

学位論文の要旨 (論文の内容の要旨)
Summary of the Dissertation (Summary of Dissertation Contents)

論 文 題 目

Dissertation title

Understanding Interdependency Between Residential and Travel Choice Behavior in the Context of a Developing City

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While urbanization and motorization can have positive economic effects, they have also brought numerous negative externalities such as air pollution, traffic congestion and overuse of energy. To mitigate such negative influences, it is important to understand the interdependence between urbanization and motorization, particularly in cities in developing countries. From the perspective of demand side, such interdependence can be partially explained as the interdependence between people's residential and travel choices. Therefore, understanding the link between people's residential and travel choice may give insights into urbanization and motorization. In the transportation field, researchers have long been interested in how to influence people's residential and travel choices towards more environmentally-friendly choice behavior through land use and transport policies. Generally, people's choice behavior is affected by not only objective factors (e.g. land use patterns and level of transport services) but also subjective factors (e.g. attitudes, learning experience and expectations). To show the true influences of land use on people's residential and travel choices, such subjective factors should also be taken into account. Taking such subjective factors into account, this study aims to depict several possible interdependencies between residential and travel choices in the context of developing countries. Generally, people in developing countries face more internal constraints (e.g. income) and external constraints (e.g. housing and transport supply) in the context of residential and travel choice than people in developed countries. However, the change in socio-economic conditions, housing and transport supply in developing countries is fast. In the context of developing countries, it is hypothesized that:

- People's self-selection regarding residential and travel choices may vary across different income groups (i.e. target groups) because different income groups may face different internal and external constraints. Additionally, self-selection effects may vary over time due to the change in: i) people's life situation and attitudes, and ii) external constraints (i.e. housing and transport supply).
- People's choice behavior may be not back-ward looking but also forward-looking.

In this study, hence, we focus on two main parts: i) self-selection effects and ii) the influences of future expectation and state dependence. The current study consists of 7 chapters with the following contents. Chapter 1 contains the background, research motivation, research objectives and questions, and outline of the thesis. Chapter 2 reviews existing studies regarding self-selection, state dependence and future expectations in the field of travel behavior. Several aspects related to methodology, behavioral viewpoints, new approaches and the context of this study will be described, followed by information on the surveys and data used. The study draws on two sources of data relating to people's residential and travel choice. First, a large-scale household interview survey was conducted in Hanoi in 2005 by the Japan International Cooperation Agency (JICA, 2007). Secondly, a small-scale household interview survey was carried out in Hanoi in 2011 by Hiroshima University Transportation Engineering Laboratory (HITEL) in close cooperation with Hanoi University of Transport and Communications (UTC). Information regarding the survey design, study area, data collection procedure, and descriptive statistics of data are described in this chapter.

Chapter 3 examines the existence of self-selection across different groups of workers. Generally speaking, knowledge-intensive workers are medium-and-high income, while labor-intensive-workers are low income. Coinciding with economic growth in developing countries, there may be a shift in the structure of the labor market from the dominance of labor-intensive workers to the dominance of knowledge-intensive workers, leading to changes in their transport-land use systems. Here, it is assumed that labor-intensive workers may be less able to self-select because they face more economic constraints. In other words, the influences of self-selection may vary across different groups of workers. Focusing on commuting for work purposes, integrated models of residential location, work location and commuting mode for both groups of labor-intensive and knowledge-intensive workers are developed. The interdependencies between these three choices are captured by using common random terms in utility functions. Notably, such common random terms may include individual- or household-specific unobserved factors (e.g. lifestyle and attitudes) that impact people's sensitivity to both location and travel choices. In a sense, common random terms may partially control for self-selection effects. These models are empirically tested with the large-scale data collected in Hanoi in 2005. As a result, the statistical significance of multiple self-selection effects caused by unobserved factors is confirmed, suggesting that the joint estimation of the above three choices is a useful approach. Moreover, the analysis shows that self-selection effects caused by unobserved factors seem to be more influential in knowledge-intensive workers' choices, while socio-demographic factors seem to be more influential in labor-intensive workers' choices. As for land use attributes, different types of households, and labor-intensive and knowledge-intensive workers, show different responses to different types of land use in location choices, especially for the work location choice. Effects of land use diversity and population density on the commuting mode choice are mixed. Additionally, the geographic centralization of knowledge-intensive employment and decentralization of labor-intensive employment are captured. These findings may be useful for city planners in Hanoi in designing land use patterns in the future.

Following Chapter 3, Chapter 4 investigates the dynamics of self-selection effects by assuming that people's life situation and attitudes will vary over time. Additionally, external constraints may be reduced over time due to economic growth and improvements in housing and transport supply. In Hanoi, urbanization and motorization in the 1990s and 2000s were characterized by urban fringe development and the rapid growth of motorcycle ownership. This phenomenon may be partially explained as outcomes of household urban fringe and motorcycle ownership choice. Hence, this chapter first examines the relationship between motorcycle ownership and urban fringe choice. It then builds a joint analysis of car ownership and urban fringe choice. As in Chapter 3, this chapter uses common random terms that partially control for self-selection effects due to household-specific unobserved factors. Furthermore, the dynamic self-selection is controlled for by parameterizing the variance of common random terms as a function of time. The proposed models are then empirically tested with the small-scale data collected in Hanoi in 2011. The results showed that the parameter of "time" variable is statistically significant. This implies that unobserved self-selection effects have varied over time. In other words, the interdependence between urban fringe development and motorcycle ownership has been strengthened. Adding to this, the joint model of urban fringe choice and car ownership choice was tested. The estimated parameter of "time" variables is also negatively statistically significant, indicating that the interdependence between urban fringe development and car ownership has been decreasing.

To understand the influences of state dependence and future expectations, Chapter 5 describes the development of a combined Revealed Preference-Future Expectation Pair Combinatorial Logit model based on people's residential location choice behavior. The influences of state dependence are captured by adding dummies of current choices in the utility functions of future choices. In contrast, the influences of future expectations are captured by adding dummies of future choices in the utility functions of current choices. The proposed model is empirically tested with large-scale data collected in Hanoi in 2005, and it is statistically confirmed that current choices and expectations about future choices mutually influence each other. Specifically, it is found that 26%-55% of the total variance of current residence utility can be explained by expectations about future choices, and 56-99% of future expectations can be captured by current choices. These findings suggest that future expectations cannot be ignored in the analysis of residential location choice behavior.

To further confirm the influences of state dependence and future expectations, Chapter 6 analyzed small-scale data using the life-course survey conducted in Hanoi in 2011. First, a data mining approach is applied to analyze mobilities in residential location and vehicle ownership. As a result, it was found that the most important predictor of residential mobility in the target year is the residential mobility made in the next five years. Regarding motorcycle ownership mobility, the most influential factors are household structure, and employment and education biographies in the target year, followed by household structure biography, employment and

education biography, and motorcycle ownership biography in the next five years. All these findings suggest the importance of future expectations in explaining residential and motorcycle ownership over the life course in the context of developing countries. Notably, car ownership is only influenced by motorcycle ownership in the past, but not by other mobility biographies.

The present study ends with Chapter 7. In this final chapter, conclusions, policy implications and limitations to the research are presented, as well as some suggestions for future research.

備考 論文の要旨はA 4判用紙を使用し、4,000字以内とする。ただし、英文の場合は1,500語以内とする。

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