2/km (SUV/Luxury Car)
Public Bus	QR3 /Ride
Metro	Standard 2 QAR/Ride, Maximum QR 6 Daily
E-bike/E-scooter sharing	QR2 + QR 0.75 /Minute
Taxi	Daytime QR 4 + QR 1.6 /km
Car rental	Average Cost QR 100 per Day
Ride Hailing/Sharing	QR 3.5 + QR 0.8 /km

Each QR 3.65 is equivalent to USD 1.00

4.1.4. MaaS Menu Preferences

In the menu-based SP scenarios, three unique scenarios were presented, allowing respondents to customize their subscriptions. Respondents had the flexibility to design their own subscriptions by selecting the desired number of rides for each mode of transport. Additionally, each scenario introduced sharing packages, enabling the subscription to be shared among up to five users. The total charge for the shared package was subject to a percentage discount based on the number of users involved. The MaaS menu preferences were crafted in alignment with two key pillars: (a) MaaS Profitability and (b) Business development, as identified in the stakeholders' brainstorming session. The first pillar features the importance of customer satisfaction and effective policymaking, while the second pillar is focused on MaaS appropriateness for cities with high expatriate workers.

4.1.5. Socio-demographic questions

To gather crucial socio-economic information from respondents, enabling the segmentation of SP analysis into relevant population and socio-economic groups was required. Variables such as nationality, income, gender, age, etc., are included in the SP survey, as outlined in Table. 3.

Table 3. Socio-demographic questions

Inquiries Regarding Individuals	Inquiries Pertaining to Work	Inquiries Related to the Household	Inquiries Regarding Technology Usage
Nationality/Ethnicity	Occupation Status	Household Size	Smartphone Availability
Gender	Occupation Type	Household Type	Internet Availability
Age	Work Location	Household Income	
Language		Number of Workers	
Marital Status		Household Location	
Personal Income			

4.1.6. Attitudinal Preference

Ultimately, the survey investigated the attitudinal preferences of respondents, particularly focusing on two significant aspects: their acceptance of ride-sharing and factors related to weather and seasonal variations. Each attitudinal question employed a Likert scale ranging from 1 to 5, evaluating agreement with statements or the

likelihood of taking specific actions. These particular themes were identified as crucial underlying factors influencing user perceptions of MaaS significantly. The survey set out to discover factors that might significantly influence how users perceive and engage with MaaS. These insights into attitudinal preferences offer valuable information for understanding the nuanced aspects of user behavior and preferences when adopting innovative mobility solutions. This aligns seamlessly with the stakeholders' emphasis on the Operating MaaS pillar, specifically addressing the imperative to enhance ride accessibility and affordability for expatriate workers. Moreover, it addresses the Ticketing Integration pillar by underscoring the importance of service providers incorporating transportation ticket integration and information provision into their strategic considerations for the future.

4.2. Sample Size and Sampling Strategy

The survey strategically selected diverse locations to maximize outreach to potential MaaS users, focusing on indoor sites like malls and key metro stations and TOD hubs such as DECC (The Doha Exhibition and Convention Center located in the central business district) and Msherib Station (functioning as a transfer hub for the Red, Gold, and Green lines of the Doha Metro, it stands as the city's largest station). The abovementioned metro stations are exhibited in Fig. 3. In Doha, the accessibility to metro stations differs in various areas, and some locations lack convenient proximity to these stations. The Metrolink serves as a feeder bus network, offering first and last-mile connectivity to Doha Metro patrons.

Figure. 3. Principal Data Collection Hubs

Consequently, the perception of MaaS and the selection of subscription packages by the residents are influenced by various urban factors. These factors include land use types, population densities, accessibility to public transport,

levels of road congestion, and the implementation of TDM measures. To capture the diverse urban contexts, our sample was stratified into five distinct areas: Rural (1), Low-Density (2), Mid-Density (3), Compact-Urban (4), and High-Density (5). The iconic Mall of Qatar served as a central collection point as well. Additional locations included bus stops, offices, bustling souqs, and the Qatar National Library, chosen for its role in ensuring equal access. This diverse approach sought to gather perspectives and insights from various demographics, demonstrating a dedication to inclusivity and a nuanced grasp of the local context. This commitment ensures the social inclusiveness of MaaS design, encompassing demographic traits and the geographical distribution of the population.

A total of 1098 responses were collected. To maintain a 95% confidence level with a marginal error and ensure a representative sample of the population, a minimum of 1068 respondents is required. The responses have been classified and presented in Table 4, organized by nationality, gender, age group, and area type.

Table. 4. Sample size distribution

No.	Category	Description				
1	Nationality	Non-Qatari (1)		Qatari (2)		
		877		191		
2	Gender	Male (1)		Female (2)		
		742		325		
3	Age Group	20-29 (1)	30-39 (2)	40-49 (3)	50-59 (4)	+60 (5)
		281	426	234	92	35
4	Area Type	Rural (1)	Low-Density (2)	Mid-Density (3)	Compact-Urban (4)	High-Density (5)
		31	293	163	120	460

Considering Qatar's population of 2.84 million and the exclusion of individuals aged 18 and below (who constitute 19% of the total population), the target demographic comprised the remaining portion of the population. Population distribution, geographic location, and access to transportation are key in shaping a successful MaaS subscription model. The dispersal of Qatar's population across various land use areas like residential, employment, and tourism significantly affects travel demand and, consequently, the need and reach of MaaS.

In the context of Qatar, where Qataris are a minority, the survey received 191 responses from Qatari nationals and 877 from non-Qataris, mainly Asians and Arabs. The gender distribution showed that 70% of respondents were male. The age distribution spanned five categories: 20-29 (281 responses), 30-39 (426), 40-49 (234), 50-59 (92), and 60+ (35).

The geographical context suggests that the engagement of Qatar's populace in MaaS and their preferences for subscription packages may be shaped by the urban environment. This includes factors like land use patterns, population density, availability of public transportation, traffic congestion, and the implementation of TDM policies. As a result, the study categorized its sample into three distinct urban classifications: high-density urban areas, urban zones with moderate density and well-established metro connectivity, and urban regions characterized by moderate density but limited accessibility to metro services.

The responses were geographically distributed across different areas: rural (31), low-density (293), mid-density (163), compact urban (120), and high-density (460). This diverse distribution highlights how socio-economic factors and urban density influence MaaS demand. Regions with high population or employment density can increase the demand for road services, driving the adoption of MaaS. By analyzing the aforementioned data, future MaaS demands and needs in Qatar can be evaluated, and the readiness of diverse demographic groups to adopt different modes within a MaaS framework can be understood.

5. Conclusion Remarks

In conclusion, this study on MaaS in Qatar holds the promise of substantially expanding our insights into the implementation of MaaS. The study aims to develop a comprehensive methodological framework that evaluates the influence of supportive transportation policies, including regulations and public transport organizations. It will also examine operational aspects like fare structures, aiming to enhance the overall efficacy of the transportation system. The implementation of MaaS in Qatar, along with specific TDM strategies, has significant potential to encourage sustainable transportation modes and attract a broader user base. To achieve these objectives, a detailed survey is designed, factoring in stakeholders' involvement, social inclusivity, cultural considerations, and advanced modeling techniques. This approach will aid in understanding users' willingness to pay and their preferences for MaaS packages. This study also incorporates stakeholders' considerations and viewpoints, ensuring that the developed MaaS solutions are inclusive and effective. The active participation of stakeholders in the planning process enhances the likelihood of adopting initiatives that align with their interests and concerns, thereby promoting sustainable mobility goals.

The survey design takes into account the socio-economic conditions and travel behaviors of respondents, providing an in-depth exploration of MaaS preferences in Qatar's unique demographic landscape. The survey focuses on how TDM measures might influence subscription rates and package selection in MaaS, with a specific emphasis on accommodating the Arabian culture and diverse stakeholder perspectives.The research methodology divides the sample across various urban contexts, such as rural areas and regions of varying population densities, to ensure a broad representation of opinions. This diverse approach highlights our commitment to inclusivity and a deep understanding of the local milieu.

By examining how urban factors like land use, public transport accessibility, and congestion levels, as well as TDM measures, affect MaaS adoption in Qatar, this research may offer valuable insights into fostering sustainable mobility in similar urban settings.

6. Study Limitation

The survey faced certain limitations that necessitated careful consideration. Firstly, it was exclusively conducted in two languages, potentially limiting inclusivity given the diverse demographic population of Qatar. A significant concern arose regarding the perceived length of the survey, resulting in participant fatigue and incomplete responses, particularly among individuals rushing through metro stations during commuting hours. Some respondents exhibited partial engagement, responding to only a portion of the survey, while others lacked a comprehensive understanding of the MaaS concept, especially during the initial explanation. Furthermore, engaging the local population proved challenging due to a notable lack of interest in participating in the survey. It is crucial to acknowledge that the first section of the survey, relying on Revealed Preference (RP) data, reflects current travel behavior. However, in the absence of implemented MaaS services in Qatar, it primarily captures existing transportation choices. These limitations emphasize the necessity for a nuanced interpretation of the survey results and caution in concluding future MaaS adoption in the region.

7. Way forward

The survey data holds the potential for constructing econometric models, specifically designed as discrete choice models, to enhance our comprehension of MaaS subscription usage. By leveraging this dataset, we anticipate discerning trends, evaluate the current market dynamics, and consider the regulatory framework's influence on MaaS design and implementation in Qatar. Additionally, the developed model will facilitate the identification of key determinants among MaaS users and relevant market segments. The integration of this model and analysis into decision-making tools empowers researchers and decision-makers to derive optimal solutions through informed, data-driven analysis.

Acknowledgments

This publication was made possible by NPRP grant # [NPRP13S-0130- 200211] from the Qatar National Research Fund (a member of Qatar Foundation). The findings achieved herein are solely the responsibility of the authors.

References

[1] Alyavina, E., A. Nikitas, and E.T. Njoya. (2020) "Mobility as a service and sustainable travel behaviour: A thematic analysis study." *Transportation Research Part F: Traffic Psychology and Behaviour* **73**: 362-381.
[2] Sochor, J., I.M. Karlsson, and H. Strömberg. (2016) "Trying out mobility as a service: Experiences from a field trial and implications for understanding demand." *Transportation Research Record* **2542**(**1**): 57-64.
[3] Mulley, C. and A. Kronsell. (2018) "Workshop 7 report: The "uberisation" of public transport and mobility as a service (MaaS): Implications for future mainstream public transport." *Research in Transportation Economics* **69**: 568-572.
[4] Canale, A., G. Tesoriere, and T. Campisi. (2019) "The MAAS development as a mobility solution based on the individual needs of transport users. in AIP conference proceedings." *AIP Publishing*.
[5] Baldassa, A., Ceccato, R., Orsini, F., Rossi, R., & Gastaldi, M. (2022). "MaaS Bundling and Acceptance in the Pandemic Era: Evidence from Padua, Italy." *Journal of Advanced Transportation*.
[6] Xu, W., G.-H. Lin, and X. Zhu. (2022) "Bundling Strategies for Ride-Hailing Platforms Based on Price and Service Level." *Journal of Theoretical and Applied Electronic Commerce Research* **17**(**2**): 851-874.
[7] Saxena, A. and V. Gupta. (2023) "Carpooling: Who is closest to adopting it? An investigation into the potential car-poolers among private vehicle users: A case of a developing country, India." *Transport Policy* **135**: 11-20.
[8] Caiati, V., S. Rasouli, and H. Timmermans. (2020) "Bundling, pricing schemes and extra features preferences for mobility as a service: Sequential portfolio choice experiment." *Transportation Research Part A: Policy and Practice* **131**: 123-148.
[9] Kandanaarachchi, T., J. Nelson, and C. Ho. (2022) "Building Trust and Collaboration Among the Stakeholders in a Mobility as a Service Ecosystem–Insights from Two Maas Case Studies." *Available at SSRN 4253442.*
[10] Pink, S., Smith, R.C., Fors, V., Lund, J., Raats, K., Osz, K., Lindgren, T., and Broström, R. (2021) "Mobility as a service through design: a human approach." *Advancing a Design Approach to Enriching Public Mobility* : 1-17.
[11] Polydoropoulou, A., Pagoni, I., Tsirimpa, A., Roumboutsos, A., Kamargianni, M., and Tsouros, I. (2020) "Prototype business models for Mobility-as-a-Service." *Transportation Research Part A: Policy and Practice* **131**: 149-162.
[12] Reck, D.J., D.A. Hensher, and C.Q. Ho. (2020) "MaaS bundle design." *Transportation Research Part A: Policy and Practice* **141**: 485-501.
[13] Shaaban, K. and A. Maher, (2020) "Using the theory of planned behavior to predict the use of an upcoming public transportation service in Qatar." *Case Studies on Transport Policy* **8**(**2**): 484-491.
[14] Newman, P.W. and J.R. Kenworthy, *The land use—transport connection: An overview.* Land use policy, 1996. **13**(1): p. 1-22.
[15] Audouin, M. and M. Finger. (2019) "Empower or Thwart? Insights from Vienna and Helsinki regarding the role of public authorities in the development of MaaS schemes." *Transportation Research Procedia* **41**: 6-16.
[16] Delponte, I. (2021) "Institutional and Non-Institutional Governance Initiatives in Urban Transport Planning: The Paradigmatic Case of the Post-Collapse of the Morandi Bridge in Genoa." *Sustainability* **13**(**11**): 5930.
[17] Li, Y. and T. Voege. (2017) "Mobility as a service (MaaS): Challenges of implementation and policy required." *Journal of Transportation Technologie*s **7**(**2**): 95-106.