

# Mobility as a Service: Exploring Feasibility and Travellers Preferences in an Emerging Economy

## Abstract

Mobility-as-a-Service (MaaS) is a novel concept in urban transport research that anticipates public transport's social, economic, and environmental impacts. Despite its potential, MaaS remains underexplored in developing countries, likely Pakistan. This study aims to evaluate the feasibility of MaaS and investigate travellers' preferences in Pakistan. The study's key objectives include designing MaaS products or bundles, identifying MaaS market segments, and estimating the demand or willingness to pay for MaaS products. To meet these objectives, the research undertakes mixed methods, such as qualitative and quantitative methods. Pursuing qualitative research, qualitative content analysis of nine focus group (FG) interviews was conducted with 6 participants from diverse backgrounds in each FG interview to gather textual data on transport modes and public transport characteristics to determine the MaaS attributes. The content analysis was guided by grounded theory, including axial coding, to develop themes leveraged to design the discrete choice experiments (DCE). DCE, one of the advanced stated preference methods, is the quantitative methodology this study has used to serve the study's primary aim of assessing feasibility and exploring the travellers' preferences for MaaS. DCE is a data-generation process that helps gather stated preferences data, relying on experimental design. Through designing an (efficient) choice experiment, we projected a hypothetical market for MaaS products with different combinations of attribute levels (called choice sets), each containing a set of mutually exclusive hypothetical alternatives (called profiles) which respondents are asked to choose their preferred one, to understand travellers' behaviour toward MaaS products. A set of MaaS product attributes with defined alternatives (profiles) takes one or more levels. The respondents' choices imply implicit trade-offs between the levels of the attributes in the different alternatives included in a choice set. Our stated choice experiment consists of 11 attributes (8 attributes with 2 levels and 3 attributes with 3 levels), including the MaaS package price, which was introduced to easily convert marginal utility estimates into willingness-to-pay (WTP) estimates for changes in the attribute levels. Using the choice experiment, a multidimensional choice dataset, along with travellers' socio-demographics, psychological and other latent variables (covariates), were collected from 624 respondents through a web-based Qualtrics survey. Each respondent was faced with ten choice tasks (MaaS product scenarios). Three major cities (Islamabad/Rawalpindi, Lahore, Multan) of Pakistan were selected to collect both qualitative and quantitative data. The conceptual framework for analysing the choices made in DCE is based on Random Utility Theory (RUT). For the empirical analysis of the choice dataset, yielding the estimates of traveller's utility and willingness to pay for MaaS products across different travellers' segments, advanced econometrics tools such as the Hierarchical Bayes-Multinomial Logit (HB-MNL) then Clustering was used as analytical tools. The study's findings indicate that the price of MaaS packages and transport modes significantly influence traveller decisions, with the Metrobus service emerging as a preferred option. Market segmentation reveals three distinct groups: price-sensitive, balanced decision-makers, and less price-sensitive consumers, each requiring tailored marketing and service customization.