An Inter-city Transit Mode Choice Study of Road-base Transportation in Thailand

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Abstract

Nowadays, not only the urban van transit becomes more famous in Thailand, but also an inter-city type as well. Some evidence found this transport mode is dangerous, especially with inappropriate speed. However, the question has appeared why passengers still use the service even though they have already known in risk. The point of focusing on inter-city transport is to think out of the box, because there are more than urban accidents to deal with. Many research papers have been done with the city van or bus so that the knowledge of rural or inter-city van transit is still scant. With the aim to understand the motivation factors that influence the public to consider inter-city transit modes, a questionnaire survey was applied then performed a binary disaggregate model. The reason of comparing only road-base (inter-city van and bus transit) because of the community train system in Thailand is inferior and far different in characteristics. Furthermore, it included "willingness to pay (WTP)" factors besides basic motivation factors to make the current study diverge from the traditional format. The rating of motivation factors found that the average scores of accessibility, look of vehicle, flexibility and service rate of inter-city van were greater than the bus. Somehow, factors of convenience and safety are the advantages of inter-city bus. The result of disaggregate model hints that improving of privacy, accessibility, seat comfort and flexibility could attract more inter-city van users together with reducing in travel time. Oppositely, inter-city bus passengers need more accessibility, service information and look of the bus. In addition, higher WTP (on private provision) passengers tend to use the bus. Finally, all of the findings can lead to appropriate recommendations and policies to improve inter-city transit system of Thailand and also be an inventory data for an upcoming research.

Keywords: Discrete model, Inter-city transportation, Public transportation, Van transit, Willingness to pay

1. Introduction

Van transit is the one of many kinds of transportation modes in Thailand. It is very rare to find in the other countries even in south-east Asia. Among public transportation modes, flexibility of the van service is a unique characteristic that make it becomes more popular. From 2006 to now, the van transit service has drown ridership from the bus transit. However, safety of the van service has never been maintained. Some evidence found this transport mode is dangerous, especially with inappropriate speed. In April, 2012, department of land transport of Thailand used the new speed detector technology called Radio Frequency Identification or RFID, the report was shown that 1.4% of transit vans used excessive speed over the

limit which mostly on toll way following by motorway. This situation seems to be more serious when the van operators attempt to use higher speed with longer traveling. Therefore, the question has been appeared why passengers still use the service even though they have already known in risk. Thus, an inter-city type of public van service should also be concerned because there are more than urban accidents to deal with. Many research papers have been done with the city van or bus so that the knowledge of rural or inter-city van transit is still scant. The aim of the current study is to understand the motivation factors that influence the public to consider inter-city transit modes. However, the community train system in Thailand is inferior and far different in characteristics so that comparing only road-base transport modes (inter-city van and bus transit) sound to be appropriate. Furthermore, because this study involves to risk acceptance of the passengers, including of "willingness to pay (WTP)" factors besides basic motivation factors makes the current study diverge from the traditional format. The outcome was expected to specify countermeasures which can recover safety of the van service.

2. Literature Reviews

In 2000, Kunasol studied the factors which related to utility score of urban van transit service [1]. He focused on flexibility of this service because he tried to continue the assumption that in developing countries, public transit passengers need high level of flexibility. Therefore, the service itself can well respond to the public. Utility theory was used to indicate quality of the service by asking passengers to give the score of each relative factor and also weigh the important level. Equation 1 and Equation 2 display the component of utility function from the theory. The result found that travel time and convenience of the van service gained higher weights than the other factors.

$$U = \Sigma(W_i * U_i) \quad (1)$$

$$U_i = \Sigma(W_{ij} * U_{ij}) \quad (2)$$

When i represents the main factors, j represents sub factor of main factors i, U represents the whole score of van transit utility, W_i represents weight factor of main factor i, U_i represents the utility score of main factor i, W_{ij} represents weight factor of sub factor j of main factors i, and U_{ij} represents the utility score of sub factor j of main factors i.

However, most of research papers about van transit in Thailand assessed the service by using of descriptive statistic [2][3][4][5]. And inter-city van transit service was found to be rarely studied. About 80% of public van investigations were applied in Bangkok and perimeter.

After that the study of the impact of van service to the former bus in Bangkok was invented by Rongviriyapanich and Prommapa [6]. They used discrete choice modeling (DCM) to develop the analysis. By selection of transit vans and buses which use the same routes, attitude and motivation data was carried out by a questionnaire survey. Binary logit model was the method to conduct the utility function of van transit. The outcome after correlation check was shown up that non-student passengers, lower fare rate per income, lower travel time times income, higher convenience, higher comfort, higher safety, higher accessibility, and more traveling on city routes were the factors that convince passengers to consider the van transit. They also calculated WTP of passenger to each factors but the way they interacted that was questionable.

Some studies from other countries are only close to the current study. Thus, to conduct the analysis, the details of mode choice studies which related to public transportation might be helpful. In India, the bus is the major transportation mode in urban areas. Moreover, due to its inadequate capacity and financial management problem, the city bus was depressed in demand and ridership every year. Thus, Vedagiri and Arasan (2009) attempted to estimate the demand change when there were the exclusive bus lanes [7]. With 2 alternatives which were using the new bus system or choosing another mode, binary logit DCM model was developed. Only older passengers, work trip traveler and passenger who can walk shortly to a bus station will use the bus with exclusive lanes. That meant the exclusive bus lanes were not worthy enough to attract passengers. However, they suggested that an appropriate range of Pseudo-R^2 value should be around 0.20-0.40 to assure the model fit.

The most appreciated study is from Jiangping Zhou (2012) [8]. She developed DCM model of university student's go-to-campus mode choice. Multinomial logit model was conducted by

using the data from internet surveying. By treating almost all variables to be dummy, higher age students were possible to avoid using transit, moreover, becoming multimodal and holding transit pass can encourage taking transit service to university significantly. Furthermore, students who were living surrounding with friends or classmates had higher chance to pick public transit.

Another research had been done by Rojo et al. (2012). This research purposes a modal choice analysis for inter-urban journeys [9]. Their reviews found that the satisfaction was not correlated to frequency of public transport usage. Moreover, the demand of using the public service had strongly related to WTP of improvement to be a certain service. Thus, the current study attempts to include WTP variables to maximize the outcome definition. However, the inventory data that collected by Royal Thai Police was the total accident rate of all kind of van. Therefore, it was not separated into the detail of inter-city transit van. Thus, it is unable to use the contingent valuation (CV) method in the current study. Thus, the basic "valuation exercise" will be appropriated in the current study [10].

3. Methodology

First of all, the study area should be within 250 km around Bangkok. It is practical because longer distance will reduce the ridership of inter-city van transit and the number of service per day of inter-city transit is decrease by distance. The data was collected in Bangkok and other eight representative provinces along 4 main arterial highways (Ang Thong, Saraburi, Chon Buri, Phetchaburi, Nakhon Sawan, Nakhon Ratchasima, Chantraburi and Prachuap Khiri Khan). Fig. 1 shows the location of each representative propinces.

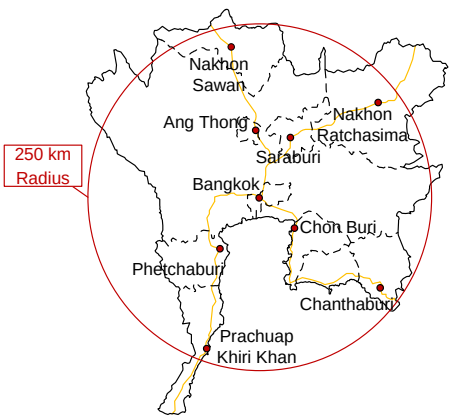

Fig. 1 The study area

The reason we picked those representative provinces because the arterial highways are passed through them. Moreover, demands of inter-city traveling of passengers in those provinces are considerably high.

Therefore, around 400 samples were expected to be complete due to large amount of population. A questionnaire survey was conducted which toke the data from the passengers who have ever used both inter-city bus and van for at least 1 year. Under the idea of selection bias elimination, usage frequency of each inter-city mode had been asked as cross-check questions. For an example, passenger who chose inter-city van but was found to pick higher usage frequency on inter-city bus had to be removed from the study. Furthermore, a pilot test around 100 samples was used to adjust the questionnaire to assure appropriate consistency. After systematic random sampling (percentages of regular inter-city van passengers should be closed to regular inter-city bus passengers, and percentages of male passengers should be closed to female passengers), only 462 samples were completed all questions properly.

DCM is the traditional method to specify the factors affected to mode selection. Thus, every question in the questionnaire form should match with it. Moreover, according to the concept of road-base study, only inter-city van and bus were involved. Thus, binary logit model will be used. Utility function of each alternative must be conducted to measure utility score of each mode that was given by decision makers. Importantly, the elements of each utility function will significantly display the factors that influenced passengers to decide using the service. Hence, utility functions of inter-city van transit and bus transit will feature the various types of attributes with vary over alternatives. Equation 3 and Equation 4 show the format of each utility function of inter-city transit mode. Passengers will pick the transit mode which is higher utility score.

$$U_n(\text{Van}) = \beta_0 + \beta_{i1}x_{i1} + \beta_{i2}x_{i2} + \ldots \qquad (3)$$

$$U_n(\text{Bus}) = \beta_{j1}x_{j1} + \beta_{j2}x_{j2} + \ldots \qquad (4)$$

When $U_n(\text{Van})$ represents a utility function of van service of passenger n, $U_n(\text{bus})$ represents a utility function of bus service of passenger n, β_{ik}, β_{jk} represents a coefficient parameter of attribute k of alternative i or j, and x_{ik}, x_{jk} represents a attribute k of van service of alternative i or j respectively.

The questions asked respondents to fill up demographic characteristics, WTP data, service characteristics, and rate the score of each motivation factor. Thus, some variables will be alternative-specific variable (ASV) while the other might ne alternative-specific dummy (ASD). Therefore, Table 1 demonstrates all variable in the questionnaire.

Table 1 Variable description

Variable	Code	Type	Value	Meaning
Mode choice	MODE	Dependent	0	Inter-city bus
			1	Inter-city van
Gender	GENMd	ASD	0	Female
			1	Male
Age	AGE1d	ASD	0	Otherwise
			1	Lower than 20 yr.
	AGE2d	ASD	0	Otherwise
			1	20-29 yr.
	AGE3d	ASD	0	Otherwise
			1	30-39 yr.
	AGE4d	ASD	0	Otherwise
			1	40-49 yr.
	AGE5d	ASD	0	Otherwise
			1	50-59 yr.
	AGE6d	ASD	0	Otherwise
			1	60 yr. and over
Family status	STA1d	ASD	0	Otherwise
			1	Single
	STA2d	ASD	0	Otherwise
			1	Married
	STA3d	ASD	0	Otherwise
			1	Widow/widower or divorced
Hometown	HTBd	ASD	0	Locates in provinces
			1	Locates in Bangkok or perimeter
Education level	EDU1d	ASD	0	Otherwise
			1	Primary and lower
	EDU2d	ASD	0	Otherwise
			1	Secondary
	EDU3d	ASD	0	Otherwise
			1	High school/vocational certificate
	EDU4d	ASD	0	Otherwise
			1	Diploma/high vocational Certificate
	EDU5d	ASD	0	Otherwise
			1	Bachelor
	EDU6d	ASD	0	Otherwise
			1	Master
	EDU7d	ASD	0	Otherwise
			1	Doctoral
Occupation	OCC1d	ASD	0	Otherwise
			1	An agriculturist/work as employee
	OCC2d	ASD	0	Otherwise
			1	Has own business/be a merchant
	OCC3d	ASD	0	Otherwise
			1	Works for state enterprises/government
	OCC4d	ASD	0	Otherwise
			1	A company staff
	OCC5d	ASD	0	Otherwise
			1	A student
	OCC6d	ASD	0	Otherwise
			1	Retired
	OCC7d	ASD	0	Otherwise
			1	Unemployed
Monthly income	INC1d	ASD	0	Otherwise
			1	Lower than ฿10000
	INC2d	ASD	0	Otherwise
			1	฿10000-19999
	INC3d	ASD	0	Otherwise
			1	฿20000-29999

Variable	Code	Type	Value	Meaning
Monthly income	INC4d	ASD	0	Otherwise
			1	฿30000-39999
	INC5d	ASD	0	Otherwise
			1	฿40000-49999
	INC6d	ASD	0	Otherwise
			1	฿50000 and over
Distance	OVD	ASV	Random	On-vehicle travel distance (km)
Time	OVT	ASV	Random	On-vehicle travel time (min)
Cost	OVC	ASV	Random	On-vehicle travel cost (฿)
Privacy	PRIV	ASV	1,Low-5,High	A score of privacy
Accessibility	ACC	ASV	1,Low-5,High	A score of accessibility
Connectivity	CONN	ASV	1,Low-5,High	A score of connectivity
Air condition	ACON	ASV	1,Low-5,High	A score of air conditioner comfort
Seat comfort	SEAT	ASV	1,Low-5,High	A score of seat comfort
Look of vehicle	VCOND	ASV	1,Low-5,High	A score of service vehicle look
Waiting point	WAIT	ASV	1,Low-5,High	A scor of waiting point
Flexibility	FLEX	ASV	1,Low-5,High	A score of flexibility
Safe speed usage	SSPD	ASV	1,Low-5,High	A score of safe speed usage
Get-off safety	GOCON	ASV	1,Low-5,High	A score of get-off condition
Security	SECU	ASV	1,Low-5,High	A score of security
Service information	SINF	ASV	1,Low-5,High	A score service information
Number of services per day	NOSPD	ASV	1,Low-5,High	A score of the number of services per day
Reliability	RELI	ASV	1,Low-5,High	A score of reliability
WTP for public transit	PWTP	ASV	1,strongly disagree-5,strongly agree	Do you agree to pay the fare more to improve public transportation?
Accident insurance holding	ACCINSHd	ASD	0	Not handling
			1	Handling
Accident insurance payment	AIPRE	ASV	1	฿1000 per year premium/฿0.2M protection (and lower case)
			2	฿1500 per year premium/฿0.3M protection
			3	฿2500 per year premium/฿0.5M protection
			4	฿4500 per year premium/฿1M protection
			5	฿8000 per year premium/฿2M protection (and higher case)

4. Results

Regarding to data collection process, passengers from both inter-city transit services were picked to be the respondents equally (around 46% were regular van users). From initial analysis, the interesting information was as follows:

- The age group of 20-29 years old was the major group of passengers who mostly choose the van service (around 55% of 20-29 yr. passengers pick the van)
- Single passengers (58%) were the highest population among the samples which found no different between mode choice (50% chance to select the van)
- Most of inter-city passengers were found to live in provincial area more than inside Bangkok and perimeter
- Students and company staff attempted to use inter-city van rather than the bus
- Lower monthly income passengers (both below 10,000 and 10,000-19,999 Thai Baht) were around 72% of the samples with there is no sign to bias to the van service

However, the crosstab results provide extended details of initial analysis and they are shown in Table 2 to Table 11.

Table 2 A crosstab result of gender and mode selection

Alternative mode	male		female	
	Count	Percentage	Count	Percentage
Inter-city van	77	44.00	137	47.74
Inter-city bus	98	56.00	150	52.26
Total	175	100.00	287	100.00

Table 3 A crosstab result of age and mode selection

Alternative mode	lower than 20		20-29		30-39	
	Count	Percentage	Count	Percentage	Count	Percentage
Inter-city van	26	46.43	93	54.71	43	40.57
Inter-city bus	30	53.57	77	45.29	63	59.43
Total	56	100.00	170	100.00	106	100.00
Alternative mode	40-49		50-59		60 and over	
	Count	Percentage	Count	Percentage	Count	Percentage
Inter-city van	28	44.44	16	34.78	8	38.10
Inter-city bus	35	55.56	30	65.22	13	61.90
Total	63	100.00	46	100.00	21	100.00

Table 4 A crosstab result of family status and mode selection

Alternative mode	single		married		widow/divorced	
	Count	Percentage	Count	Percentage	Count	Percentage
Inter-city van	135	50.00	61	40.13	18	45.00
Inter-city bus	135	50.00	91	59.87	22	55.00
Total	270	100.00	152	100.00	40	100.00

Table 5 A crosstab result of hometown and mode selection

Alternative mode	BKK and perimeter		province	
	Count	Percentage	Count	Percentage
Inter-city van	42	45.16	172	46.61
Inter-city bus	51	54.84	197	53.39
Total	93	100.00	369	100.00

Table 6 A crosstab result of education level and mode selection

Alternative mode	primary and lower		secondary		high school*		diploma**	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Inter-city van	16	34.78	16	44.44	39	41.05	26	50.98
Inter-city bus	30	65.22	20	55.56	56	58.95	25	49.02
Total	46	100.00	36	100.00	95	100.00	51	100.00
Alternative mode	bachelor		master		doctoral		other	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Inter-city van	102	51.26	14	42.42	1	100.00	0	0.00
Inter-city bus	97	48.74	19	57.58	0	0.00	1	100.00
Total	199	100.00	33	100.00	1	100.00	1	100.00
*And also vocational certificate equivalent, **And also high vocational certificate equivalent								

Table 7 A crosstab result of occupation and mode selection

Alternative mode	agriculturist*		own business**		state enterprises***		company staff	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Inter-city van	21	38.18	41	50.00	22	31.88	54	51.92
Inter-city bus	34	61.82	41	50.00	47	68.12	50	48.08
Total	55	100.00	82	100.00	69	100.00	104	100.00
Alternative mode	student		retired		unemployed		other	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Inter-city van	63	53.85	6	50.00	6	30.00	1	33.33
Inter-city bus	54	46.15	6	50.00	14	70.00	2	66.67
Total	117	100.00	12	100.00	20	100.00	3	100.00
*And also work as employee, **And also a merchant, ***And also government officer								

Table 8 A crosstab result of monthly income and mode selection

Alternative mode	lower than ฿10000		฿10000-19999		฿20000-29999	
	Count	Percentage	Count	Percentage	Count	Percentage
Inter-city van	84	48.28	77	48.43	34	44.74
Inter-city bus	90	51.72	82	51.57	42	55.26
Total	174	100.00	159	100.00	76	100.00
Alternative mode	฿30000-39999		฿40000-49999		฿50000 and over	
	Count	Percentage	Count	Percentage	Count	Percentage
Inter-city van	12	32.43	3	42.86	4	44.44
Inter-city bus	25	67.57	4	57.14	5	55.56
Total	37	100.00	7	100.00	9	100.00

Table 9 A crosstab result of public WTP agreement and mode selection

Alternative mode	strongly disagree		disagree		average	
	Count	Percentage	Count	Percentage	Count	Percentage
Inter-city van	3	16.67	31	45.59	68	50.00
Inter-city bus	15	83.33	37	54.41	68	50.00
Total	18	100.00	68	100.00	136	100.00
Alternative mode	agree		strongly agree			
	Count	Percentage	Count	Percentage		
Inter-city van	102	50.00	10	27.78		
Inter-city bus	102	50.00	26	72.22		
Total	204	100.00	36	100.00		

Table 10 A crosstab result of accident insurance owning and mode selection

Alternative mode	non-owning		owning	
	Count	Percentage	Count	Percentage
Inter-city van	96	45.50	118	47.01
Inter-city bus	115	54.50	133	52.99
Total	211	100.00	251	100.00

Table 11 A crosstab result of accident insurance payment and mode selection

Alternative mode	฿1000 per year premium/฿0.2M protection (and lower)		฿1500 per year premium/฿0.3M protection		฿2500 per year premium/฿0.5M protection	
	Count	Percentage	Count	Percentage	Count	Percentage
Inter-city van	129	52.02	51	45.13	22	39.29
Inter-city bus	119	47.98	62	54.87	34	60.71
Total	248	100.00	113	100.00	56	100.00
Alternative mode	฿4500 per year premium/฿1M protection		฿8000 per year premium/฿2M protection (and higher)			
	Count	Percentage	Count	Percentage		
Inter-city van	7	29.17	5	23.81		
Inter-city bus	17	70.83	16	76.19		
Total	24	100.00	21	100.00		

Unfortunately, the factors in DCM model might correlate to each other. Thus, to eliminate multicollinearity that can be occurred during analysis, correlation test should be applied and any factors which correlate to the other will get "**Marks of correlation**". The marks can be point out which factors should be eliminated under DCM model development. The pairs of correlation are shown as follows:

- OVD↔OVT
- OVD↔OVC
- OVT↔OVC
- PRIV↔SEAT
- ACC↔CONN
- ACON↔SEAT
- ACON↔VCOND
- SEAT↔SSPD
- VCOND↔WAIT
- SSPD↔GOCON
- SINF↔RELI
- NOSPD↔RELI

By the assumption that all factors have the initial important weight equal to each other, thus, they cannot be removed without reasons. Independent-samples t-test was attempted to investigate the factors which make inter-city van difference from the bus significantly. The factors that were found to be the same property will be used to consider elimination of correlated factors. Therefore, the test can perform prominent characteristics of each inter-city mode. Table 12 shows the result of t-test of independence means.

Table 12 The result of t-test of independence means

Variable	Unit	Alternative mode		F-test of variances equality's P-value	t-test of means equality	
		Mean			Equal variances assumed's P-value	Unequal variances assumed's P-value
		Inter-city van	Inter-city bus			
PRED	km	17.15	19.06	0.337	0.414	
PRET	minute	32.40	35.52	0.193	0.212	
PREC	Thai Baht	32.84	36.05	0.146	0.373	
OVD	km	158.63	157.70	0.679	0.875	
OVT	minute	135.41	165.70	0.354	0.000	
OVC	Thai Baht	134.24	134.54	0.018		0.943
POSTD	km	18.64	19.05	0.999	0.922	
POSTT	minute	33.36	34.56	0.773	0.753	
POSTC	Thai Baht	35.18	38.76	0.138	0.395	
PRIV	score	2.96	3.49	0.512	0.000	
ACC	score	3.63	3.40	0.351	0.000	
CONN	score	3.58	3.47	0.007		0.051
ACON	score	3.31	3.48	0.737	0.005	
SEAT	score	2.92	3.77	0.709	0.000	
VCOND	score	3.46	3.32	0.206	0.022	
WAIT	score	3.37	3.38	0.569	0.915	
FLEX	score	3.73	3.24	0.633	0.000	
SSPD	score	2.89	3.74	0.268	0.000	
GOCON	score	3.26	3.65	0.219	0.000	
SECU	score	2.99	3.74	0.078	0.000	
SINF	score	3.24	3.45	0.226	0.001	
NOSPD	score	3.50	3.16	0.502	0.000	
RELI	score	3.29	3.36	0.380	0.247	
*The shade cell represents significant level at 95% confident interval						

By using P-values of adjusted t-test of mean equality, the result indicated that accessibility, look of vehicle, flexibility and the number of services per day were the major advantages of inter-city van. While privacy, air condition comfort, seat comfort, safe speeding behavior, get-off condition, security, and service information of inter-city bus were better. Furthermore, on-vehicle

distance (OVD), on-vehicle cost (OVC), connectivity (CONN), waiting point (WAIT) and reliability (RELI) of inter-city van were found to be alike the bus. However, all of those factors got the marks of correlation so that they can be eliminated from the analysis.

Finally, DCM model was conducted by remainder factors (after removal of correlated factors by using t-test result). According to utility function's structure, demographic characteristics were treated as ASD and placed only on inter-city van side same as WTP variables. However, service characteristics and motivation factors were anticipated to be various among the functions. Adjustment of the model was completed by backward method. Therefore, the final binary logit model is shown in Table 13. Overall accuracy of the final model was fine with 0.2120 of McFadden's R^2 (or Pseudo-R^2).

Table 13 The result of DCM analysis

Utility function of inter-city van		
Variable	Coefficient	P-value
V_Constant	-0.5327	0.4886
V_AGE2D	0.4952	0.0291
V_OCC4D	0.4209	0.1134
V_AIPRE	-0.2678	0.0105
V_OVT	-0.0042	0.0314
V_PRIV	0.4009	0.0038
V_ACC	0.3624	0.0177
V_SEAT	0.3846	0.0071
V_FLEX	0.5203	0.0006
Utility function of inter-city bus		
Variable	Coefficient	P-value
B_ACC	0.3326	0.0286
B_ACON	0.2255	0.1541
B_VCOND	0.3853	0.0120
B_SINF	0.3841	0.0064
Model indicators		
LL(β)	-251.36	
LL(0)	-318.98	
Pseudo-R^2	0.2120	
*The shade cell represents significant level above 95%		

5. Discussions

Considering only the final model, looking at 95% of confident interval can describe less information but typical. As the result, passengers with lower WTP of accident insurance payment (as private provision of WTP indicator) might choose inter-city van rather than the bus. Thus, that means private provision of WTP can be use to separate the group of inter-city transit users. Therefore, this can probably say that "Passengers of inter-city bus have higher WTP compare with inter-city van passengers" when using accident insurance payment to measure. And use of accident insurance experiment provided quite acceptable result, even though we had anticipated the result to be public provision of WTP. When focusing on service characteristics and motivation factors, inter-city van travel time is significantly what the users concern. This variable should be attended if need to keep demand of inter-city van service. However, trade-off is exactly critical to safety for speed increase. Accessibility and flexibility are the advantages of inter-city van service as well while better privacy and seat comfort could gain more attraction from the van passengers. On the contrary, inter-city bus users care more on service information while they need accessibility as same as inter-city van passengers. However, good-looking or up-to-date buses are the big deal to gain higher demand to the bus service. Hence, it is an implicit reason why some passengers prefer the van rather than the bus. For demographic characteristics, passengers who are 20 to 29 years old likely favor inter-city van transit more than the other age groups.

6. Conclusions

Inter-city van transit is utilized by superior travel time and its convenience especially flexibility. In addition, privacy and seat comfort of the van are the factors which cannot be avoided. Therefore, improvement of van comfort may draw passengers to take the van service. However, inter-city bus transit passengers seem to pay attention on service information instead. Therefore, they also need the new or up-to-date service vehicles which are good looking enough to attract them. By the way, demographic characteristics got less predictive power on inter-city transit mode choice expect early working age people (around 20-29 years old). However, to improve inter-city transit services, both transit modes require greater accessibility to make passengers reach the services easier. Lastly, only private provision can be able to indicate mode selection. The possible reason is that private goods are more obvious to interpret than public goods or individual's attitude of Thai people can interpret on private provision easier. However, the result indicated that inter-city bus passengers have higher WTP and may care themselves by life

support during traveling more than the van passengers. Furthermore, a CV method of WTP assessment might give a different result. However, it requires sufficient inventory data. Thus, any involved agencies should be awakened and start to separate accident data into subcategory including inter-city transit mode. This effort will be exactly useful for future researches.

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