18

MARKET ANALYSIS OF PASSENGER VANS IN BANGKOK

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ABSTRACT

Initially, passenger vans in Bangkok were illegal. Nonetheless, passengers preferred them to conventional buses due to their speed, comfort and ease of access at affordable prices. Conventional bus operators considered the passenger vans as competitors who caused lower revenues. Therefore, Thai government started enforcing passenger van regulations in 1999 to provide safe public transport and to eliminate the competitions. This policy was not based on theoretical consideration. An analysis of passenger vans market in Bangkok has not been undertaken. Moreover, illegal passenger vans are still existent. This study verified market competition between the passenger vans and conventional buses based on the demand side and found that there was no price competition. The passenger van market is an oligopoly market with implication of product differentiation. Deregulation of passenger van entry was recommended to bring more licensed passenger vans and to create competitive market environments where services would be improved. Regulations related to safety and qualities of the services were maintained.

1. INTRODUCTION

Passenger van services supply 12-seat air-conditioning vans with guaranteed seats. According to the passenger van regulations, numbers of passenger vans entry in the business, number of routes, maximum fares and capacity of vehicles are enforced as well as vehicle fitness and

driver disciplines. The controlled maximum number is 5,574 vehicles operating on 116 routes, but the actual numbers of operators and passengers are not officially recorded. Fares vary from 8-43 baht (50 baht = 1 EUR). The passenger vans are preferred by middle-income commuters because 1) they charge similar fares to conventional air-conditioning (a-c) buses but offer more convenience and comfort in the form of guaranteed seats and faster services 2) they reduce travel times since their smaller size enables them to move quickly through congested roads, they have fewer stops, and some of them operate on expressways 3) they offer a level of service similar to taxis but at lower fares, and they give a better sense of safety for female passengers who travel alone (Leopairojna and Hanaoka, 2005). At the start, the passenger vans were considered illegal. The conventional bus operators considered the passenger vans as competitors due to overlapping of their routes. Therefore, the government enforced the regulations for the passenger vans in 1999 without considering market structure and nature of competition between the passenger vans and conventional buses. Leopairojna and Hanaoka (2005) researched the market structure of passenger vans using the northern corridor of Bangkok as a case study area and found that the passenger van market was an oligopoly with implications of product differentiation and collusion. Unlicensed passenger vans were found during field surveys. Deregulation of entry was recommended in general to bring more licensed passenger vans in the market while deregulation of maximum fare was recommended only on passenger van routes where competition among passenger van operators or companies occurred. It is speculated that after the price was deregulated under the deregulated entry, van companies might increase the van fares. In such a case it is unclear whether passenger van users may change to other public transport modes. Detailed study to understand passenger van user mode choice preferences is thus required.

The objectives of this paper are to verify market competition between passenger vans and a-c buses in Bangkok, and to estimate future market of passenger vans based on opinions and preferences of the demand side, that is, commuters and other passengers. Passengers on passenger vans and conventional a-c buses on three selected corridors in the northern part of Bangkok were examined as case studies.

2. BACKGROUND OF PASSENGER VANS IN BANGKOK

2.1 Overview of Transport

Bangkok Metropolitan Area (BMA), a capital of Thailand, is surrounded by five neighbouring provinces. At the national level, this area is considered the core of the country and referred to as “Bangkok Metropolitan Region (BMR)”. In 2004, BMA and BMR had registered populations of around 5.63 million and 9.64 million respectively (DOPA, 2005). Average household incomes in BMA and BMR were 29,425 and 28,076 baht/month (NSO, 2003). Since BMR is the location where economic development is highest, it is attracting people from countrywide, and population and vehicle numbers are increasing. In conjunction with

uncontrolled and unplanned land development, insufficient public transport and limited road space, this has led to the most serious problem in Bangkok - traffic congestion. Figure 1 presents comparisons between numbers of registered population, total vehicles, cars and motorcycles in Bangkok during 1993 - 2005. In 2004, numbers of population dropped due to a revision of household records and number of all vehicles declined because number of vehicles, which licenses were terminated, was removed. Total vehicles increased from 2.66 million in 1993 to 5.02 million in 2005 and resumed their upward trend. AMP and ESRI (2004) reported that in 2003, about 16.47 million person trips took place per day in BMR, 55% by private and 45% by public vehicles. The private vehicles included cars (35%) and motorcycles (20%). The main public vehicles were buses (23%), taxis and tuk-tuks (10%), hired motorcycles (7%), passenger vans (3%), boats (1%), commuter trains and rail transit systems (1%). Travel conditions were poor with an average speed of 15 kph in the inner area of Bangkok, 18 kph in BMA, and 21 kph in BMR. To alleviate traffic congestion problems, the government is attempting to reduce the usage of private vehicles by improving public transport systems, especially the rail transit systems.

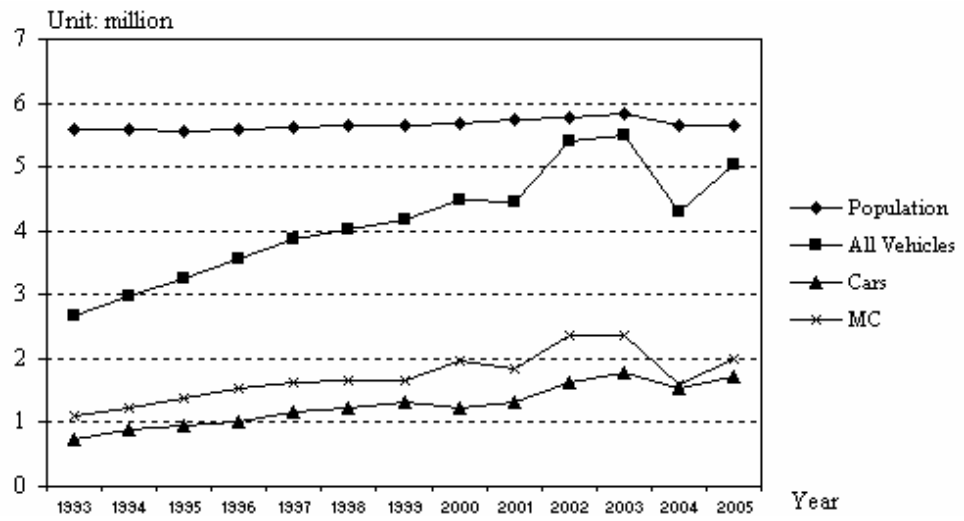


Figure 1: Comparisons between Registered Population and Vehicles in Bangkok (Compiled from DOPA, 2006 and DLT, 2006)

2.2 Overview of Public Transport

Bangkok is situated on the banks of the Chao Phraya River into which feed the city's canal network. The city has benefited from both water and land transport. Public transport systems in Bangkok are categorized into three groups that are water-based, rail-based and road-based.

Water transport plays a less important role in the public transport system due to its confined service areas. Express boats and canal boats are more popular during rush hours because they help commuters to save travel time. Fares on water transport are similar to conventional a-c

buses, yet the travel time is less. Nonetheless, the level of comfort is low, especially in canals due to the water pollution problem.

Rail-based public transport comprises commuter trains and urban rail transit systems. State Railway of Thailand (SRT) operates the commuter trains as a public service obligation on lines radiating for 61-133 km from Bangkok. The commuter trains play an insignificant role due to their limited service areas, low frequency, and low level of comfort. For the urban rail transit systems, the first phase of the Bangkok Mass Transit System (BTS) was opened in 1999 with a total of 23.1 km of routes and the second phase is under construction. In 2004, the first 20 km phase of an Underground Metro Line was opened. The BTS is operated by a private company and the Metro is managed by a government agency. To attract more commuters, extension of the rail transit systems comprising a further 291 km on seven routes was approved by the government in 2004 and planned for completion in 2009 (OTP, 2004).

Road-based public transport includes mass public transport and personal public transport modes. Bangkok Mass Transit Authority (BMTA) was authorized to provide bus services in BMR (BMTA, 2004). The government considers BMTA services as a welfare function. BMTA follows this government policy in providing cheap fares for lower income groups. Consequently, bus fares are priced below fully allocated costs and the deficiency is being met by government subsidy. Since BMTA is the only agency authorized to provide bus services, the other bus operators have to get sub-license contracts from BMTA. As of September 2005 (BMTA, 2006), BMTA is responsible for 15,857 vehicles on 429 routes. BMTA operates 3,579 buses on 102 routes with joint-service buses (3,485 buses, 106 routes), minibuses (1,113 buses, 46 routes), small buses plying lanes- operate only on local roads (2,161 buses, 105 routes), and passenger vans (5,519 vans, 116 routes), as presented in Figure 2. The passenger vans have the highest number of vehicles and routes.

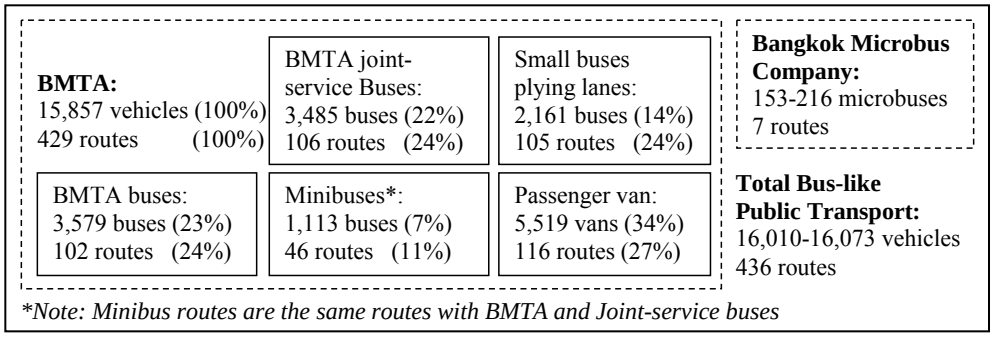


Figure 2: Mass Public Transport in Bangkok (BMTA, 2006)

Another mass public transport is the microbus service that provides 35-seat air-conditioning minibuses with guaranteed seats. The service is operated by Bangkok Microbus Company, a private company that has been directly regulated by the Department of Land Transport (DLT) since 1993. The number of routes was reduced from 35 routes in 1993 to 7 routes in 2004. To

continue the business, the company joined hands with BTSC to provide some minibuses as shuttle bus services that circulate around BTS stations and feed passengers to the stations.

The personal public transport in Bangkok includes taxis, tuk-tuks, and hired motorcycles. After the government ended entry regulation to the taxi trade in 1992, taxis have been licensed by DLT (GTZ, 2003). At the end of January 2005, Bangkok has 81,983 licensed taxis (DLT, 2005a). The tuk-tuk is a three-wheeled vehicle that has a two-stroke engine and is powered by liquefied petroleum gas (LPG). DLT imposed a limit of 7,400 tuk-tuks in the Motor Vehicle Act (GTZ, 2003). There were 7,382 tuk-tuks in Bangkok at the end of 2003 (DLT, 2005a). Hired motorcycles have become common for public transport commuters in Bangkok in the last ten years. They play roles as feeder services that take passengers from local roads to conventional public transport on main roads. As from May 11 2005, DLT requires all hired motorcycles in Thailand to be registered (DLT, 2005b).

2.3 Development of Passenger Van Services

2.3.1 Process of Regulation

There is no record of when the passenger van services were actually started in Bangkok. A report from DLT explained that when the Land Transport Act B.E. 2522 was enforced in 1979, there was no regulation related to passenger van services (DLT, 2003). However, the Act states that operating public transport services requires official permission from DLT. The passenger van services were operated as public transport services by investors without getting permission from DLT. Furthermore, the Motor Vehicle Act of B.E. 2522 (1979) determines that drivers are not allowed to operate passenger vans as public vehicles when they are registered as private vehicles. Additionally, under the Royal Decree Establishing BMTA B.E. 2519 (1976), only BMTA is authorized to provide bus services in BMR. Therefore, DLT promulgated that operating vans as public transport services were illegal in 1984, and the Ministry of Transport (MOT) formulated a policy to eliminate the passenger van services in 1986 (DLT, 2003). Notwithstanding this, the passenger van services kept expanding during 1986 to 1996 as the suburbs of Bangkok developed as residential areas and most working places continued to be located in the central areas. Suburbanites, who could not afford private vehicles, required proper public transport services for commuting. While BMTA provided bus services on main roads, passenger vans located their terminals in new housing estates, markets or community centres in suburbs and connected to shopping centres, education areas, and locations where passengers could transfer to other public transport modes.

The popularity of the passenger vans caused the incumbents including BMTA and its joint-service operators considered the passenger vans as competitors. They complained to DLT that passenger van routes were overlapped and the passenger vans competed to take passengers. Panyasutti (2001) studied the passenger van policy and found that the policy was initiated when politicians responded to the complaints and exercised their power through the policy

maker that was the MOT. Therefore, the government has enforced passenger van regulations to eliminate competitions between the passenger vans and BMTA bus services since 1999. DLT and BMTA were assigned by MOT as main agencies involved in the passenger van regulation. The two agencies proposed the passenger van policy based on their knowledge and experiences. Feasibility of the policy and its impacts were not considered. Furthermore, the passenger van policy was based on no theory and lack of academic reliability. Leopairojna and Hanaoka (2005) explain that BMTA was granted "transport business licenses" to operate passenger van services and distributed sub-license contracts to passenger van drivers. To get the sub-licenses, passenger van drivers had to improve conditions of their vehicles to meet DLT standards, arranged insurances for passengers, paid entry and contract fees to BMTA, and agreed to pay monthly concession fee to BMTA without receiving subsidy from the government. The licenses are limited to 5,574 vans. Passenger van operators could request for additional fleets and routes by gathering 500 signatures from passengers and proposing their requests through district councils (DLT, 2003). BMTA would submit the requests to DLT for approval. According to the transport business licenses (DLT, 1999), passenger van fares are controlled at not more than 1 baht/km for the first 10 km and not more than 0.60 baht/km for each additional km. An additional fare, that is not more than 5 baht/person/trip, is allowed for routes operated on expressways or toll ways. The passenger van drivers are under BMTA authority, while DLT monitors the passenger van services and has authority to withdraw licenses of routes that are below DLT standards. Regulations concerning passenger van services by the two agencies are summarized in Box 1.

Box 1: Regulation Regarding Passenger Van Services

In each Transport Business License (DLT, 1999), the following conditions are fixed:

- Route alignment, origin and destination
- A minimum and maximum range of passenger vans (passenger van quota on each route)
- Type and colour of a passenger van (following DLT standards) and capacity (not more than 12 seats)
- Number of persons attached to a vehicle (a driver and a fare collector)
- Daily work time (head office and local office must be open from 8.30am to 4.30pm on business day)
- Places for keeping, repair and maintenance the vehicles
- Operating hours (6.00am to 10.00pm) and minimum total daily trips (detailed timetable and headway are set by a passenger van company of each route)
- Maximum fare (for example, passenger vans on route 1 can charge not more than 15 baht/person/trip)

In BMTA regulations (BMTA, 2001), passenger van drivers have to follow these regulations:

- Picking up passengers only at origins and drop off them at bus stops along routes or at destinations, asking passengers to get off before arriving at their destinations is prohibited
- To operate vans outside regular routes, drivers have to get official permission from DLT and BMTA
- To stop temporarily for repairing or for some reasons, drivers have to inform BMTA
- Monthly concession fee (1,070 baht) must be paid to BMTA
- Motor and compulsory third party insurances must be provided to passengers in case of accidents
- Vehicles must be clean and in good conditions
- Drivers have to follow Land Transport Act B.E. 2522 (1979) for driving disciplines

The government regulated the passenger van services to provide licensed passenger vans and to eliminate the influential figures from the business. Initially, management of the passenger van services was started by investors who established terminals, determined routes, and operated the services including the setting of fares and schedules. To establish the terminals, the investors required support from influential figures and paid huge kickbacks in return. Passenger van drivers were required to be members of the terminals and had to pay entry and monthly membership fees. After the regulation, the investors continued as passenger van companies and the influential figures were remained as observed from rising of the fees. In 1998, the maximum entry and monthly membership fees were 100,000 and 4,000 baht (Eamsupawat, 1999). After the regulation, the fees were raised to 250,000 and 5,000 baht (Longji, 2003). Moreover, some illegal vans are found on the regulated passenger van routes mixing with the legal fleets.

One possible reason that the illegal vans remain is actual number of passenger vans before the registration was higher than the given passenger van quota. A report form BMTA show that BMTA received transport business licenses of 115 van routes with a range of 4,789-8,505 vans from DLT in 2000 (BMTA, 2001). The maximum number was the existing number of vehicles found in field surveys, i.e., the existing number of vans was around 8,500 vans. In addition, the Senatorial Subcommittee studied passenger vans in July 2001 and found that 8,000 to 9,000 vans were operated in Bangkok and surrounding provinces (Nation, 2001). However, during the registration period from 1999 to 2001, only 5,566 van drivers applied for the contracts from BMTA (BMTA, 2001). In 2002, a Deputy Minister of MOT aimed to complete the van-regulating task to support his campaign for Bangkok traffic order (Bangkokpost, 2002). Therefore, DLT and BMTA concluded that only 5,566 vans actually operated in Bangkok (PFEC, 2003) and the Deputy Minister made a policy to limit quota of the van licenses as 5,566 vans (DLT, 2003) without considering supply of other bus services and demand of commuters in Bangkok. There was a request to increase the van quota, but the Deputy Minister insisted that the quota was appropriate (Longji, 2003). In 2004, BMTA revised the numbers of vans on each route by surveying the actual number of vans operated and received licenses on these routes. The range of passenger vans was amended at 3,964 - 5,574 vans (DLT, 2004). The maximum number of the passenger vans found in the field survey was given as the revised passenger van quota. This information shows that the government controlled number of passenger vans by using ad hoc approach and based on the actual situations and political matters without theoretical thinking. An analysis of market structure, market segmentation, and real competitors of the passenger vans has not been undertaken.

2.3.2 Competitors of the Passenger Vans

One reason that BMTA considered that there were competitions between the passenger vans and BMTA buses is duplications of their routes. When the passenger van services were started, they operated on high demand routes and overlapped with BMTA services. In 1999, BMTA surveyed passenger van routes and submitted the routes to DLT for approval of transport business licenses (BMTA, 2001). The submitted van routes were not modified, however, and the duplications were continued. Leopairojna and Hanaoka (2005) compared household income and mode usages of Bangkok residents and passenger van commuters and found that the passenger van and BMTA a-c bus commuters had similar income levels. It may therefore be assumed that the main competitor of the passenger van service is the BMTA a-c bus service. Comparison between passenger van and BMTA a-c bus services is presented in Table 1. There are 5,574 vans on 144 routes and 1,890 a-c buses on 79 routes. Van fares vary from 8-43 baht. In May 2005, BMTA a-c bus fares were 9-17 baht for ordinary type and 11-21 baht for EURO I and II a-c buses. Fares of vans and a-c buses were not so different for routes that are shorter than 20 km. The gap was increased with operating distances. For routes that had operating distances 51-60 km, fares of passenger van were two times higher than fares of a-c buses. Most of passenger vans operate route distances of 21-30 km while most of a-c buses operate route distances of 31-40 km.

Leopairojna and Hanaoka (2005) studied competition between the passenger van and a-c bus services based on the supply side using the northern corridor of Bangkok as a case study area. There were two passenger van companies operated on the same route. Surveys of the van drivers show that they considered another group and unlicensed vans as their competitors, not the a-c buses. The van drivers agreed that the passenger van users were a different attributive group compared to a-c bus users. However, BMTA judged the passenger vans as competitors because of duplications between their routes and attempted to increase its number of bus users by revising route alignments, improving services such as providing new a-c buses, and operating on expressway during peak hours with the existing fare. The competition yields benefits to the users because they have more alternatives for their commuting. Opinions of the van drivers regarding the passenger van regulations show that they agreed with the passenger van quota that prevents new drivers to enter the market. The van drivers preferred this job due to its self-employed attribute since they own or rent the vans and manage their working hours themselves and its good profits since they could earn 15,000-45,000 baht/month while a new graduate earns 7000 baht/month in a public agency. To maintain their good incomes, the drivers agreed that the maximum fares should be revised to cover increased fuel costs, the regulated capacity (11 passengers) should be increased to 14 passengers, and they should be allowed to pick up passengers from bus stops along their routes.

Table 1: Comparison between Passenger Vans and BMTA a-c Buses

Distances (km)	Passenger vans			BMTA a-c buses		
	Number of routes[1] (Percentage)	Number of vehicles[2] (Percentage)	Fares[3] (baht)	Number of routes (Percentage)	Number of vehicles (Percentage)	Fares (baht)
1-10	8 (6%)	188-265 (5%)	8-14	0 (0%)	0	9-11[4], 11-15[5]
11-20	46 (32%)	100-1,400 (25%)	10-21	12 (15%)	171 (9%)	11-15, 15-19
21-30	66 (46%)	1,964 -2,767 (50%)	10-27	23 (29%)	483 (26%)	15-17, 21
31-40	16 (11%)	523-735 (13%)	20-32	29 (37%)	781 (41%)	17, 21
41-50	6 (4%)	245-346 (6%)	20-38	14 (18%)	427 (23%)	17, 21
51-60	2 (1%)	44 -61 (1%)	43	1 (1%)	28 (1%)	17, 21
Total	144 (100%)	3,964 -5,574 (100%)	8-43	79 (100%)	1,890 (100%)	9-17, 11-21

Note: [1] Number of main routes and sub-routes
[2] The minimum and maximum range in the passenger van quota determined by BMTA and DLT
[3] Additional 5 baht for routes operated on expressways or toll way
[4] Fares of BMTA ordinary a-c buses start from 9 baht to 17 baht (2 May - 8 July 2005)
[5] Fares of BMTA EURO I and II a-c buses start from 11 baht to 21 baht (2 May - 8 July 2005)

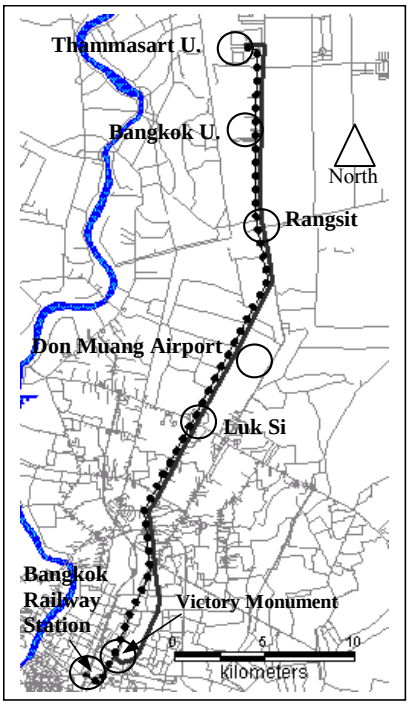
Source: The authors made from DLT (2004) and Naewna (2005)

3. STUDY DESIGN AND METHODOLOGY

From checking passenger van and BMTA a-c bus routes, there were seven corridors that the two modes have the same route alignments, origins and destinations. From field surveys, some passenger van routes were not operated and had too small number of fleets comparing to the a-c buses. Therefore, three corridors comprising nine routes of passenger vans and a-c buses in the northern part of Bangkok were selected as case study areas. Questionnaire surveys were prepared and distributed to passenger van and a-c bus users boarding in the three corridors. Conjoint analysis method was applied to find preferences of the respondents. Before preparing surveys using conjoint analysis method, a pilot survey of public transport users was conducted.

3.1 Case Study Areas: Three Corridors

The three corridors, referred to as corridors A, B, and C. They have different features in terms of distance, fare, and land use type of the origins and destinations. Corridor A comprises passenger van route 85 and a-c bus routes 29, 39, and 510. The surveys were not conducted on a-c bus routes 39 and 510 because their route alignments are different from the passenger van route. In addition, these two a-c bus routes do not operate on the Tollway while the passenger van and a-c bus route 29 operate on the Tollway on whole operation hours and during peak hours respectively. The passenger van route 85 and a-c bus routes 29 have origins in Thammasart University (TU) Rangsit Campus and destinations at Victory Monument (VM) and Bangkok Railway Station, as shown in Figures 3.



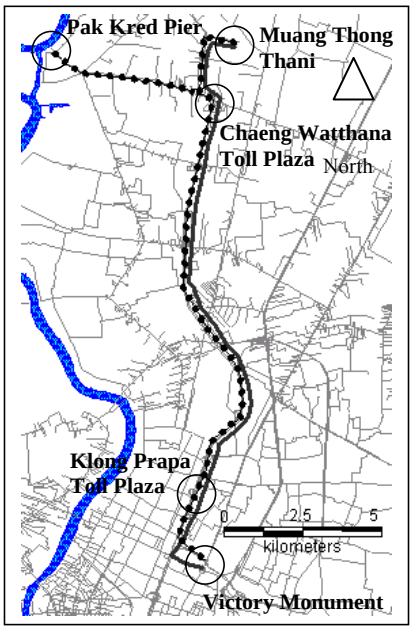
Corridor A

	Passenger Van Route 85	BMTA a-c Bus Route 29
Operator	Two van companies	A Private Company
Origin	Thammasart U.	Thammasart U.
Land Use Type	Education Area	Education Area
Destination	Victory Monument	Bangkok Railway Station
Land Use Type	Transportation Hub	Transportation Hub
Distances	45 km	42.5 km
Fares	30 Baht	17 Baht
Expressway Usage	Yes	Yes, only peak hours
Travel time	45 min (off-peak)	120 min (off-peak)
	60 min (peak)	90 min[1] (peak)
Vehicles	53-74 vans	40 a-c buses
Regulated Capacity	11 seats, no standee	46 seats, 30 standees
Headways	5-8am 5 min	Peak hours: 5-7 min
	8-9am 10 min	Off-peak hours: 10 min
	9-10am 20 min	
	10am-4pm 15 min[2]	
	4-9pm 10 min	

Note: [1] Ttravel time using the Tollway during peak hours
[2] Start timing when the first passenger gets on a van

Figure 3: Information and Route Alignments of Corridor A

Corridor B includes passenger van route 86 and a-c bus route 166. The two routes are operated on the Second Stage Expressway from Muang Thong Thani (MTT) to Victory Monument (VM). However, the a-c bus route is extended to Pak Kred Pier, as presented in Figure 4. The a-c bus users have to travel from MTT to Pak Kred Pier before entering the Expressway at Chaeng Watthana Toll Plaza and exiting at Klong Prapa toll plaza on Rama 6 Road while the passenger vans exit at Victory Monument. Passengers on the passenger vans have to transfer to other vehicles to reach destinations on Rama 6 Road.



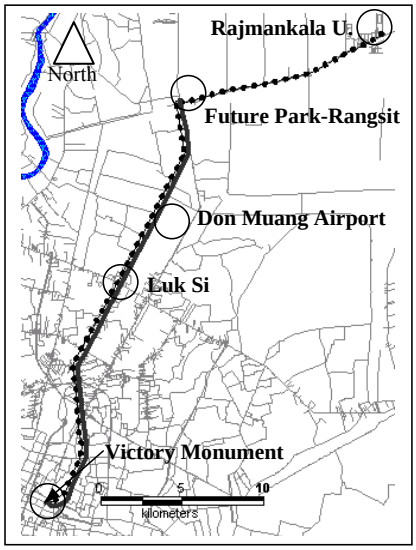
Corridor B

	Passenger Van Route 86	BMTA a-c Bus Route 166
Operator	A van company	BMTA
Origin	Muang Thong Thani	Muang Thong Thani
Land Use Type	Residential Area	Residential Area
Destination	Victory Monument	Victory Monument
Land Use Type	Transportation Hub	Transportation Hub
Distances	20 km	31 km
Fares	25 Baht	17 Baht
Expressway Usage	Yes	Yes
Travel time	20 min (off-peak)	40 min (off-peak)
	25 min (peak)	45 min (peak)
Vehicles	53-74 vans	20 a-c buses
Regulated Capacity	11 seats, no standee	46 seats, 30 standees
Headways	5.30-11am Full	Peak hours: 7-8 min
	11am-2pm 15 min[1]	Off-peak hours: 10-15 min
	2-3pm 10 min[1]	
	3-4pm 10 min	
	4-6pm 5 min	
	6-8pm Leave when another van arrives	
	8-9pm 5 min	
	9-10pm 10 min	

Note: [1] Start timing when the first passenger gets on a van

Figure 4: Information and Route Alignments of Corridor B

Corridor C contains passenger van route 83 and a-c bus routes 538 and 522. The passenger van and a-c bus route 522 have the same origins and destinations but the route alignments are different and route 522 is not operated on the Tollway. Interviewing the van drivers show that they considered route 538 as their competitors because it is operated on the Tollway and has the same route alignments. Passenger van route 83 has its origin at Future Park Rangsit Shopping Centre (FPR) while a-c bus route 538 has its origin at Rajmankala University (RU). The two routes have the same destinations at Victory Monument (VM), as shown in Figure 5.



Corridor C

	Passenger Van Route 83	BMTA a-c Bus Route 538
Operator	A van company	A Private Company
Origin	Future Park- Rangsit	Rajamankala U.
Land Use Type	Shopping Center	Education Area
Destination	Victory Monument	Victory Monument
Land Use Type	Transportation Hub	Transportation Hub
Distances	28 km	42 km
Fares	20 Baht	19 Baht
Expressway Usage	Yes	Yes
Travel time	20 min (off-peak)	25 min[1] (off-peak)
	40 min (peak)	45 min[1] (peak)
Vehicles	40 vans	30 EURO I a-c buses
Regulated Capacity	11 seats, no standee	46 seats, 30 standees
Headways	Peak hours: 5 min or full	Peak hours: 5 min
	Off-peak hours: Full (Not longer than 15 min)	Off-peak hours: 7 min

Note: [1] Travel time from Future Park-Rangsit to Victory Monument

Figure 5: Information and Route Alignments of Corridor C

3.2 Questionnaire Surveys

Questionnaire surveys of passenger van and a-c bus users were conducted on three corridors between April and May 2005. A revealed and a stated preference approaches were applied to find characteristics of the respondents and their trips, their mode selections, and their opinions. A "multiple factor (attribute) full-concept" conjoint analysis method were employed to find preferences of the users. Questionnaire items were grouped in 4 parts that are characteristics of the respondents and their trips, mode selection, opinions of the respondents, and their preferences. Details of the items are presented in Box 2.

Box 2: Questionnaire Items

Part 1. Respondent and Trip Characteristics:
- Gender
- Age
- Household income
- Household vehicles
- Occupation
- Origin and destination
- Frequency of travelling by passenger vans/a-c buses
- Main trip purpose

Part 2. Mode Selection:
- Present regular public transport mode
- Former regular public transport mode
- Reason(s) to select the present mode
- Availability of passenger vans/a-c buses
- Reason(s) for not selecting passenger vans/ a-c buses
- A new mode if this passenger van/a-c bus route stop operating
- Possibility to change mode if passenger van/ a-c bus fares were increased
- A new mode if passenger van/a-c bus fares were increased

Part 3. Opinions of the respondents:
- Suitability of existing fares
- Suitability of planned schedules
- Consistency of planned and actual schedules
- Overload capacity of passenger vans/a-c buses
- Deregulation of passenger van entry
- Allowing van drivers to pick up passengers along routes

Part 4. Preferences of the respondents:
(Details are described in sections 3.3 and 3.5)

3.3 Conjoint Analysis

SPSS (1997) explains that in conjoint analysis, products are separated into different product features. The product features are general "attributes" or "factors" of the product, such as size, colour, or price. Each attribute has different "levels" that represent specific values of the attributes for a particular product. For example, the attribute 'size' can have two attribute levels that are 'small' and 'large'. The attributes are measured by "importances". The importances evaluate the total impact that a particular attribute can have on total preference. The attribute levels are measured by their "utilities". The utility scores or "path-worth utilities" or "path-worths" are measures of how important each attribute is to a respondent's preference of a product. The highest total utility score represents the most preferred product features. The attributes and attribute levels must be selected before collecting data for conjoint analysis. There are two approaches in collecting data for conjoint analysis. The first approach is the "two-factor (attribute)-at-a-time trade off method". In this approach, a trade-off matrix,

which presents all combinations of all levels of two attributes of a product, are prepared for respondents. The respondents are asked to rank the combinations based on their preferences. This approach is not popular because the matrix can handle only two attributes at a time while many attributes are involved in studies (MV-Research, 2002). The second approach is the "multiple factor (attribute) full-concept method" which is used in this study. In this approach, a set of product concepts or profiles is prepared for respondents. One product concept includes one level of each attribute. The respondents are asked to rank, order, or score these product concepts according to their preferences. The technique has been applied in many studies as to predict preferences for transport services, financial services, and automobiles. However, the technique is not suitable for products that consumers evaluate by their "image" such as beer or cigarettes (Populus, 2004). Conjoint analysis is applied in the field of transport study by many researchers. For example, Kroes and Sheldon (1988) clarified that conjoint analysis is the best-known stated preference (SP) method that uses experimental design procedures to provide different transport options for consideration by respondents. Pas and Huber (1992) employed conjoint analysis in studying how inter-city rail travellers respond to new transport services and what attributes of the services they prefer. Maier et al. (2002) used conjoint analysis technique to examine the preferences and behavioural stability of product logistics managers. Daneilis et al. (2005) applied conjoint analysis to estimate the preferences of logistics managers in freight service attributes. Nam et al. (2005) examined consumer preferences for transport telematics services over time in terms of services features and purchasing time by conjoint analysis method. In this paper, conjoint analysis was applied to study what attributes that passenger van and a-c bus users prefer in selecting public transport modes. The conjoint analysis technique was selected because it estimates the "trade-offs" that the users make in choosing their modes. The technique is very close to their actual lives when people have to make decisions among numerous things under different situations.

3.4 Pilot Study of Public Transport Users

Before preparing the questions using conjoint analysis technique, a pilot study of 100 public transport users was conducted in January 2005 to find the most important attributes considered in selecting their modes. Attributes selected for the pilot survey were based on five main attributes, namely cost, safety, time, convenience, and comfort, as presented in Table 2.

Table 2: Attributes in the Pilot Survey

Main Attributes	Attributes	Rank
Cost	**Fares**	**3**
Safety	Vehicle conditions such as old or new, cleanliness and size of vehicles	6
	Crew manner and driving behaviour	5
	Image/reputation of the mode such as occurrences of road accidents	11
Time	A mode that arrives at where you are waiting first, no matter what type it is	10
	Reliability: arriving at a bus stop or leaving a van terminal at the same time everyday	12
	Saving in-vehicle travel time	**1**
Convenience	Ease of travel from your home to a bus stop or a van terminal	7
	Ease of transferring to other modes to complete your trip	8
	Making a trip without changing vehicles	**2**
Comfort	Availability of information at a bus stop or a van terminal such as schedule and map	12
	Comfort such as air-conditioning and guaranteed seats	**4**
	Facilities at bus stops or van terminals such as seats and shelter	13
	Perceived distances of the route either short or long distances	9
	Level of crush and probability of getting a seat	8

The respondents included undergraduate and graduate students, administrative staff, and workers in Asian Institute of Technology (AIT) and Thammasart University (TU) Rangsit Campus. The respondents were asked to select four attributes that they considered most important and rank them. Results of the pilot survey shows that the most important attributes were saving in-vehicle travel time, completing a trip without transferring to other vehicles, fare, and comfort such as air-conditioning and guaranteed seats. These four attributes were employed in formulating questionnaire surveys using conjoint analysis approach to examine passenger van and a-c bus users. Reliability and waiting time were not selected since passengers in Bangkok get used to with unreliable and long waiting time bus services.

3.5 Determination of User Preferences

Before preparing questions for conjoint analysis, attributes of passenger van and a-c bus must be selected, as described in Section 3.4. Levels of the attributes were based on existing conditions of the passenger van and a-c bus routes obtained from field surveys. On corridor A, travel times from TU to VM during peak hours are 60 and 90 minutes, and fares are 30 and 17 baht for the passenger vans and a-c buses respectively. On corridor B, travel times from MTT to VM are 25 and 45 minutes, and fares are 25 and 17 baht for the passenger vans and a-c buses respectively. On corridor C, travel times from FPR to VM are 40 and 45 minutes, and fares are 20 and 19 baht for passenger vans and a-c buses. Attributes and attribute levels of the passenger van and a-c bus included in the study are presented in Table 3.

Table 3: The Attributes and Attribute Levels included in the Study

Attributes	Attributes Levels	Corridor A	Corridor B	Corridor C
Travel time	Travel time by passenger vans	60 minutes	25 minutes	40 minutes
	Travel time by a-c buses	90 minutes	45 minutes	45 minutes
Transferring	Need to transfer	Transfer	Transfer	Transfer
	No need to transfer	No Transfer	No Transfer	No Transfer
Fare	Fare of passenger van	30 Baht	25 Baht	20 Baht
	Fare of BMTA a-c buses	17 Baht	17 Baht	19 Baht
Seat Availability	Guaranteed seat	Guaranteed	Guaranteed	Guaranteed
	Not guaranteed seat	Not guaranteed	Not guaranteed	Not guaranteed

After selecting the attributes and attribute levels, a set of product concepts or profiles is prepared. One product concept includes one level of each attribute. From Table 3, each corridor would require 16 profiles (2x2x2x2) that would be too many for a respondent to rank, order, or score. Therefore, an "orthogonal array" was applied. An orthogonal array is a subset of all of possible combinations that allows estimation of the part-worths for all main effects (SPSS, 1997). By generating an orthogonal array design, each corridor got a set of ten profiles. The differences among the three sets of profiles were levels of travel times and fares. In each set, there were two profiles representing existing conditions of the passenger van and a-c bus routes. In the surveys, the respondents were asked to assign a rank to each profile from 1 to 10, that is 1 for the most preferred and 10 for the least preferred profiles.

4. RESULTS AND INTERPRETATION

4.1 Characteristics of the Respondents and their Trips

A total of 960 copies of questionnaires were distributed to passenger van and a-c bus users on the three corridors and 726 copies were completed. Characteristics of the respondents and their trips are compared in percentages and summarized in Table 4. From Table 4, percentage of female respondents on the passenger vans were high (61%, 66% and 62% on corridors A, B, and C) because the passenger vans offer similar level of services to taxis but give better sense of safety (from crimes) for female passengers who commute on their own. The similar characteristics of the respondents on the three corridors were majority of them had private vehicles in their households (83% of all respondents) and their main trip purposes were to work or attend schools (51%) and personal business (31%).

From data in Table 4, chi-square test was applied with the null hypothesis that there is no difference between the respondents on the passenger vans and a-c buses on the three corridors in terms of distributions of genders, age groups, household income, household vehicles, occupation, frequency of travelling by passenger vans/a-c buses, and trip purpose. On corridor A, results of the chi-square test show that at 95% confident level, distributions of gender, age groups, household incomes, household vehicles, occupations, and trip purposes of the

respondents on the passenger vans and a-c buses were not different. However, distribution of frequencies of travel was different. From Table 4, 45% of the respondents on the passenger vans travelled by the passenger vans less often than 10 times/month while 31% of the a-c bus respondents travelled by a-c buses more often than 40 times/month. One possible reason is that many students in TU and BU stay in dormitories and go home during weekends. The students, who stay in dormitories, selected the passenger vans for this trip purpose while the students, who commute, selected a-c buses to travel between home and universities.

On corridor B, results of the chi-square test show that at 95% confident level, distributions of age groups, household incomes, household vehicles, occupations, and trip purposes of the respondents on the two modes were not different but distributions of genders and frequencies of travel were different. The reason of difference between the frequencies of travel is unclear. The larger part of the respondents on the passenger vans and a-c buses were female (66%) and male (52%) respectively. Percentage of female respondents on the passenger vans were high since the passenger vans offer similar level of services to taxis but give better sense of safety for female passengers, as mentioned earlier.

On corridor C, results of the chi-square test show that at 95% confident level, distributions of genders, household vehicles, frequencies of travel, and trip purposes of the respondents on the two modes were not different but distributions of age groups, household incomes, and occupations were different. The larger part of the passenger van respondents were working adults (54%), ages older than 20 years old (66%) and had household incomes higher than the average household income of population in BMR (59%). The majority of the respondents on the a-c buses was students (67%), age 20 years old and younger (44%), and had household incomes lower than the average of BMR (57%). The students selected the a-c buses because they could reach their destinations (VM or RU) without transferring and the a-c bus operator offers discount bus fares to the students.

Table 4: Characteristics of the Respondents and their Trips (%)

Corridor A	**Passenger Van Route 85 (115 completed copies)**						**BMTA a-c Bus Route 29 (130 completed copies)**					
Gender	Male 39	Female 61					Male 49	Female 51				
Age (years old)	≤ 20 50	21-30 34	31-40 10	41-50 5	> 50 1		≤ 20 55	21-30 36	31-40 6	41-50 2	> 50 1	
Household Income (baht/month)	<28,000 28	28-40,000 30	>40,000 27	n/a. 15			<28,000 28	28-40,000 23	>40,000 38	n/a. 11		
Household Vehicles	None 11	One mc 11	One car 24	Multiple 54			None 9	One mc 9	One car 22	Multiple 58	n/a. 2	
Occupation	Student 66	Self 7	Private 11	Public 12	Others 4		Student 74	Self 8	Private 12	Public 4	Others 2	
Frequency of travel (times/month)	10 or less 45	11-20 10	21-30 18	31-40 7	>40 14	n/a. 6	10 or less 20	11-20 19	21-30 24	31-40 4	>40 31	n/a. 2
Trip Purpose	Work 58	Personal 27	Social 6	Shopping 4	Others 5		Work 56	Personal 26	Social 7	Shopping 6	Others 5	
Corridor B	**Passenger Van Route 86 (110 completed copies)**						**BMTA a-c Bus Route 166 (108 completed copies)**					
Gender	Male 34	Female 66					Male 52	Female 48				
Age (years old)	≤ 20 21	21-30 47	31-40 16	41-50 11	> 50 5		≤ 20 27	21-30 52	31-40 11	41-50 6	> 50 4	
Household Income (baht/month)	<28,000 35	28-40,000 21	>40,000 32	n/a. 12			<28,000 34	28-40,000 22	>40,000 29	n/a. 15		
Household Vehicles	None 23	One mc 8	One car 28	Multiple 41			None 19	One mc 10	One car 36	Multiple 31	n/a. 4	
Occupation	Student 34	Self 17	Private 28	Public 16	Others 5		Student 44	Self 11	Private 25	Public 18	Others 2	
Frequency of travel (times/month)	10 or less 38	11-20 11	21-30 20	31-40 0	>40 24	n/a. 7	10 or less 24	11-20 14	21-30 18	31-40 2	>40 38	n/a. 4
Trip Purpose	Work 44	Personal 36	Social 7	Shopping 9	Others 4		Work 53	Personal 26	Social 9	Shopping 7	Others 5	
Corridor C	**Passenger Van Route 83 (123 completed copies)**						**BMTA a-c Bus Route 538 (140 completed copies)**					
Gender	Male 38	Female 62					Male 42	Female 58				
Age (years old)	≤ 20 32	21-30 41	31-40 14	41-50 11	> 50 0	n/a. 2	≤ 20 44	21-30 42	31-40 8	41-50 5	> 50 1	
Household Income (baht/month)	<28,000 33	28-40,000 26	>40,000 33	n/a. 8			<28,000 57	28-40,000 22	>40,000 9	n/a. 12		
Household Vehicles	None 14	One mc 13	One car 27	Multiple 43	Others 3		None 20	One mc 22	One car 16	Multiple 40	n/a. 2	
Occupation	Student 46	Self 10	Private 30	Public 12	Others 2		Student 67	Self 5	Private 18	Public 6	Others 4	
Frequency of travel (times/month)	10 or less 34	11-20 18	21-30 21	31-40 3	>40 20	n/a. 4	10 or less 49	11-20 14	21-30 15	31-40 4	>40 16	n/a. 2
Trip Purpose	Work 51	Personal 31	Social 8	Shopping 7	Others 3		Work 39	Personal 35	Social 11	Shopping 9	Others 6	

On the entire three corridors, results of the chi-square test show that at 95% confident level, distributions of household incomes, household vehicles, and trip purposes of the respondents on the passenger vans and a-c buses were not different. However, distributions of genders, age groups, occupations, and frequencies of travel were different, but these characteristics were not significant. From their characteristics, it could be

concluded that the respondents on the passenger vans and a-c buses were in the same groups who had household incomes higher than the average household income of BMR (63%), had private vehicles (a motorcycle, a car, or both) in their households (84%), and had main trip purpose to work or attend school (50%). They were middle income groups and had private vehicles in their households but used public transport for commuting or going to school.

By checking origins and destinations, it found that on corridor A, 53% of the respondents on passenger van route 85 travelled on the whole route between VM and TU (45 km) and 45% travelled between VM and destinations between Rangsit and TU (35-45 km) while none of the respondents on a-c bus route 29 travelled on the whole route (42.5 km) and only 4% travelled between VM and destinations between Rangsit and TU. These results show that the respondents on corridor A selected modes based on their travelling distances, that is, the passenger vans for long-distance trips and the a-c buses for short-distance trips. On corridor B, all of respondents on passenger van route 86 and 39% on a-c bus route 166 travelled on the whole routes between VM and MTT. These results show that the respondents on corridor B selected modes based on route alignments and distances, that is, the passenger vans, which had shorter route alignment and travelling time, were selected when the respondents travelled on the whole route and the a-c buses were chosen when they travelled on some part of the route. On corridor C, 77% of the respondents on passenger van route 83 travelled on the whole routes between VM and FPR (28 km) and 23% travelled between destinations in the middle of VM and FPR while 60% of the respondents on a-c bus route 538 travelled on the whole route between VM and RU (42 km) and 10% travelled between destinations in the middle of VM and FPR. The respondents on corridor C selected their modes based on their origins and destinations, that is, the passenger vans for travelling between VM and FPR, the a-c buses for travelling between VM and RU, and either the passenger vans or the a-c buses for travelling between destinations in the middle of VM and FPR. These results show that the respondents viewed the two modes as different services and selected their modes based on travelling distances, route alignments, and origins and destinations.

4.2 Mode Selection Survey

A revealed preference (RP) approach was applied to find regular modes, modes that the respondents were using regularly before changing to their existing modes, and reasons for selecting or not selecting passenger vans or a-c buses. Stated preference (SP) approach was employed to examine how the respondents would select their modes under assumptions that these passenger van or a-c bus routes were to stop operating and fares were to be increased.
Results of the surveys, which are summarized in Table 5, show that the respondents on passenger vans and a-c buses on the three corridors provided similar results in mode selection.

56% of the respondents on the passenger van route 85, 48% on route 86, and 69% on route 83 travelled by passenger vans regularly. Before changing to the passenger vans, majority of them were travelling by a-c buses. The surveys show that the passenger vans were preferred

because of their shorter travelling times (25%) and greater comfort because of guaranteed seats (14%) while 56% did not give their reasons. Under the assumption that these passenger van routes stopped operating, 77% of the respondents on route 85, 75% on route 86, and 68% on route 83 would change to the a-c buses. Under the assumption that passenger van fares were increased, 43% of the respondents on route 85, 40% on route 86, and 28% on route 83 would change to the a-c buses. These results show that the respondents on the passenger vans viewed the a-c buses as alternatives.

Table 5: Summary of Mode Selection of the Respondents (%)

Corridor A	**Passenger Van Route 85 (115 respondents)**							**BMTA a-c Bus Route 29 (130 respondents)**						
Regular Mode	Van 56	a-c bus 29	Bus 10	Car 1	Taxi -	Others 4	n/a. -	Van 14	a-c bus 65	Bus 18	Car -	Taxi -	Others 3	n/a. -
Previous Mode	Van -	a-c bus 37	Bus 10	Car 2	Taxi 1	Others 2	n/a. 47	Van 13	a-c bus -	Bus 38	Car 6	Taxi 2	Others 4	n/a. 37
Stop operating	Van -	a-c bus 77	Bus 7	Car 5	Taxi 2	Others 3	n/a. 6	Van 47	a-c bus -	Bus 38	Car 2	Taxi 4	Others 5	n/a. 4
Fare increased	Change to new mode 57					No 41	n/a 2	Change to new mode 38					No 62	n/a -
New Modes	a-c bus 43	Bus 5	Car 5	Taxi -	Others 4			Van 19	Bus 14	Car 1	Taxi 1	Others 2		
Corridor B	**Passenger Van Route 86 (110 respondents)**							**BMTA a-c Bus Route 166 (108 respondents)**						
Regular Mode	Van 48	a-c bus 29	Bus 11	Car 2	Taxi 2	Others 5	n/a. 3	Van 17	a-c bus 66	Bus 12	Car -	Taxi -	Others 2	n/a. 3
Previous Mode	Van -	a-c bus 28	Bus 8	Car 4	Taxi -	Others 5	n/a. 55	Van 19	a-c bus -	Bus 33	Car 4	Taxi -	Others 12	n/a. 32
Stop operating	Van -	a-c bus 75	Bus 5	Car 6	Taxi 3	Others 2	n/a. 9	Van 44	a-c bus -	Bus 31	Car 2	Taxi 2	Others 6	n/a. 15
Fare increased	Change to new mode 48					No 52	n/a -	Change to new mode 29					No 68	n/a 3
New Modes	a-c bus 40	Bus 3	Car 1	Taxi 3	Others 1			Van 19	Bus 7	Car 1	Taxi -	Others 2		
Corridor C	**Passenger Van Route 83 (123 respondents)**							**BMTA a-c Bus Route 538 (140 respondents)**						
Regular Mode	Van 69	a-c bus 15	Bus 10	Car 2	Taxi 2	Others 1	n/a. 1	Van 24	a-c bus 64	Bus 11	Car -	Taxi -	Others 1	n/a. -
Previous Mode	Van -	a-c bus 50	Bus 7	Car 2	Taxi 2	Others 9	n/a. 30	Van 19	a-c bus -	Bus 27	Car 6	Taxi -	Others 7	n/a. 41
Stop operating	Van -	a-c bus 68	Bus 10	Car 4	Taxi 5	Others 10	n/a. 3	Van 67	a-c bus -	Bus 17	Car 1	Taxi 1	Others 7	n/a. 7
Fare increased	Change to new mode 42					No 57	n/a 1	Change to new mode 42					No 56	n/a 2
New Modes	a-c bus 28	Bus 3	Car 1	Taxi 1	Others 9			Van 27	Bus 12	Car -	Taxi 1	Others 2		

For the respondents on a-c buses, 65% of the respondents on a-c bus route 29, 66% on route 166, and 64% on route 538 travelled by the a-c buses frequently. Before changing to the a-c buses, they were travelling by regular buses (33%) and passenger vans (17%). The a-c buses were preferred due to the comfort of air-conditioning (16%), and convenience (5%) while 37% did not give their reasons. The passenger vans were less preferred due to expensive fares (21%), discomforts such as narrow space (10%) and crowded (6%), and inconvenient such as needed to travel to passenger van terminals (6%) and needed to transfer (3%) while 46% did not give their reasons. Under the assumption that these a-c bus routes stopped operating, 47% on route 29, 44% on route 166, and 67% on route 538 would change to passenger vans while 38% on route 29, 31% on route 166, and 17% on route 538 would change to regular buses. Under the assumption that the a-c bus fares were increased, 19% of the respondents on route

29, 19% on route 166, and 27% on route 538 would change to travel by the passenger vanswhile 14% on route 29, 7% on route 166, and 12% on route 538 would change to regular buses. These results show that the respondents on the a-c buses viewed the passenger vans as one of alternative rather than regular buses.

The above results show that the effect of increasing passenger van fares was not significant factor for the respondents on the passenger vans because 51% of them would continue travelling by the passenger vans and 38% would change to the a-c buses. The a-c buses were the main alternative mode for them since more than 70% of them would change to a-c buses when these passenger van routes stopped operating. Surprising results were that when fares of the a-c buses were to be increased, 63% of all respondents on the a-c bus would continue travelling by the a-c buses and 23% of them would change to the passenger vans. It could be concluded that that the respondents on the two modes did not considered only fares of each mode as the principal factor in their choices. It might be that price elasticity of demand is not high. Results of the mode selection survey show that the respondents on the passenger vans viewed the a-c buses as alternatives and the respondents on the a-c buses viewed the passenger vans and regular buses as alternatives. Only a small number of the respondents on both modes consider cars and taxis in their mode choices. This result shows that the passenger vans are not only the “cream skimming” but they are essential mode for road public transport in Bangkok.

4.3 Opinions of the Respondents

Results of the questionnaire surveys show that 79% of the respondents on the passenger vans agreed that the van fares were reasonable while 66% of the respondents on a-c buses agreed that the a-c bus fares were reasonable. Planned schedules of the passenger van and a-c bus routes were provided in the questionnaires, 68% and 70% of the respondents on the passenger vans and a-c buses agreed that the planned schedules were adequate but only 39% and 25% of them agreed that the actual schedules were consistent with the planed schedules. These results show that the a-c bus and passenger van schedules were not reliable.

According to BMTA regulations, passenger van drivers are not allowed to pick up passengers from bus stops along their routes. In practice, passenger van drivers pick up passengers along their routes and claim that they offer more choice of modes and more convenience for commuters. The surveys show that 57% of the entire respondents on the passenger vans and a-c buses disagreed with picking up passengers along the routes, as presented in Table 6, because it caused traffic congestion and increased their travelling times. The respondents, who agreed (39%), gave the reason that it offered more convenience for commuters who live far from van terminals.

DLT regulations require a passenger van to have a capacity of 12 seats including a driver. However, most van drivers have added another row of three seats to carry 14 passengers. Van

drivers agreed that the regulated capacity should be increased to 14 seats. In opposition, 90% of the respondents on the passenger vans agreed that a capacity of 14 seats were uncomfortable and unsafe. Similarly, BMTA a-c buses have a regulated capacity of 46 seats and 30 standees, but the number of passengers during peak hours is higher. Consequently, 82% of the respondents on the a-c buses agreed that operations over capacity were uncomfortable and unsafe. Regarding passenger van entry regulations, most passenger van drivers disagreed with entry deregulation because it would increase competition for obtaining customers. However, 50% of the entire respondents agreed that passenger van entry should be deregulated, as shown in Table 6, because number of passenger vans would be increased to meet demands of users, it provided more alternatives for commuters, passengers would be protected, and it would lead to competition in terms of fare reduction and quality improvements. The respondents who disagreed (44%) worried that the deregulation would cause traffic congestion since the number of passenger vans would be increased.

Table 6: Opinions of the Respondents Regarding Passenger Van Regulations

Corridors	Respondents	Picking up passengers along routes			Deregulation of passenger van entry		
		Agreed	Disagreed	n/a.	Agreed	Disagreed	n/a.
Corridor A	115 van users (100%)	43 (37%)	65 (57%)	7 (6%)	67 (58%)	38 (33%)	10 (9%)
	130 bus users (100%)	62 (48%)	65 (50%)	3 (2%)	69 (53%)	58 (45%)	3 (2%)
Corridor B	110 van users (100%)	27 (24%)	82 (75%)	1 (1%)	56 (51%)	49 (45%)	5 (4%)
	108 bus users (100%)	44 (41%)	58 (54%)	6 (5%)	45 (42%)	57 (53%)	6 (5%)
Corridor C	123 van users (100%)	56 (46%)	63 (51%)	4 (3%)	56 (46%)	57 (46%)	10 (8%)
	140 bus users (100%)	53 (38%)	79 (56%)	8 (6%)	72 (52%)	59 (42%)	9 (6%)
All three corridors	348 van users (100%)	126 (36%)	210 (60%)	12 (4%)	179 (51%)	144 (41%)	25 (8%)
	378 bus users (100%)	159 (42%)	202 (53%)	17 (4%)	186 (49%)	174 (46%)	18 (5%)
	726 respondents (100%)	285 (39%)	412 (57%)	29 (4%)	365 (50%)	318 (44%)	43 (6%)

4.4 Results of Conjoint Analysis

During the questionnaire surveys, the respondents were asked to assign a rank to different sets of ten profiles prepared by conjoint analysis. After data was collected, the conjoint procedure was applied to the collected data to calculate utility scores or values of each attribute level. Utility values of the attribute levels based on preferences of the respondents are presented in Table 7. Utility values and averaged importance in Table 7 show that the respondents on corridors A and B considered the difference between “not guaranteed seat” and “guaranteed seat” as more important than the difference between “no transfer” and “transfer”. On corridor C, the respondents considered the difference between “no transfer” and “transfer” as more important than the difference between “not guaranteed seat” and “guaranteed seat” because costs of travelling would be increased when passengers needed to transfer. To arrive at RU, users of the passenger van route 83 have to transfer to another van route or the a-c bus route 538. The transferring increases traveling costs by 15 baht for the a-c buses. On corridors A and B, transferring was also needed but the difference between “no transfer” and “transfer” was less important because the increasing fares were 6 and 10 baht for regular and a-c buses.

Table 7: Averaged Importance and Utility Values of the Attributes

Corridor A	**Passenger Van Route 85**				**BMTA a-c Bus Route 29**				
Mode Attributes	Averaged Importance	Attribute Level	Utility Values	Utility Gain	Mode Attributes	Averaged Importance	Attribute Level	Utility Value	Utility Gain
Seat Availability	30.23	Not guaranteed	1.8772	1.8772	Seat Availability	33.94	Not guaranteed	2.2586	2.2586
		Guaranteed seat	3.7544				Guaranteed seat	4.5172	
Transferring	25.56	No transfer	-1.5877	-1.5877	Transferring	26.68	No transfer	-1.7759	-1.7758
		Transfer	-3.1754				Transfer	-3.5517	
Travel time	24.72	60 minutes	-3.0702	-1.5351	Travel time	21.50	60 minutes	-2.8621	-1.4310
		90 minutes	-4.6053				90 minutes	-4.2931	
Fare	19.49	17 Baht	-1.5830	-1.2105	Fare	17.88	17 Baht	-1.5557	-1.1897
		30 Baht	-2.7935				30 Baht	-2.7454	
Corridor B	**Passenger Van Route 86**				**BMTA a-c Bus Route 166**				
Mode Attributes	Averaged Importance	Attribute Level	Utility Values	Utility Gain	Mode Attributes	Averaged Importance	Attribute Level	Utility Value	Utility Gain
Seat Availability	36.25	Not guaranteed	2.2353	2.2353	Seat Availability	31.01	Not guaranteed	2.1800	2.1800
		Guaranteed seat	4.4706				Guaranteed seat	4.3600	
Transferring	30.52	No transfer	-1.8824	-1.8823	Transferring	30.87	No transfer	-2.1700	-2.1700
		Transfer	-3.7647				Transfer	-4.3400	
Travel time	28.78	25 minutes	-2.2181	-1.7745	Travel time	29.73	25 minutes	-2.6125	-2.0900
		45 minutes	-3.9926				45 minutes	-4.7025	
Fare	4.45	17 Baht	-0.5833	-0.2745	Fare	8.39	17 Baht	-1.2538	-0.5900
		25 Baht	-0.8578				25 Baht	-1.8438	
Corridor C	**Passenger Van Route 83**				**BMTA a-c Bus Route 538**				
Mode Attributes	Averaged Importance	Attribute Level	Utility Values	Utility Gain	Mode Attributes	Averaged Importance	Attribute Level	Utility Value	Utility Gain
Transferring	42.39	No transfer	-2.6818	-2.6818	Transferring	45.10	No transfer	-2.7153	-2.7153
		Transfer	-5.3636				Transfer	-5.4306	
Seat Availability	37.64	Not guaranteed	2.3818	2.3818	Seat Availability	34.83	Not guaranteed	2.0972	2.0972
		Guaranteed seat	4.7636				Guaranteed seat	4.1944	
Travel time	18.10	40 minutes	-9.1636	-1.1454	Travel time	18.80	40 minutes	-9.0556	-1.1314
		45 minutes	-10.309				45 minutes	-10.187	
Fare	1.87	19 Baht	2.2455	0.1181	Fare	1.27	19 Baht	1.4514	0.0764
		20 Baht	2.3636				20 Baht	1.5278	

The above results show that the respondents had the same major concerns in selecting their modes, namely comfort (seat availability), convenience (no transfer), and short travelling time, while the differences of prices (fares) of the passenger vans and a-c buses were not of importance. Furthermore, the results in Table 7 show that averaged importance of attributes - "travel time" and "fare" on corridor A were higher than those on corridors B and C. One reason was that the attribute levels of corridor A were the most different (60 and 90 minutes, and 17 and 30 baht) while the attribute levels of corridor B were smaller different than on corridor A (25 and 45 minutes, and 17 and 25 baht), and the attribute levels of corridor C were not much different (40 and 45 minutes, and 19 and 20 baht).

The utility values can be added together to get the total utility of a profile. The profiles with higher total utilities represent higher preferences. Table 8 presents total utilities of the ten profiles of corridor A. The best service was profile 7 while the worst service was profile 5. Profile 4, which represented existing conditions of the passenger van route 85, received higher preference than profile 9, which represented existing conditions of the a-c bus route 29, but total utility scores were not so different. This means, under the existing conditions on corridor A, the respondents on passenger van route 85 had little potential to transfer to the a-c

buses. They would transfer to modes that have combinations of attributes as presented in profiles 7, 2, and 3 while the respondents on the a-c buses had potential to transfer to passenger vans. Rankings of the profiles by the respondents on the passenger vans and a-c buses were not the same because the utility values, which the respondents on the two modes gained when the attribute levels were changed, were slightly different, as shown in Table 7.

Table 8: Ranking of Profiles by the Respondents on Corridor A

Ranking of Profiles by the Respondents on Passenger Van Route 85						
Rank	Profiles	Travel Time	Transferring	Fare	Seat Availability	Total Utility
1	7	60 min	No transfer	17 Baht	Guaranteed seat	7.6053
2	2	60 min	No transfer	17 Baht	Not guaranteed seat	5.7281
3	3	90 min	No transfer	30 Baht	Guaranteed seat	4.8597
4	4	60 min	Transfer	30 Baht	Guaranteed seat	4.8071
5	*10*	*60 min*	*No transfer*	*30 Baht*	*Not guaranteed seat*	*4.5176*
6	*1*	*90 min*	*Transfer*	*17 Baht*	*Guaranteed seat*	*4.4825*
7	9	90 min	No transfer	17 Baht	Not guaranteed seat	4.193
8	6	90 min	No transfer	30 Baht	Not guaranteed seat	2.9825
9	8	60 min	Transfer	30 Baht	Not guaranteed seat	2.9299
10	5	90 min	Transfer	17 Baht	Not guaranteed seat	2.6053
Ranking of Profiles by the Respondents on BMTA a-c Bus Route 29						
Rank	Profiles	Travel Time	Transferring	Fare	Seat Availability	Total Utility
1	7	60 min	No transfer	17 Baht	Guaranteed seat	7.8275
2	2	60 min	No transfer	17 Baht	Not guaranteed seat	5.5689
3	3	90 min	No transfer	30 Baht	Guaranteed seat	5.2068
4	4	60 min	Transfer	30 Baht	Guaranteed seat	4.862
5	*1*	*90 min*	*Transfer*	*17 Baht*	*Guaranteed seat*	*4.6207*
6	*10*	*60 min*	*No transfer*	*30 Baht*	*Not guaranteed seat*	*4.3792*
7	9	90 min	No transfer	17 Baht	Not guaranteed seat	4.1379
8	6	90 min	No transfer	30 Baht	Not guaranteed seat	2.9482
9	8	60 min	Transfer	30 Baht	Not guaranteed seat	2.6034
10	5	90 min	Transfer	17 Baht	Not guaranteed seat	2.3621

For corridor B, the results were similar to corridor A. The respondents on the two modes gave better rank to a profile that represented existing conditions of the passenger van route 86 than the profile that represented existing conditions of the a-c bus route 166. This means, under the existing conditions on corridor B, the respondents on passenger van route 86 had no potential to transfer to a-c buses while the respondents on the a-c buses had potential to transfer to passenger vans. Similarly on corridor C, the profile that represented existing conditions of the passenger van route 83 received higher preference than the profile that represented existing conditions of the a-c bus route 538. This means, under the existing conditions on corridor C, the respondents on passenger van route 83 had small potential to transfer to BMTA a-c buses while the respondents on the a-c buses had potential to transfer to the passenger vans. The results of conjoint analysis show that preferences of the respondents on the passenger vans and the a-c buses were similar.

4.5 Market Analysis of the Passenger Vans

Leopairojna and Hanaoka (2005) studied market structure of the passenger vans on corridor A based on information from the supply side and found that there was no price competition between the passenger vans and a-c buses. Operators of the two modes competed in providing different type of services that were express with guaranteed seats (passenger vans) and slow without guaranteed seats but cheaper (a-c buses). The study concluded that under the existing entry and maximum fare regulations, market structure of the passenger vans was an oligopoly market with implication of production differentiation where different firms, that were BMTA and passenger van operators, provide different quality of services.

Carlton and Perloff (1990) explain that an oligopoly market is a market where there are a few firms. Each firm considers the other firms as its competitors. They produce homogeneous products, act independently but concern about how their competitors react when they make decisions in their prices or outputs. Varian (1999) describes that each firm attempts to get more customers by making its product similar to products of the other firms but this strategy does not succeed all the time. A reverse strategy to get more customers is making the customers think that its product is different from the products of its competitors, that is, product differentiation.

Following the above study, additional overlapped passenger van and a-c bus routes and the demand side were analyzed in this study. From route alignments of the passenger vans and a-c buses, it seemed like the two modes offered the same services that transported passengers between the city center and the centers in suburbs by air-conditioning vehicles. However, the passenger van and the a-c bus services were different, as presented in Table 3. The passenger vans supplied express services for long-distance trips with guaranteed seats and higher fares while the a-c buses provided slow services with not guaranteed seats but cheaper fares and many bus stops for short-distance trips. This information reveals that the passenger vans, which were new comers of the market, started their firms by offering similar services to the a-c buses and attempted to get more customers by making the passenger van services different from the a-c bus services, that is, fast in long distance and guaranteed seats. For the demand side analysis, results of the questionnaire surveys show that the respondents on the passenger vans and a-c buses had similar characteristics and agreed in the same matters regarding the passenger van regulations. Furthermore, results of the conjoint analysis show that they had similar preferences. Therefore, it could be concluded that the users of the two modes were in the same group. From mode selection survey, it found that they considered the two modes as alternatives. They did not consider only fares of the two modes as principle factor in selecting their choices but also considered comfort and convenience. These results correlate with results of the conjoint analysis where “fare” got the least importance while “seat availability” and “transferring” received the higher importance from the respondents. Results of checking origins and destinations show that they selected the passenger vans or the a-c buses based on their own conditions and conditions of each mode. Conditions of the respondents included their trip distances (long or short distances) and their origins and destinations, and conditions of the passenger van and a-c bus routes were route alignments (direct or detour routes) and

seat availability (guaranteed or not guaranteed seat). These information shows that the respondents viewed the passenger vans and the a-c buses as different product or services.

The analyses of the additional overlapped passenger van and a-c bus routes and the demand side in this paper verify that there was no price competition between the passenger vans and a-c buses. The passenger van market is an oligopoly market with implication of product differentiation. Price competition can be initiated by deregulation of the passenger van entry. Deregulating only the entry regulation while maintaining other regulations would bring more licensed passenger vans in the market and generate fair and competitive market environments where services would be improved and fares would be reduced. In addition, the illegal passenger vans would be licensed, passengers would be protected by insurances, and BMTA would earn more concession fees. In addition, this study found that the actual number of passenger vans operating on the corridor was lower than the minimum number of quota under the DLT license permission. This result shows that the passenger van quota had little influence to the passenger van operation since the passenger van companies observed demand of passengers on the route and determined to supply the quantity of their services to complement the observed demand. Therefore, the passenger van quota should be cancelled.

5. CONCLUSION

In this paper, an overview of Bangkok and its public transport operation with development of passenger van services was provided. The regulation policy of the passenger vans based on opinions of the users was evaluated. Results of chi-square test show that distributions of household incomes, household vehicles, and trip purposes of the respondents on the passenger vans and a-c buses were not different. The respondents on the two modes were in the same groups who were middle income groups and had private vehicles in their households but used public transport for commuting or going to school. Mode selection survey show that the respondents considered the two modes as alternatives. The respondents considered comfort, convenience and fare as the principal factors in their mode choices. Respondent opinions show that 79% of the respondents on the passenger vans agreed that the existing passenger van fares according to the maximum fare regulation were reasonable. For the entry regulation, 50% of the entire respondents agreed with the entry deregulation while 44% worried that the deregulation would increase the number of passenger vans and lead to worse traffic congestion. About passenger van capacity, 90% of the respondents on the passenger vans agreed that overload of the passenger vans made them feel uncomfortable and unsafe. Most respondents on both modes disagreed with allowing passenger van drivers to pick up passengers along the routes since it causes congestion. It is concluded, therefore, that the passenger van regulations regarding safety and qualities of the services should be remained.

The pilot survey of public transport users shows that the respondents considered in-vehicle travel time, completing a trip without transferring, fare, and comfort as the most important attributes in selecting their modes respectively. Conjoint analysis shows that they considered the difference between “not guaranteed seat” and “guaranteed seat” as more important than

the difference between "passenger van fares" and "BMTA a-c bus fares", that is, comfort and convenience were more important than fares. The government policy in keeping bus services as a welfare function and providing cheap services is not appropriate for the a-c bus services since this paper shows that the a-c bus and the passenger van users, which were in the same group, considered comfort and convenience instead of fares in selecting their choices.

Market analysis of the passenger vans show that there was no price competition between the passenger vans and a-c buses on the three corridors. The passenger van market was an oligopoly market with implication of product differentiation. The study recommends that removing the passenger van quota, that is, deregulating only the entry regulation while maintaining other regulations would bring more licensed passenger vans in the market and generate fair and competitive market environments where users would be benefit.

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