Exploratory Factor Analysis of Service Quality Determinants: A Case Study of Urban Public Transport in Wroclaw, Poland*

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Abstract

The main aim of this study is to identify which quality attributes (latent factors) define the quality of urban public transport services, but are not directly measurable through questionnaire data. As no previous studies have been conducted in this area for Wrocław, the scope of the research was limited to MPK Sp. z o.o. (Municipal Transport Company, Ltd.), headquartered in Wrocław, which operates the majority of bus routes and all tram lines in the Wrocław metropolitan area.

The quality of public transport in Wrocław was measured as a latent construct, represented by 14 observable quality attributes. Exploratory Factor Analysis (EFA) was conducted to assess the structure of these attributes, and Principal Component Analysis (PCA) was employed to determine the number of underlying factors. Based on Kaiser's criterion two factors were extracted. Collectively, these factors account for 51.23% of the variance in the original variables. To align the factor structure with the observed variables, a Varimax normalised orthogonal rotation was applied. Each quality attribute was assigned to a factor based on its factor loading, with a threshold of 0.6 as the minimum value for inclusion. As a result, all 14 quality attributes were grouped under one of the two factors. The first factor accounts for about 43.35% of the total variance and captures how efficiently users are able to reach their destinations in terms of time. The second factor accounts for 7.89% of the variance and reflects the economic accessibility of different stakeholder groups.

Keywords: public transport, service quality, Exploratory Factor Analysis (EFA), Principal Component Analysis (PCA)