Modelling of Behavior Patterns for Work and Service Trips of Residents of Tehran

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Extended Abstract

Introduction

Modeling for explaining complex patterns of behavior of urban residents can address the analysis and description of many urban issues. It can be used in broad sectors of urban planning that need to analyze the current situation and predict future behavioral patterns of population. Because of the complexity of economic activities and social structures in Tehran, any urban planning for the future requires precise analysis of behavioral patterns of residents in this city in connection with determining residence and services as the major human activities.

Models of travel distribution between regions are mathematical formulas of distributed trips based on various assumptions and some regularity observed during the trip length frequency. In these models, the purpose is to analyze distribution of trips between pairs of source-destination. Due to incapability of travel forecasting models such as spatial interaction models, the need for models to predict behavior is reasonable in predicting travel behavior patterns and those social and economic differences between source-destination travel. In this study, the Choice Model (type of Multinomial logit model) is employed for modeling the business patterns of and services trips behavior amongst of residents of Tehran in order to understand and analysis the complexities of these trips on various influencing factors.

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Methodology

The purpose of this paper is to model behavioral patterns of the work and services travel for residents of twenty-two districts of Tehran through.

Thus, the work-to-home and home-to-service models of selection-type model (multiple logit model) were constructed the maximum likelihood method.

After creating many work-to-home and home-to-service desirability functions, their parameters and final coefficients of their variables are made based on multiple Logit model and work-to-home and home-to-service trips in Tehran or using maximum likelihood method, in which the final desirability function is produced. The statistical analysis and producing symptom parameters and variable coefficients for built desirability functions, the modeling accuracy and precision in the reconstruction of observed business trips and services in Tehran are analyzed by linear regression function.

Results and Discussion

All variables for work-to-home utility function, u_{ij}^{wh}, and home-to-service utility function, u_{ij}^{hs}, which are the results of modeling in equations 9 and 10 are highly significant in t-statistical value and its zero test is rejected with more than 99% probability. Also, all estimated parameters are marked as expected. Fitness index for these models is estimated by linear regression coefficient. Linear regression functions, 13 and 14 represent compliance rate of work-to-home and home-to-service estimated models relative to corresponding observations in the modeling range (Tehran). As shown in Figure 1 and 2, distribution and diviation of points from the 45–degree line is relatively low. In Table 11, it can be seen that the accuracy of work-to-home and home-to-service models in the reconstruction of observations is adequate and Linear regression coefficients, R_{wh}^2 and R_{hs}^2 are *0.885* and *0.940*, respectively. t–statistical value for b, is respectively (*60.923*) and (*86.580*), at significant level $\alpha = 0.01$, with degree of freedom equal to $d.f = 483$, ($t_{0.01} = 2.326$) such that it is significantly large and; then its zero test is rejected. Also, t–statistical value for a, is respectively (*3.224*) and (*1.822*) at a significant level $\alpha = 0.01$, with degree of freedom equal to $d.f = 483$, ($t_{0.01} = 2.326$), such that is small and meaningless; then its zero test is not rejected. In addition, the distribution represents the significance of regression coefficient R_{wh}^2 and R_{hs}^2 between estimates and observations; hence, the simultaneously zero test for a and b is rejected. Therefore, a is not zero, but too small.

Conclusion

In this paper, behavioral patterns of work and service trips for residents of twenty-two region in tehran were modeled and processed by creating work-to-home and home-to-service multinomial-logit-type models using maximum-likelihood method. These model could explain the behavioral patterns of work and service trips of Tehran residents and predicted of future pattern.

Keywords: Multinomial Logit Model, Work -to- Home Model, Home -to- Service Model, Maximum Likelihood Method, Utility Function, Tehran.