

Study on Social Experiment of Bus Rapid Transit (BRT) Introduction in Vientiane Capital, Lao PDR

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Vientiane is capital city of Lao PDR. The estimated population is about 787 thousands in 2011.

JICA has been supporting Vientiane's effort to realize public transport oriented city such as formulating Master plan of Vientiane Capital, provision of 42 new buses, and conducting technical cooperation.

In December 2011, JICA and KEI, in close collaboration with Yokohama National University, Yokohama city, and major Japanese bus operators commenced the technical cooperation project named "Enhance the Capacity of Vientiane Capital State Bue Enterprise". During the project period, we have conducted the social experiment of Bus Rapid Transit (BRT) system in June 2013.

Key Words : *Bus Rapid Transit(BRT), Laos, Official Development Assistance (ODA), Social Experiment*

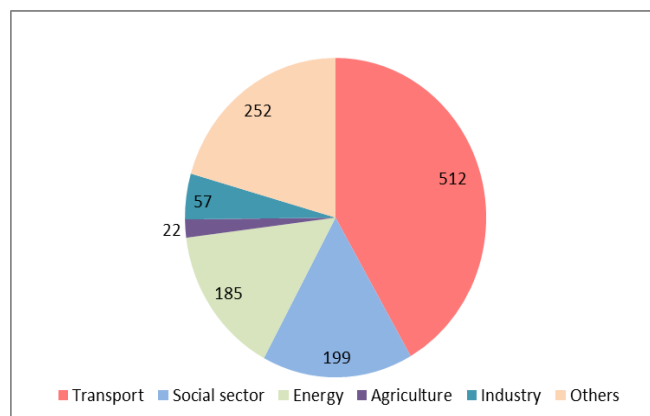
1. INTRODUCTION

JICA is a responsible agency for Japan's Official Development Assistance (ODA) program. In October 1, 2008, ODA Loan program and Grant Aid program were integrated to JICA and it becomes world largest bilateral donor agencies. Three cooperation scheme, Technical Cooperation program, ODA Loan program and Grant Aid program are managed under one organization and Japan's ODA is expected to be more efficient and more harmonized way to meet the development partner countries' demand.

Transportation sector such as road, railway, is one of JICA's major active field. For loan aid, more than 40% were allocated in the sector in 2012 as shown in Fig. 1. Many developing countries are facing challenges such as lack of appropriate infrastructure facilities, human resources, budget, and laws and regulations.

One of JICA's feature is to cover whole stages from planning stage, implementing stage, and operation and maintenance (O&M) stage by using above three cooperation schemes.

Fig. 1 Distribution by sector in 2012 (Loan aid committed amounts in billion JPY)



2. JICA'S COOPERATION TO URBAN TRANSPORT SECTOR IN VIENTIANE

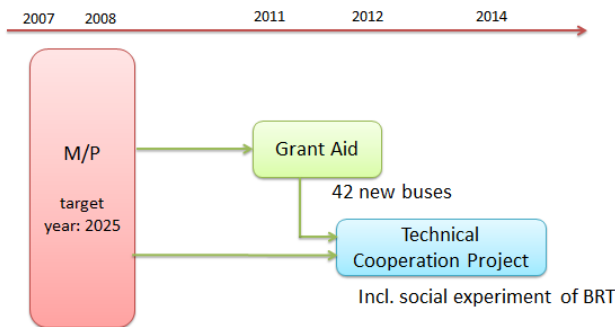
Vientiane Capital, the capital city of Lao PDR has facing rapid urbanization and mortarization. Estimated number of population was 787 thousand in 2011 and it will reach to one million near future. Number of registered car is 365 thousand in 2009. This number is more than triple compared with 113 thousand in 2000. Most of Public bus in Vientiane

are operated by Vientiane Capital State Bus Enterprise (VCSBE), that is 100% state own enterprise. However due to over-aged vehicle, decreased number of operational buses, etc, number of passenger was dropped to 2.8 million in 2009 from 7.6 million in 2002.

In order to realize public transportation oriented mobility and make sustainable city, Ministry of Public Work, Vientiane Capital, and VCSBE considered improved and efficient public bus services should be provided to the citizenz and they decided to apply for Japan's ODA program.

JICA has been cooperating urban transport sector in Vientiane since 2007. Following formulating urban transport masterplan, grant aid project for providing 42 new buses as well as technical cooperation project named "Enhance the Capacity of Vientiane Capital State Bue Enterprise" were commenced. Sequence of JICA's cooperation in Vientiane is shown in Fig.2.

Fig. 2 Sequence of JICA's cooperation in Vientiane



3. SOCIAL EXPERIMENT OF BRT

(1) Objectives

JICA has conducted social experiment of BRT as one of components of the technical cooperation project.

The objectives are as below.

- 1) To reduce bus travel time during peak hour,
- 2) To grasp problems for introducing BRT priority lane, and
- 3) To evaluate impact of social experiment

(2) Outline of the experiment

Date: June 17 to 21, 2013

Time: 7:00 am to 8:30 am

Bus lane: one inbound bus exclusive lane converted from outbound lane

Inbound bus route: From Friendship bridge (FSB) to Central bus stop (CBS) route with bus lane and alternative new road as shown in Fig.3

Outbound bus route: From CBS to FSB via orig-

inal bus route as shown in Fig.4

Fig. 3 Inbound bus route

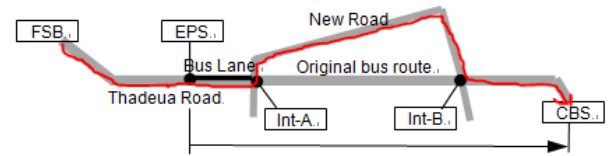
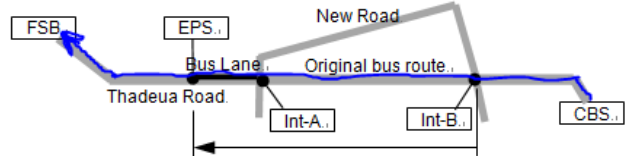
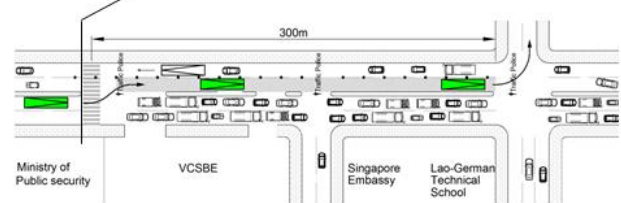


Fig. 4 Outbound bus route



On Thadeua road, a 300m bus priority lane is installed during morning peak hours from 7:00 am to 8:30. The road has two inbound and two outbound lanes, however during the experiment period, one outbound lane is converted to bus priority lane. It means that the road becomes three inbound and one outbound lanes as shown in Fig.5. Furthermore, in order for inbound bus to avoid traffic congestion section on original bus route, alternative new road is designated as bypass road.

Fig. 5 Bus priority lane



(3) Result of traffic count survey

In order to evaluate the effect and influence of the bus lane installation which is converted from one outbound lane, the cross-sectional traffic volume survey is conducted.

- Morning peak period of inbound is around 8:00 a.m. The total of inbound traffic for one hour from 7:15 to 8:15 during the experiment is 2,880 cars.
- On the other hand, outbound volume did not exceed 300 except traffic volume of 8:30-8:45. It is assumed that once bus priority lane has returned to original lane, stucked outbound traffic has becomes smooth traffic flow.
- Difference of the traffic volume of inbound and outbound from 7:45 to 8:00 is more than 3 times.

Fig. 6 Inbound traffic volume

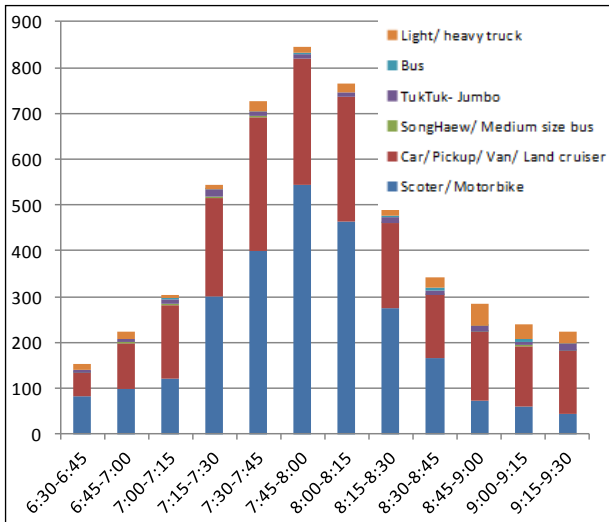
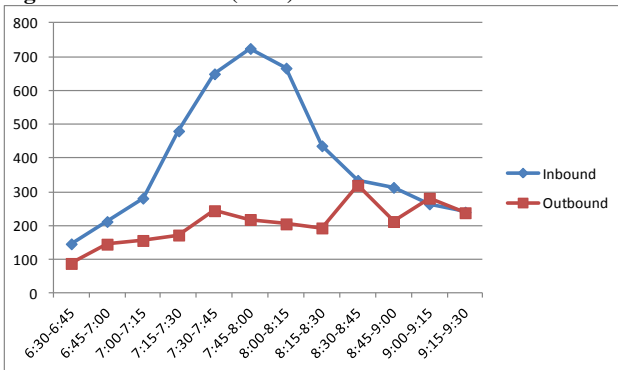


Fig. 7 Traffic volume (PCU)



(4) Result of travel time survey

In order to evaluate the effect of bus priority lane and alternative road, both inbound and outbound buses are counted. We also conducted “without” case as baseline.

Table 1 Inbound Travel time (without bus lane)

Survey date.	Departure time from FSB.	Passage time at EPS.	Arrival time ↓ at CBS.	Travel time from EPS to CBS.	Number of loading passengers at EPS.
June 10 (Mon).	7:35 a.m.	8:05.	8:20.	15 min.	15.
11 (Tue).	7:35 a.m.	8:05.	8:21.	16 min.	29.
12 (Wed).	7:35 a.m.	8:02.	8:15.	13 min.	22.
13 (Thu).	7:35 a.m.	8:06.	8:21.	15 min.	26.
14 (Fri).	7:35 a.m.	8:07.	8:21.	14 min.	29.
Average.				15 min.	24.

Table 2 Inbound Travel time (with bus lane)

Survey date.	Departure time from FSB.	Passage time at EPS.	Arrival time ↓ at CBS.	Travel time from EPS to CBS.	Number of loading passengers at EPS.
June 17 (Mon).	7:35 a.m.	8:11.	8:22.	12 min.	34.
18 (Tue).	7:35 a.m.	8:05.	8:15.	11 min.	12.
19 (Wed).	7:35 a.m.	8:06.	8:16.	10 min.	17.
20 (Thu).	n/a.	n/a.	n/a.	n/a.	n/a.
21 (Fri).	7:35 a.m.	8:04.	8:12.	8 min.	26.
Average except June 20.				10 min.	22.

• The inbound travel time reduced from 15 minutes to 10 minutes in average.

- However number of passenger did not increase compared with “without” case.
- At the section of 300m bus priority lane, average time reduced 1.17 minutes to 0.66 minutes, however bus driver tended to operate slowly on the bus priority lane since the lane has separated by only tentative road cone and road width was not enough.



Photo1 : Bus priority lane and road cone



Photo2 : Inbound bus on the bus priority lane

(5) Findings and issues

1) Decrease of intersection capacity

At the intersection, road cones were installed before the intersection in order to prevent outbound cars enter into bus priority lane. However it forced even left turn car to use side-walk lane and it caused traffic congestion and less intersection capacity. On and after the following day, road cones were removed and left turn car were allowed to use center lane.

Fig. 8 Decrease of intersection capacity (1st day)

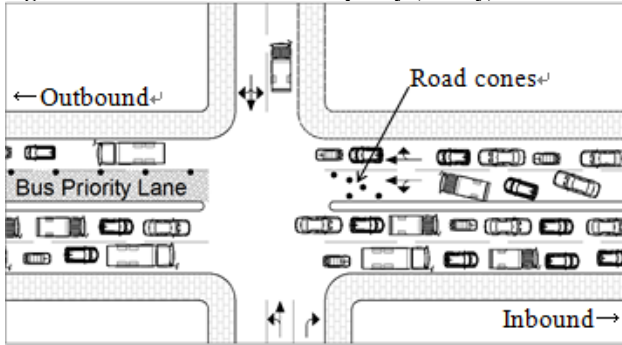
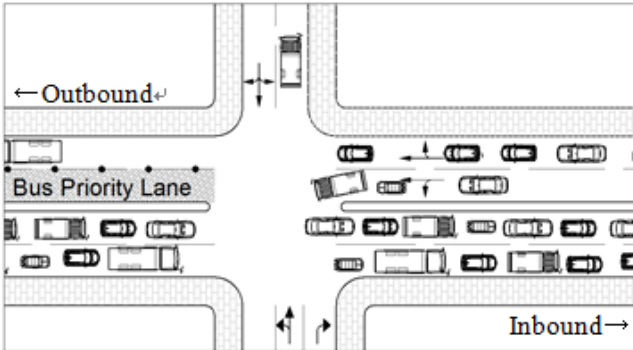


Fig. 9 Decrease of intersection capacity (following day)



2) Decrease of traffic speed

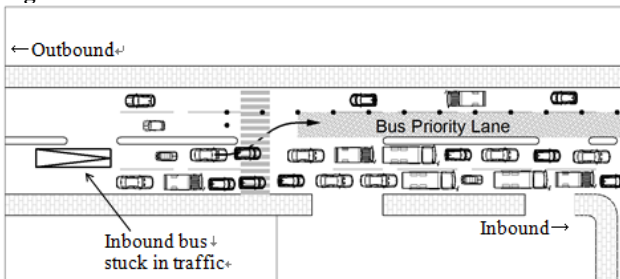
Due to convert one outbound lane to bus priority lane, all outbound vehicles had to use only one lane. When a slow speed vehicle ran, following vehicles were forced to adjust the low speed since they could not pass the slow vehicle.

3) Length of bus priority lane

During the peak hours, a line of clogged cars became longer than the length of the bus priority lane. Therefore, the inbound bus was stuck in traffic for several minutes before entering into bus priority lane. If the bus lane is extended, the required time of inbound bus can be shortened further.

As for the bus lane extension, comparison between benefits for the inbound bus and a negative impacts for outbound bus should be taken into account.

Fig. 10 Length of bus lane



4. CONSIDERATION

- An effect will become bigger if a bus lane is extended. However, traffic congestion of outbound may become severe.
- In this experiment, the operation interval of the bus was every 15 minutes. The bus lane has the capacity to accept more frequent bus operation, without increasing the road to outbound.
- In order to increase the effect of a bus lane, measures for modal shift from private car or motorcycle to public bus use need to be considered.
- For further BRT social experiment implementation, followings are to be discussed. (a) target road selection, (b) traffic survey analysis, (c) type of BRT/Bus priority lane, (d) consensus among relevant organizations and citizens, (e) capacity development of relevant organizations to continue introducing BRT/Bus priority lane.
- Regarding above (c), there are two kinds of bus lane/bus priority lane that could be introduced in Vientiane Capital. There are (a) changeable center lane, (b) fixed bus lane during peak hour. From the viewpoints of various criteria such as efficiency, cost, safety, sustainability, JICA will recommend type (b) to Vientiane Capital.

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