PASSENGER BEHAVIOR AND OPERATOR ANALYSIS BETWEEN HIGH-SPEED RAILWAY AND AIRLINE IN THAILAND

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Abstract: In the future of inter-city transport in Asia region, it has only two competitors between High-Speed Railway and Airline that can be reach satisfy of passenger in travelling time, cost-benefit, and comport. This research will conduct by using Multinomial Choice Logistic and Discrete Choice Model to analyzed passenger model choice. The result of research will be fulfilling vision of development of High-Speed Railway in Thailand.

1. INTRODUCTION

In an inter-city transport sector, passenger has many choices to use satisfy and suitable transport to reach them destination. In practically from short to long distance to travelling, Airline and High-Speed rail (HSR) seem to be a suitable choice with time-distance compromised (figure 1.1). In the future of inter-city transport in region, they are only two competitors that can be reach satisfy of passenger in travelling time, cost-benefit, and comport. The major kind of infrastructures for the Asia regional development is transport development.

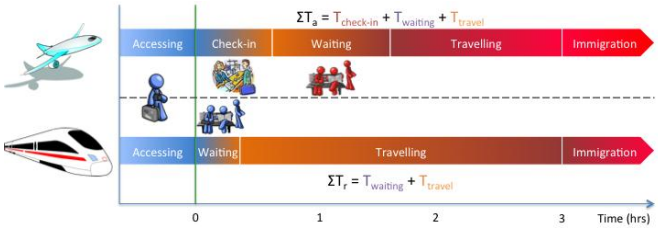

Fig.1.1 *Comparison of an ideal travelling time*

Social mobility is an important part of people moving from place to place, attractive tourisms, and spread developing to deeper land. In future of regional, ASEAN Economic Community (AEC) has an effected to increase traveling demands from business trips, tourism industries, and emigrates. And Thai's government already agreed with China to investment for North-Eastern and Southern lines (figure 1.2). For the Northern and Eastern lines was interested by Japanese investment.

This research was conducting under supposing many Thai people want to travel by HSR, because after region economic blooming, many countries in ASEAN dream and planning to construct a high-speed rail.

2. METHODOLOGY

This research trying to created utility model from Multinomial Logistic Model (MNL) and examining a relationship between general costs of passenger, total travelling time, and quality of services that directly affected to transport mode-choice (v).

The data for estimate model was provided by questionnaire. It was obtained personal information such gender, occupation, income, transport mode choice for modeling.

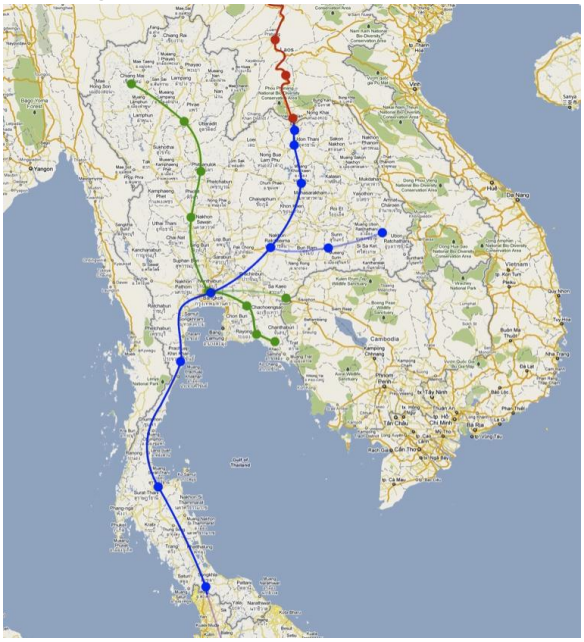

Fig. 1.2 *Network Plan of High-Speed Rail in Thailand*

2.1. MULTINOMIAL LOGISTIC MODEL

The mathematical form of a discrete choice model is determined by the assumptions made regarding the error components of the utility function for each alternative, which gives the choice probabilities of each alternative as a function of the systematic portion of the utility of all the alternatives. The general expression for the probability of choosing an alternative k from set of all alternatives is:

$$\Pr(k) = \frac{e^{U_{ki}}}{\sum e^{U_{kj}}} \quad (1)$$

Where: $\Pr(k)$: Probability of choosing alternative ki

U_k : Component of Utility of alternative k

2.2. UTILITY MODEL

The utility maximization rule states that an individual will select the alternative from his/her set of available alternatives that maximizes his or her utility. The general expression of Utility function of alternative k is described as follows:

$$U_k = \sum \beta_i V_i \quad (2)$$

Where: β_i : Parameter of variable i for alternative k

V_i : Variable I for alternative k

ε : Constrain for Utility function

2.3 PARAMETER ESTIMATION

The one of popular methods for estimate parameter of model is Maximum Likelihood Method. The general expression is described as:

$$L = \prod_{n=1, i \in S_n} \prod \Pr(k) \quad (3)$$

$$LL = \log(L) \quad (4)$$

By maximize value of L by take logarithm function; the equation will be return fitness of parameter β for each variable.

3. EXPERIMENT

3.1 PASSENGER CHOICE

From section 2, the passenger will choose the appropriated transport mode from operator performance such fare and quality of service.

The utility model will be described as:

$$U_k = \beta_c C_k + \beta_t T_k + \beta_f F_k \quad (5)$$

Where: β : Parameter of each variable

C_k : General cost of passenger of mode k

T_k : Total travel time of mode k

F_f : Frequency of service of mode k

The passenger choice will be conducting like probability function as:

$$x_k^{OD} = \frac{e^{U_k(C_k^{OD} T_k^{OD} F_k^{OD})}}{\sum e^{U_k(C_k^{OD} T_k^{OD} F_k^{OD})}} \quad (6)$$

And flow of boarding passenger in each transport mode is:

$$v_k^{OD} = x_k^{OD} V_k \quad (7)$$

Where: x_k^{OD} : Boarding ratio for mode k

v_k^{OD} : Number of Boarding for mode k

V_k : Total passenger in OD/market

3.2 OPERATOR PROFIT

The profit of operator will measure successful of each operator and help them to manage them own firm. Not only operator is use these result, transportation authority should be mine for change a regulation in future.

The revenue from OD route for each operator can be obtained as,

$$R_k = v_k^{OD} p_k^{OD} \quad (8)$$

The total revenue of both operators can be obtained as,

$$R = \sum v_k^{OD} p_k^{OD} \quad (9)$$

where: R_k^{OD} : Each operator's revenue

v_k^{OD} : Transit fair (10)

The profit form OD route for each operator can be obtained as,

$$P_k = R_k^{OD} - O_k^{OD} F_k^{OD} \quad (11)$$

where: P_k : Each operator's profit

O_k^{OD} : Each operator's operating cost

F_k^{OD} : Each operator's fixed cost

4. CONCLUSION

Initially, the research is tried to illustrate relationship between HSR, Airline, and passenger with respected to regional economics. The purposed model represents each relationship of passenger choice and each performance of operators when the High-Speed Railway is come to operate in Thailand. It was a directly effect to same class of inter-city transport such as airline. The transportation authority will concern to deregulation in inter-city of transportation.

5. REFERENCE

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