

ANALYSIS ON MODE CHOICE AND USER PREFERENCES OF GOVERNMENT OFFICIALS TO PUBLIC TRANSPORT IN VIENTIANE LAO PDR

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In Vientiane, the capital city of Lao PDR, public transport (PT) ridership has been decreasing in recent years due to a low level of service, causing a negative perception of PT from the general public. As a result, the use of private vehicles has steadily been increasing. This has caused congestion during the morning and evening peak hours in the CBD area, where due to a high concentration of workplaces of government offices, the number of officials commuting by private vehicles is particularly high. Under this context, the promotion of PT use within government officials is considered a first step in reversing the current trend in mode choice. However, a study of mode choice and preferences of government officials regarding PT in Vientiane has not been carried out before. Thus, the main objective of this study is to identify the characteristics that influence the mode choice of government officials in Vientiane and reveal their preferences related to PT. The study uses person-trip data containing a sample of 4,700 households collected in 2019 by The Project for Institutional Capacity Building for Sustainable Urban Transport System in Lao PDR, a technical cooperation project funded by JICA (Japan International Cooperation Agency). From the analysis, it was found that the majority of government officials that are current PT users have a low monthly household income, do not receive commuting allowance nor have a driving license, and do not have access to private vehicles or private vehicles within the household are not available for their use. Furthermore, improvements in comfort, fare price, and punctuality of the bus service, in addition to the management of parking in the city, would shift government officials away from using private vehicles in favor of PT.

Key Words : *public transport, mode choice, user preference, government officials, modal shift*

1. INTRODUCTION

Economic growth, rapid urbanization, and im-

provement in the quality of life in developing countries commonly induces demand of private vehicles at a higher rate than demand for public transport.

Consequently, motorization in these countries gradually advances, resulting in a rise of environmental concerns. From a global perspective, road passenger transport such as cars, motorcycles, buses, and taxis accounts for almost a quarter, 24%, of the global CO₂ emissions related to the entire transport sector¹⁾. With this background, the mitigation of emissions from the transport sector has become a global challenge. Therefore, encouraging people to shift from private vehicles to PT has become of major importance for achieving sustainable transport systems. Thus, within this context, understanding the behaviors of private vehicle and PT users, as well as determining the point at which the cost of private vehicle use would shift users to PT²⁾, is crucial for the planning of sustainable transport.

In Vientiane, the capital city of Lao PDR, PT ridership has been decreasing in recent years due to a low level of service, causing a negative perception of PT from the general public. As a result, the use of private vehicles has steadily been increasing. This has caused congestion during the morning and evening peak hours in the CBD area, where due to a high concentration of workplaces of government offices, the number of officials commuting by private vehicles is particularly high. It is important to note that in Lao PDR, education and health workers in addition to government office workers are all considered government officials. Therefore the high concentration of schools, colleges, hospitals, and government offices located in the CBD causes a particularly high proportion of commuters to be government officials.

Under this context, the promotion of PT use within demographic is considered to be a first step in reversing the current trend in mode choice. However, a study of mode choice and preferences of government officials regarding public transport in Vientiane has not been carried out before.

Previous research includes studies conducted on the effect of transport policies and behaviors related to modal choice for predicting the willingness of private vehicle users to shift to PT^{2), 3), 4)}, as well as the vast research on the examination of the factors influencing a shift to PT by improving the service level and operation of PT, in addition to the adoption of transport demand management measures^{5), 7), 8), 9)}. However, only a few studies have focused on commuter's mode choice behaviors towards PT. Existing studies have already revealed that cost is not a main factor influencing modal choice. Instead, time, convenience, and degree of comfort have been found to be the crucial factors determining modal choice for work trips^{10), 11)}.

This study aims to identify the characteristics that influence the modal choice of government officials in Vientiane and reveal their preferences related to PT.

The research questions intended to be answered are: (1) which are the characteristics that influence the modal choice of government officials? and (2) which are the main factors relevant to government officials in making a change in modal choice, to switch from private vehicles to PT? In order to answer these questions, the current study uses in the analysis person-trip data containing a sample of 4,700 households collected in 2019 by The Project for Institutional Capacity Building for Sustainable Urban Transport System in Lao PDR (VTMP), a technical cooperation project funded by Japan International Cooperation Agency (JICA).

This paper is organized as follows: Section 1 introduces the concept and background of the study; Section 2 describes the methodology such as the study area, current conditions of public transport in Vientiane, and details related to data collection; Section 3 presents the analysis results and discussion; and Section 4 provides the conclusion of the current study.

3. METHODOLOGY

(1) Study area

Vientiane consists of 9 districts and has a population of approximately 948,000 people (2020) within an area of 3,920 km², resulting in a population density of 210 people/km². As of 2019, the number of registered vehicles in Vientiane amounted to 955,535 vehicles, a figure that in recent years has continued to increase annually at an average rate of 9%.

In this study, the urban core of Vientiane, as shown in Figure 1, has been selected as the target area due to the prominent concentration of government officials. The proportion of government officials commuting to work is significantly higher than other areas, with trips heavily clustering in the CBD as shown in the Figure 2.



Fig.1 The study area: Vientiane.

Source: VTMP (JICA)

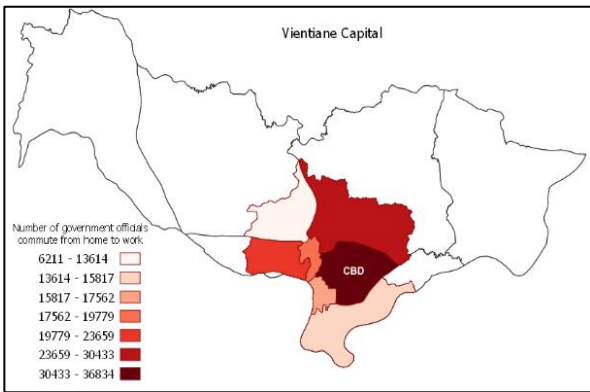


Fig.2 Number of government officials commuting from home to work by district

This contributes to congestion to congestion in the urban core during the morning and evening peak hours.

(2) Urban Transport in Vientiane

From the total number of registered vehicles in 2019, 3,947 vehicles correspond to urban transport.

The main PT service within the urban core of Vientiane is currently provided by public buses operated by the Vientiane Capital State Bus Enterprise (VCSBE), in addition to individual paratransit operators. Paratransit modes include taxi, Songtaew, tuk-tuk, Jumbo and motorbike taxi, as shown in Figure 3 and Figure 4.

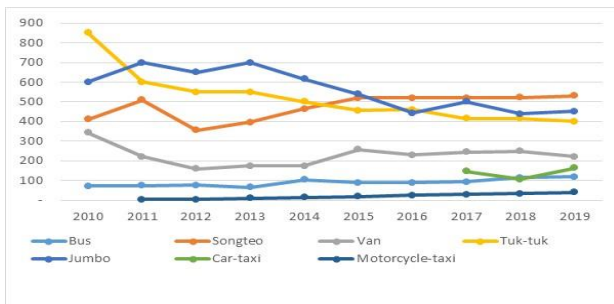


Fig.3 Registered PT vehicles in Vientiane



Fig.4 PT in Vientiane

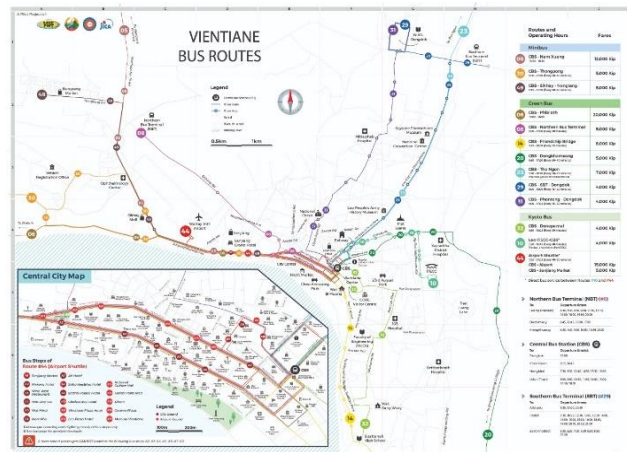


Fig.5 Public bus routes currently operated in Vientiane Source: VCSBE

VCSBE has been conducting the bus operation as an independent public entity without any operational subsidy from the government. As of 2021, VCSBE operates 15 routes from the central part of the city area as shown in Figure 5.

According to the JICA project study, the mode share of PT in 2008 was 4%, a figure that decreased significantly to 1.4% in 2019. Currently, around 29% of the population in the target area has access to PT from bus stops along the access road within a 500 m to their home. When comparing to other mega cities, this is a very low percentage.

(2) Data Collection

VTMP conducted a person-trip survey in 2019 to study the characteristics of present traffic demand in Vientiane. The survey consisted of interviewing a total sample of 4,700 households from villages within the project’s target area, averaging a sample ratio of 3.27%. A total of 5 forms were used in the survey to obtain details on: (1) household information, (2) household member information, (3) trip information of household members, (4) perception of PT and (5) daily activity. This paper used the data from survey forms 1 to 4 and selected only information regarding commuter government officials for analyzing the factors influencing modal choice and determining their preferences PT.

The characteristics of data regarding government officials are shown in Table 1. Male respondents form the majority of the sample with a total of 4,407 officials (81.8%), while female respondents totaled 981 people (18.2%).

In relation to the age of respondents, the percentage of 40-49 years old (24.7%), 50-59 years old (38.8%) and 60 years old and above (25.6%) was comparatively high in comparison to other age groups. Regarding total monthly household income, the 400-999 USD range was found to account for the

Table 1. Characteristics of respondents (government officials only)

Characteristics	Category	Frequency	Percentage
Gender	Male	4,407	81.8%
	Female	981	18.2%
Age	22-29	84	1.6%
	30-39	504	9.4%
	40-49	1,329	24.7%
	50-59	2,091	38.8%
	Upper 60	1,380	25.6%
Monthly total household income	Under 99 USD	50	0.9%
	100-399 USD	1,122	20.8%
	400-999 USD	3,176	58.9%
	1000-1999 USD	876	16.3%
	2000-2999 USD	46	0.9%
	3000-3999 USD	34	0.6%
	Over 4000 USD	84	1.6%
Motorcycle ownership	0 unit	116	2.2%
	1 unit	965	17.9%
	2 units	1,829	33.9%
	3 units	1,378	25.6%
	4 units	660	12.2%
	5 units	279	5.2%
	more than 6 units	161	3.0%
Car ownership	0 unit	1,377	25.6%
	1 unit	2,399	44.5%
	2 units	1,002	18.6%
	3 units	425	7.9%
	4 units	135	2.5%
	5 units	34	0.6%
Motorcycle available	No	5,244	97.3%
	Yes	144	2.7%
Car available	No	4,410	81.8%
	Yes	978	18.2%
Motorcycle license	No	3,634	67.4%
	Yes	1,754	32.6%
Car license	No	4,059	75.3%
	Yes	1,329	24.7%
Mode	Motorcycle	3,484	64.7%
	Car	1,841	34.2%
	PT	63	1.2%

highest proportion (58.9%) of the sample. This follows statistics on the salary of government officials, with monthly figures averaging around 200 USD (excluding other allowances). The majority of the

households were found to own 2-3 motorcycles. Households that reported owning a car/ownership of one vehicle was found to be the highest proportion (44.5%). It is important to consider that although some households own a car or a motorcycle, some household members cannot drive and need to be accompanied. This is considered to influence the number of government officials that reported to not have availability to private vehicles, being 97.3% in the case of a motorcycle and 81.8% for car. Furthermore, the proportion of officials without a driving license was also found to be high, 67.4% for a motorcycle driving license and 75.3% in the case of a car driving license.

3. RESULTS

(1) Characteristics influencing transport mode selection

This part of the study analyzed data from forms (1) household information, (2) household member information, and (3) trip information of household members to answer the research question regarding the characteristics influencing the modal choice of government officials.

As shown in Figure 6, mode share of motorcycle for the commute to work represents the highest proportion (64.7%) of government officials. This is considered to be due to the low cost of motorcycles and the ease of access to parking space. In relation to the reason behind not using PT, previous studies have found that possible reasons include the absence of public transport alternatives and the lack of access to existing public transport near the place where they live¹²⁾. This may also partially be connected to the reasons behind officials who choose to commute by car (34.2 %). Taking into account the low cost of PT, it is considered that officials who have no other choice of transport or with low household monthly income select to use public transport (1.2%). This study follows previous research in considering the importance of improving PT service and upgrading

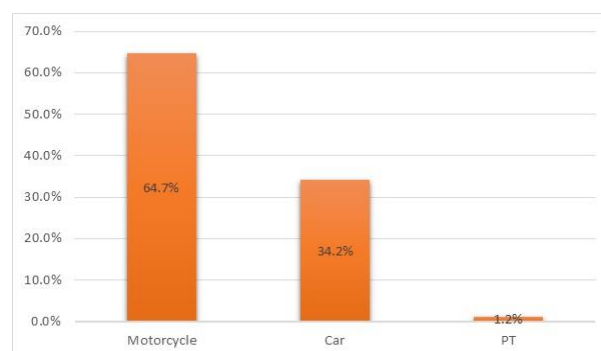


Fig.6 Mode share of government officials in Vientiane

its image to make it more attractive for high income people and car users⁶⁾.

As per the analysis of the characteristics of government officials currently using PT, Table 2 showcases that male government officials within the ages of 30-49 years old select PT at a greater proportion than female officials. In terms of household monthly income, the 100-399 USD and 400-999 USD income groups were found to be ones with highest percentage of PT users, 35% and 43% respectively. The study considers that the main reason for selecting PT is its affordable fare and the fact that users may not have any alternative choice for transportation. This may be due to the unavailability of private vehicles in their household or, even if the household owns a private vehicle, the government official may not be able to drive. This can be observed from the high percentage of officials without a driving license, 94% in the case of a car driving license and 44% for motorcycles. Therefore, there may not be another choice for their commute. More than half of public transport users reported work commute as their trip purpose. The remaining less than 40% reported using PT for other private activities.

Table.2 Characteristics of PT users

Characteristics	Category	Frequency	Percentage
Age	30-39	19	30%
	40-49	26	41%
	50-59	18	29%
Gender	Male	56	89%
	Female	7	11%
Allowance	No	61	97%
	Yes	2	3%
MC license	No	28	44%
	Yes	35	56%
Car license	No	59	94%
	Yes	4	6%
MC available	No	59	94%
	Yes	4	6%
Car available	No	22	35%
	Yes	41	65%
Usual work place	No	24	38%
	Yes	39	62%
Income	100-399 USD	22	35%
	400-999 USD	27	43%
	1000-1999 USD	11	17%
	2000-2999 USD	2	3%
	upper4000 USD	1	2%

In Lao PDR, government officials have a commuting allowance given in the form of fuel tickets, with amount depending on the position within the government. This commuting allowance is not provided to contract and in-training government officials before ascending to permanent government positions (this includes cleaning staff). Taking this into account, the data shows that those who do not have access to this commuting allowance are prone to choosing PT due to their financial situation.

(2) Main factors impacting decision making on modal shift from private vehicle to PT

This part of the study analyzes Form 4 (PT management) to answer the research question of determining the main factors relevant to government officials in making a change in modal choice from private vehicles to PT. The study selected government officials who are non-users of PT within the data sample group to identify opinions related to PT and possible improvements that could motivate a change in their mode selection.

Figure 7 gives information on the satisfaction of non-users of PT within government officials, specifically of VCSBE's bus service. In the case of respondents with zero previous experience using public transport, respondents were asked for their opinion based on their perception of the bus service.

Results show that the majority of officials consider PT to be safe, economic, and comfortable. Regarding the main reason for which they do not use PT, waiting times, lack of punctuality, and absence of door-to-door convenience in using PT were the main reasons identified. It is considered that due to buses in Vientiane commonly not stopping at designated bus stops and instead stopping wherever users indicate, punctuality is greatly affected. Therefore, since users cannot estimate the bus arrival time, they feel uncomfortable with the bus service.

Moreover, tropical weather conditions in Laos bring seasons of heavy rain during which people prefer to avoid walking for long distances. Therefore, the study considers that the availability of a door to door

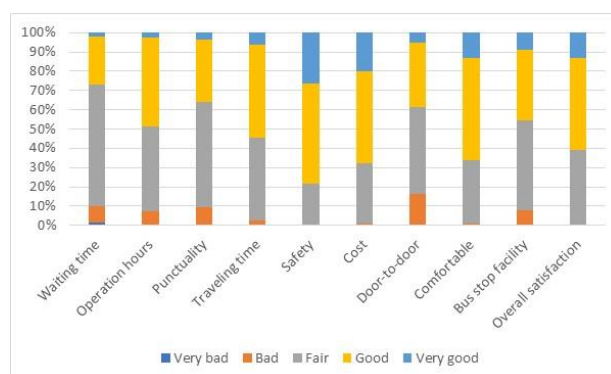


Fig.7 Satisfaction of bus service

bus service that could enable access as close as possible to the front of the potential user's home would motivate more people to change their current mode selection. From Form 4, an analysis of the modal choice of non-users according to different scenarios was also conducted.

In these scenarios, possible changes to transport-related regulations, such as parking management, in addition to bus service improvements, were presented to the respondent in order to better understand the main characteristics of their modal choice. Table 3 illustrates the results. Six main factors that would make non-users of PT consider a change to use PT were identified: making the bus fare free, starting operation of a bus service in front of their house, on-time arrival of buses, installation of air conditioners (A/C) at bus stops, strict control of illegal parking in the city center, and the provision of car and motorcycle parking lots near the bus stops.

The above results are similar to the factors identified by the satisfaction survey on the bus service. Most non-user concerns are on price, accessibility, time, comfort of bus facilities and parking management. Users who answered they would consider a

mode change based on any of the six factors identified previously were also analyzed. Table 4 and Table 5 present the characteristics of potential PT users which currently are non-users of PT. The previously identified six main factors were considered to identify potential PT users. From the results, the majority were found to be 30-39 year-old male and female officials with a monthly household income of 100-399 USD.

Table 6 also shows that potential users currently do not receive any commuting allowance, do not own a driving license and do not have access to a private vehicle. In addition to a possible negative perception of public transport and a low level of service, it is considered that people have the image PT is the modal choice for low-income people. Thus, most of them to cover their transportation needs.

Table 3 Potential scenarios to shift modal transport to public bus

	N	Would start using	Wouldn't use
1. If bus service hours are extended	1,950	81%	19%
2. If bus is operated every 15 minutes	1,938	82%	18%
3. If bus fare is free	1,874	88%	12%
4. If bus operates in front of your house	1,902	85%	15%
5. If bus arrival time become punctual	1,911	85%	15%
6. If illegal parking is strictly controlled in the city center	1,861	89%	89%
7. 1 million KIP fine when drinking and driving	1,915	84%	16%
8. If car and motorcycle parking lots are provided near the bus stop	1,867	89%	11%
9. If A/C installed at bus stops	1,859	90%	10%
10. 1 million KIP fine when riding a motorcycle without helmet	1,941	75%	32%
11. 1 million KIP fine when riding a motorcycle with 2 people or more	1,958	74%	35%

Table 4 Characteristics of potential PT users by age

	Age	1.If the busfare is free N= 1619	2. If bus operates in front of your house N= 1592	3. If the bus arrival time become punctual N= 1583	4. If illegal parking is strictly controlled in the city center N=1619	5. If car and motorcycle parking lots are provided near the bus stop N= 1592	6. If A/C installed at bus stops M=1583
Male	Total	63.9%	63.8%	63.9%	63.9%	63.8%	63.9%
	20-29	10.7%	10.7%	10.8%	10.7%	10.7%	10.8%
	30-39	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%
	40-49	11.4%	11.4%	11.2%	11.4%	11.4%	11.2%
	50-59	13.5%	13.6%	13.6%	13.5%	13.6%	13.6%
	60-69	7.2%	7.1%	7.4%	7.2%	7.1%	7.4%
Female	Total	36.1%	36.2%	36.1%	36.1%	36.2%	36.1%
	20-29	11.2%	11.4%	11.3%	11.2%	11.4%	11.3%
	30-39	14.7%	14.5%	14.4%	14.7%	14.5%	14.4%
	40-49	5.3%	5.3%	5.4%	5.3%	5.3%	5.4%
	50-59	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
	60-69	1.5%	1.4%	1.5%	1.5%	1.4%	1.5%

Table 5 Characteristics of potential PT users by income

	Income	1.If the busfare is free N= 1619	2. If bus operates in front of your house N= 1592	3. If the bus arrival time become punctual N= 1583	4. If illegal parking is strictly controlled in the city center N=1634	5. If car and motorcycle parking lots are provided near the bus stop N= 1628	6. If A/C installed at bus stops N=1635
Male	Total	63.8%	63.9%	63.9%	63.8%	63.8%	63.9%
	Under 99 USD	5.0%	5.1%	5.0%	5.1%	5.0%	5.0%
	100-399 USD	54.6%	54.7%	54.7%	54.7%	54.6%	54.7%
	400-999 USD	4.0%	3.9%	4.0%	3.9%	3.9%	4.0%
	1000-1999 USD	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
	upper 4000 USD	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Female	Total	36.2%	36.1%	36.1%	36.2%	36.2%	36.1%
	Under 99 USD	3.5%	3.5%	3.3%	3.4%	3.3%	3.3%
	100-399 USD	30.8%	30.6%	30.8%	30.7%	30.9%	30.8%
	400-999 USD	1.7%	1.8%	1.8%	1.8%	1.8%	1.8%
	1000-1999 USD	0.2%	0.3%	0.2%	0.2%	0.2%	0.2%

Table 6 Characteristics of potential PT users by commuting allowance, driving license and vehicles available

	Allowance		MC license		Car license		MC available		Car Available	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
1.If the busfare is free	84.1%	15.9%	24.8%	75.2%	42.1%	57.9%	35.6%	64.4%	58.6%	41.4%
2. if bus operates in front of your house	84.1%	15.9%	25.1%	74.9%	42.5%	57.5%	35.5%	64.5%	59.0%	41.0%
3. if the bus arrival time become punctual	83.9%	16.1%	25.1%	74.9%	42.5%	57.5%	35.6%	64.4%	59.1%	40.9%
4.If illegal parking is strictly controlled in the city center	84.3%	15.7%	24.8%	75.2%	42.1%	57.9%	35.7%	64.3%	58.7%	41.3%
5. if car and motorcycle parking lots are provided near the bus stop	84.1%	15.9%	25.0%	75.0%	42.4%	57.6%	35.7%	64.3%	58.8%	41.2%
6. if A/C installed at bus stops	84.0%	16.0%	24.9%	75.1%	42.1%	57.9%	35.8%	64.2%	58.7%	41.3%

6. CONCLUSIONS

Currently, the level of service of PT in Lao PDR including Vientiane is very low, causing a negative perception. Consequently, the number of passengers is decreasing year by year, contributing towards the worsening of traffic conditions and the financial situation of the public bus operator in Vientiane since it does not receive any subsidy. With this context, this study aimed to identify the characteristics that influence the modal choice of government officials in Vientiane and identify their preferences related to public transport to examine potential users within government officials who would consider a shift to public transportation.

The findings of this study are useful as a recommendation of improvements to the service level of PT and the elaboration of policy to promote a modal shift from private vehicles to PT in the future. An increase in passengers would bring an improvement to the financial situation of PT operators which can provide the funding needed to continue improving the level of the service of PT.

The analysis results reveal that the majority of government officials that are PT users are male officials from the ages of 40-49 years old that have a low monthly household income. Additionally, some government officials currently do not receive any commuting allowance; do not own a driving license and the households do not own private vehicles or private vehicles within the household are not available for their use.

It can be seen that non-users of PT consider the level of service, accessibility, and degree of comfort for their modal choice. Furthermore, an improvement in comfort, fare price, and punctuality of the bus service in addition to the management of parking in the city would shift non-users from using private vehicles to public transport.

This study also found that the characteristics of potential PT users are both male and female officials from the ages of 30-39 years old with a low monthly household income of 100-399 USD who do not receive any commuting allowance, do not own a driving license and private vehicle or the private vehicle owned by the household is not available for their use. Therefore, the study considers the improvement of

the PT service and the upgrade of its image as a significant step in making PT a more attractive option. As previous studies have pointed out, improvements to service and image in addition to parking regulations can make PT more attractive for high income people⁶⁾.

For further studies, it is considered that there is a need to focus on government officials to study more about the factors that influence the decision of government officials to shift to PT and to identify the needed improvements to the level of service of transport required for better connectivity in Vientiane.

ACKNOWLEDGMENTS

The authors would like to acknowledge all who contributed to this paper. Especially, we would like to thank JICA for sponsoring and providing the PT data for this study.

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(October 1, 2021)