第Ⅳ部門

Study on Optimal System Design for Bus Rapid Transit in Vientiane Capital, Lao PDR.

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1. Introduction

Vientiane is a small city with approximately 588,000 residents (estimated 2007). However, traffic congestion has already become one of serious problems. This is due to the increasing of private vehicle usage such as passenger cars and two-wheel vehicles. Accident on the roads is also increasing, which most of the cases involved with 2-wheel vehicle and passenger cars. The above-mentioned problems can possibly be solved if the bus service is improved by providing efficiency and effectiveness. In this study, Bus Rapid Transit (BRT) is introduced in order to serve as the main public transportation on appropriate existing road infrastructure for commuting, school travel and other visiting purposes on the main road between Urban districts and Centre Business District with its special characteristic of providing elements: exclusive lane, better quality of buses and station, higher speed and safer and more attractive transit with Intelligent Transport System. This research therefore attempts to study an optimal system design of BRT. Two main routed were selected (figure 1): Route A, where there are large communities and high demand of travel including from Central station to Thong Pong station. Route B was from Central to Dongdok (National University) for the total length of 24.2 km.

2. Methodology

Since the main purpose of this research is to determine an optimal BRT system and element design. Therefore, the objective functions set forth takes into account three perspectives: the passengers, the transit agency and the community. A good BRT route is defined as an attractive one from all the three perspectives. Four objective functions were set: the first straightforward objective is to minimize the total waiting time of the passengers. This is strictly the perspective of passengers. The second objective is to minimize the total unused seat capacity as to allow for a more viable BRT service. This is strictly the perspective of the transit agency who wishes to see more usage of the available BRT seats. The third objective is to minimize the total comparison between the BRT route and its best competitor, which is usually the private car,



Figure 1: Map of Study Area

motorbike and so on. This objective represents the perspectives of the government and the BRT passengers. The fourth objective is to minimize the number of BRT vehicles to carry on the determined frequencies (timetables). This is strictly the transit agency perspective who wishes to perform all the BRT trips using the minimum number of vehicles.

The flow of this study is conducted in 6 steps: determine combinations of BRT elements based on the setting of combination, access cost for each combination, obtain feasible and budget compliant of all combinations, evaluate all feasible combinations, evaluate all feasible combinations, conduct multi-objective planning analysis of the selected feasible combinations with respect to the cost-effectiveness, and finally select optimal system and element design for BRT. One of the most important parts of this study is the evaluation measure of system optimization. Cost-effectiveness categories are used for evaluation: reduced accident costs, time cost saving for current transit riders, reduced costs for new transit riders and reduced air pollution costs



Figure 2: Demand for BRT System if Operated



Figure 3: Reasons for Riding BRT



Figure 4: Reasons for Not Riding BRT

3. Survey and Results

In order to make the ridership prediction, questionnaire was developed; the person trip survey and related preference survey were carried out in the study area during February 2008. The target groups were made to large scale of employees, students and so on. 759 samples of 800 distributed were collected with the total males and females of 448 and 311 respectively. Three survey points have been conducted: the National University, Offices around the CBD and on-board survey.

Some analysis based on stated preference has been made and the results are: 64% of the samples will choose to ride BRT, about 5% will not use and the rest of 31% may use the BRT (figure 2). The main reasons for using BRT is for saving in economy, then if the frequency of service is offered and to avoid accident for 35.7%, 19.3% and 17.5% respectively (figure 3). The main reasons for not using BRT are owning of private automobile as this importantly referred to social status, if BRT station is far from home, and if the service is not frequent for the percentage of 33.6%, 25.8% and 23.5% respectively (figure 4).

4. Conclusions

From the result of survey, it tends to show that the implementation of BRT system is feasible as there are high correspondent percentages of demand. For further study, an optimization of system design will be made based on the setting of feasible element

combination, travel demand which obtained from the survey and the use of multi-objective planning model to analyze cost-effectiveness of each element combination and finally obtain optimization of the most suitable system of BRT for Vientiane Capital.