전통적인 4단계 교통수요 예측 모형을 활용한 교통망 분석 - 미얀마 만달레이시 중심으로

Analysis Transportation Network Using Traditional Four-step Transportation Modeling : A Case Study of Mandalay City, Myanmar

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Summary

The rapid urbanization and modernization observed in countries like Myanmar have led to significant concerns regarding traffic congestion, especially in urban areas. This study focuses on the analysis and revitalization of urban transport in selected areas of Myanmar. The core of urban transportation planning lies in travel forecasting, which employs models to predict future traffic patterns and guide decisions related to road capacity, transit services, and land use policies. Travel demand modeling involves a series of mathematical models that simulate traveler behavior and decision-making within a transportation system, including highways, transit options, and policies. The paper offers an overview of the traditional four-step transportation modeling system, utilizing a simplified transport network in the context of Mandalay City, Myanmar.

Keywords : Urbanization, Traffic congestion, Travel Forecasting, Transportation Modeling, Myanmar

1. Introduction

The increasing population, economic growth, and urbanization in cities worldwide have heightened the need for improvements in highway infrastructure due to significant land transportation challenges. Traffic congestion in many regions has led to adverse environmental, social, and economic consequences, underscoring the vital role of an efficient transportation system in metropolitan areas. Urban transportation planning involves essential activities aimed at facilitating the movement of people and goods, with the estimation of transportation demand being a critical aspect. The commonly used four-step urban transportation modeling system is discussed, covering trip generation, trip distribution, modal split, and trip assignment, with a focus on how Origin-Destination surveys, including home interviews, are used to gather data. The study delves into the challenges of public transportation in Asian developing nations, particularly in major areas of Myanmar, a country with complex geography and significant trade importance, providing detailed economic and demographic context for Mandalay as an illustrative example.

2. Method

The Household or Home Interview Survey was employed as the primary data source for conducting an origin and destination (O-D) survey, aimed at providing essential insights for addressing traffic issues and formulating medium- to long-term transportation policies. Typically, traffic surveys offer fundamental data for the analysis of the current traffic situation and serve as the foundation for predicting future traffic demand. The collected data is valuable for analysts in calculating annual average daily traffic (AADT) volumes, which can be compared with the model's allocated volume in step four to validate the model's accuracy. Additionally, this data aids planners in identifying any existing challenges within the transportation network. To

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model public transportation demand in the study areas, the Household or Home Interview Survey was chosen as the most appropriate data source. This survey serves multiple objectives, including establishing the socioeconomic characteristics of the study area residents, obtaining insights into their travel patterns, and establishing correlations between trip-makers' socioeconomic attributes and their travel preferences, allowing for disaggregated analysis by factors such as gender, age, and income. Table 3.1 presents a structured organization of the household survey data, categorizing it into socioeconomic characteristics, travel patterns, and trip-specific details.

Table 1. Survey Items of Person Trip Survey

Item		Content
Socio economic information	Form1: Household Information	Household Composition Housing Information Household Income Household Socio-economic Status Vehicle Ownership
	Form2: Household Member Information	Age, Gender, Education, Occuption, Income Vehicle Availability
Trip information	Form 3: Daily Activity Information	Trip Purpose(including pick-up/send-off) Origin/ Destination, Departing/ Arriving Time, Transfer Point Travel Mode Travel Time, Cost, Fare

3. Conclusion

The study involves the use of various models to analyze and predict transportation patterns in the study area. For trip generation, independent variables such as average income, average household size, and average car ownership are considered, while the number of trips serves as the dependent variable. Regression analysis, specifically using the Linest formula, is applied to obtain the coefficients for the trip generation model. In the modal split model, a multinomial logit model is used to calculate mode choices based on factors like average income, travel time, and travel cost. The assignment model involves defining links and nodes for the study area and incorporates factors like trip interchange matrices and traffic counts to determine link travel times and identify congestion in the transportation network.

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