A Study of Urban-Rural Public Bus Passengers' Demographic and Trip Characteristics in Peninsular Malaysia

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Abstract

This research highlights the urban-rural bus services gap in the selected settlements in Peninsular Malaysia. Four states are selected as case studies with Johor to represent the southern states, Penang to represent the northern states and for east-coast states, Pahang is selected. Meanwhile Perak is to represent a still developing state, which is yet to reach the advanced level of large conurbations. The main objectives are to evaluate the urban and rural bus service quality through passenger satisfaction survey. A total of 1130 survey questionnaire forms is distributed and collected. The results confirmed that there are gaps in urban and rural bus services based on the level of satisfaction among the passengers from different localities.

Keywords: *public bus service; passengers' characteristics; passengers' preference; on-board survey*

Introduction

Public bus services are widely provided in many urban and rural areas of the countries and the quality of the services yet to be continuously improved and monitored. According to Kamaruddin et al., (2012) the move toward a sustainable transport system, in general, will closely related to the relationship between satisfaction and environment. A public bus service should provide a good accessibility that leads to reliable, safe, intelligent, convenience and effective of transportation system (Amiril, Nawawi, Takim, & Latif, 2014) . The using of public bus in urban or rural areas can reduce the traffic volume and solve the traffic congestion. However in the reality, the poor and unreliable services contribute to the worse transportation system (Suwardo, Napiah, & Kamaruddin, 2009). The current bus systems adopted by many towns and cities; especially those in Malaysia are not appropriate and equipped to address the needs of the settlement forms, socio-demographic and trip characteristic of the good urbanization process. Thus, these systems portray a bad image to the overall connectivity and mobility in the urban or rural areas of Malaysia. Hence, some quality measure should be imposed to replenish high quality of existing bus services (Napiah, Farid, & Suwardo, 2010; Suwardo, Napiah, & Kamaruddin, 2008a, 2008b). It's necessary to assess the current bus services in urban and rural settlements of Peninsular Malaysia through the evaluation of passenger's demographic, travel characteristics and passenger's satisfaction and preference. The determination of the gap between urban and rural bus services is useful in upgrading the system and the services in overall.

Literature Review

Public bus services are the most popular, affordable and widely provided public transport modes in many urban and rural areas of many countries. An excellent public bus service is important to support the economic growth, the growing population and the expansion of urban or rural activities (Bachok, Osman, & Ponrahono, 2014). The current bus systems adopted by many towns and cities; especially those in Malaysia are not appropriate and equipped to address the needs of the settlement forms, socio-demographic and trip characteristic of the good urbanization process. Thus, these systems portray a bad image to the overall connectivity and mobility in the urban or rural areas of Malaysia. A public bus service should provide a good accessibility that leads to reliable, safe, intelligent, convenience and effective of the transportation system (Amiril et al., 2014). Apart from that, an efficient public bus service enhances personal economic opportunities, saves fuel, saves money and reduces the environmental impacts. In reality, however, if the quality of services is poor and unreliable, the public bus services tend to contribute to the worsening of the transportation system. In the example, there are issues of limited and low quality of facilities, inconvenience fleet, low passenger trips and long waiting time (Rohani, Wijeyesekera, & Karim, 2013).

Bus service performance and quality need to be evaluated in providing reliable and good standard of operation. These relate to internal and external factor influence in quality bus services performance (Henning, Muruvan, Feng, & Dunn, 2011). A standard Level of Service (LOS) and passengers satisfaction measures can be rendered to determine the quality of the service (Ismail et al., 2012; Kamaruddin et al., 2012; Noor, Nasrudin, & Foo, 2014). In the example, accessibility and effectiveness of buses service can be measured as the internal factor and passengers' comfort and convenience as the external factor (Suwardo et al., 2008a). From these categorisations, various measurements of the level of services (LOS) (Transportation Research Board, 2003, 2013) can be derived. These are:

i. the fleet and vehicle types.
ii. the services types
iii. the stations and waiting facilities
iv. the route and schedule systems
v. the fare and zoning systems
vi. the travel, waiting and delay time
vii. the information systems
viii. the passengers' comfort and convenience

Geographical factors such as population, environment, economics and culture are among the factors that influence the bus operation service provided. The types and features of urban bus services may differ from rural bus services where coverage routes, fare system and fleet depend on the local needs (Rohani et al., 2013; Sham, Samsudin, & Rahman, 2013; Sham, Soltani, Sham, & Mohamed, 2012). It is because the services provided may influence by the geographical factors such as population, environment, economics and culture (Odeck & Alkadi, 2004). Commonly, in many urban and rural area, public transportation system deals largely with issues and problems encountered with transportation services, operation, infrastructure and facilities (Ariffin & Zahari, 2013).

Public bus services in urban and rural settlements in Malaysia are not excluded from dealing with these issues. In the example, public bus in rural areas in Europe countries is functioning as mode to reduce the private vehicles dependency in sustaining the environment conditions as to preserve the geo-culture (Patrick & Roseland, 2005). Meanwhile, in rural areas of Malaysia, normally the services provided in rural is more of social obligation in nature (Ismail et al., 2012; Noor et al., 2014). An extensive public bus service transformation programs in the urban area might be suitable, but the situation for rural areas are different because of small population and diverse activity locations factors (Ariffin & Zahari, 2013). Whichever effort to upgrade and transform the bus system and operation in the rural area to increase the ridership would be a challenge. The common scenario of low ridership and the old system of public bus service may exist for many years servicing interdistrict or door to door routes to the rural passengers.

Looking at the recent public transportation system in Malaysia as a whole, it can be described the system is poor in the aspect of service quality (Almselati, Rahmat, & Jaafar, 2011). Malaysia's public transport system start in early 1960's, but until now the quality of services is considered low and people more attracted to drive own vehicles to mobile within the city (Zakaria, Hussin, Batau, & Zakaria, 2010). This scenario can clearly be seen in the recent number of private vehicles registered that increased 1.35% from 20,944.496 in 2012 to 21,516,181 in 2013 (Ministry of Transport Malaysia, 2014). Most of the citizens contend that the system is inconvenient and unreliable. It is normally related to the poor infrastructure and failure to abide the time of bus arrival/departure (Too & Earl, 2010). People are not attracted to use the public transport because lack of flexibility,unexpected travel time and less of safety (Ismail, Hafezi, Nor, & Ambak, 2012). The poor public transport system in Malaysia has cause tremendous challenges to public transport authorities such as Suruhanjaya Pengangkutan Awam Darat (SPAD) and local councils (Jayaraman, Choong, Suan, & Lin, 2011). Hence, transformation programmes are structured and developed by the authorities are to improve the level of services inevitably to change the negative perception of the public (Aziz & Amin, 2012). In this research, the passenger's demographic and trip characteristics will be studied to identify the difference or similarity between urban and rural public bus passengers' preferences in Malaysia. It is an aim of this research to analyse the level of service quality of public bus services through a passengers' satisfaction survey before generalizing the issues existing in the system.

Research Aim and Objectives

This study aiming at assessing the urban and rural bus service quality through passenger satisfaction survey in selected settlements of Peninsular Malaysia. The research objectives are:

1. To identify the urban and rural public bus passenger's demographic in selected settlements of Peninsular Malaysia.
2. To assess the urban and rural public bus passenger's travel characteristics.
3. To determine the urban and rural bus passenger's satisfaction and preference.

Methodology

Methodologies adapted are based on the successful adoption of methods in other contemporary literature (Kamaruddin et al., 2012; Napiah et al., 2010; Suwardo et al., 2009, 2008b; Yaakub & Napiah, 2011). The selection of case studies is determined based on geographic location to represent urban-rural settlement zones in Peninsular Malaysia. On-board transit survey was deployed to capture passenger's feedback with the determined sampling unit.

a. Case Studies

Four states are selected as case studies with Johor to represent the southern states, Penang to represent the northern states and, Pahang for east-coast states. Meanwhile Perak is to represent a still developing state, which is yet to reach the advanced level of large conurbations.

b. On-board Transit Survey

To capture the passengers demographic and travel characteristics, on-board intercept face to face questionnaire survey method has been utilized. The survey is deployed during the on-board survey with a standard question about the respondent's background on age, ethnicity and gender. The survey is asked to the respondents who make themselves approachable and voluntarily give feedback during the on-board survey. Systematic coding of the category of respondent's background on age, ethnic and gender are applied and be filled up by the enumerators. The questionnaire is categorized into two (2) sections:

i. Section A consists of questions regarding the purpose of ridership and trip characteristics

ii. Section B poses questions about the level of satisfaction with current bus services and aims to capture the data on passenger's preferences and aspirations.

All items in Section A and B were developed based on four dimensions of level of service quality in public transportation that are tangible, reliable, responsiveness and certainty.

c. Sampling Unit

The population for sampling is the whole bus users in Peninsular. However, the sampling frame is limited to the four (4) states as has been discussed in the *case studies* of the paper. Target respondents are on-board passengers in the range of ages between 15 and 55 years old that commuted routinely using a public bus service (Ismail et al., 2012). A total of 1130 survey questionnaire forms is distributed and collected during the on-board survey for 42 identified routes. Distributions of respondents according to urban-rural centre are (Table 1):

Table 1: Sampling Distribution

Settlement	Terminal	Category	Frequency	Percentage %
Kerian, Perak	Parit Buntar	Rural	100	9.3
Ipoh, Perak	Medan Kidd	Urban	105	8.9
Seberang Prai, Penang	Penang Sentral	Rural	101	8.8
Georgetown, Penang	Jetty Terminal	Urban	100	9.6
Kuantan, Pahang	Hentian Bandar	Urban	130	5.3
Pekan, Pahang	Pekan	Rural	108	17.7
Johor Bahru, Johor	Larkin Terminal	Urban	60	8.8
	Johor Bahru Sentral	Urban	200	11.5
Batu Pahat, Johor	Batu Pahat	Rural	226	20
	TOTAL		**1130**	**100**

Source: Field survey 2014.

d. Procedure

Most of the passengers responses are captured between 9.00am to 5.00pm of the bus trips on weekdays and weekend operation. A pair of enumerators riding a specific route for a specific timeframe and with the minimum target of successful capture of 100 respondents for each route.

Limitation

All the findings in this study are subject to the data collected according to the research convenience and the permission given by the operators. Most of the data are collected during off-peak of public bus services within a week. In addition, in certain urban areas such Johor Bahru, the data are collected during the school holiday weeks that is resulting in the distortion of patronage occupancy per trip. Findings can be different if longer survey period is conducted, or if the survey is conducted during the daily trips with no public or school holidays, or if more allocation of funding to undertake on-board surveys for more than once on a single trip/route and if the survey was carried out by more numbers of enumerators. Despite the adaptability of methodology upon different case studies, there are still some important limitations. The study is being limited by various logistics and human resources factors such as:

i. Several targeted operation time duration for data collection could not be realized during the comprehensive survey due to bus breakdowns, drivers' behaviour/attitude issues and changed/altered timetable schedules, frequency and route de-fixing.
ii. Bus conditions being different during one trip compared to another. Bus chassis, engines, comfort and convenience levels are also being distinguishable from one passenger to another.

Findings and Discussions

From the survey, the categories of respondents are mostly passengers on the commuting trip that use bus services as mode to travel between locations repeatedly. It shows the school age group (15-17years old) respondents from rural is higher than urban with 27% difference. While the percentage distribution in college age (18-24 years old) group, working age (25-54 years old) group and retired (above 55 years old) group shows urban respondents are higher with 13.8% and 10.8% differences accordingly compared to rural respondents. It is suggested that more of rural passengers are from school age group due to the absence of bus school services provided in rural areas contrary to urban areas. Public bus services become the main mode for school children to reach their daily destination such as home or class. The distribution of respondents in the urban area (52.7%) is larger than rural passengers (47.3%) because the designated routes are determined by the operators giving the permission to conduct surveys on their buses (Table 2). The ethnic composition of respondents shows more Malay in rural areas with 8.2% difference, but more Chinese, Indian and Others ethnic in urban areas with difference of 14.2%, 33.8% and 19.6% accordingly (Table 2). This percentage distribution proves the common scenario of ethnic composition in urban and rural areas of Malaysia where, Malay is dominating rural areas while Chinese, Indian and Others ethnic dominating most of the urban area. The percentage of male (55.8%) and female (51%) passengers in urban areas are higher than those in rural, explaining the common characteristic of capture readers in the public bus services particularly in aspect of locality biased (Table 2).

The overall findings of percentage distributions on socio-demographic aspect show the geographical factors such as population composition and locality determined the patronage pattern of bus services. The study also shows that there is a slight variance in the percentages of distribution between urban and rural passenger's demographic profile as determinant factors of bus services.

Table 2: Urban and Rural Passenger's Socio-Demographic Aspect

DEMOGRAPHIC PROFILE	LOCALITY				Total (frequency)	DIFFERENCES IN %
	Urban		Rural			
	Freq	%	Freq	%		
a. Age						
School (15-17years old)	81	36.5%	141	63.5%	222	Rural > Urban with 27%
College (18-24years old)	181	56.9%	137	43.1%	318	Urban > Rural with 13.8%
Working (25-54years old)	272	56.9%	206	43.1%	478	Urban > Rural with 13.8%
Retired (above 55)	62	55.4%	50	44.6%	112	Urban > Rural with 10.8%
Total	595	52.7%	535	47.3%	**1130**	
b. Race						
Malay	337	45.9%	397	54.1%	734	Rural > Urban with 8.2%

Chinese	104	67.1%	51	32.9%	155	Urban > Rural with 14.2%
Indian	103	66.9%	51	33.1%	154	Urban > Rural with 33.8%
Others	52	59.8%	35	40.2%	87	Urban > Rural with 19.6%
Total	595	52.7%	535	47.3%	**1130**	
c. Gender						
Male	227	55.8%	180	44.2%	407	Urban > Rural with 11.6%
Female	369	51%	354	49%	723	Urban > Rural with 2%
Total	595	52.7%	535	47.3%	**1130**	

Source: Field survey 2014.

In Table 3, the aspects of trip characteristics are studied to differentiate and identify the distributions of urban and rural passengers. Four (4) variables of purpose, frequency, cost and distance of the trip are studied to understand the trip patterns between urban and rural passengers. From the study, it shows that more rural passengers used the services to attend classes compared to urban passengers who usually used the service for other purposes trip of leisure, appointment and working. This trip purposes scenario confirmed the higher percentage in school age group among the rural respondent compared to other age groups for urban passengers. The respondents from urban areas who use the public bus to reach their destination for leisure, working and appointment are higher compared to the rural passengers. This scenario confirms the theory of public bus services in rural areas are more towards social obligation rather than an alternative transportation system like in urban settlement. Furthermore, there is a higher percentage of urban passengers who travel using public bus 1-10 days and more than 20 days every month compared to rural passengers. Meanwhile, rural passengers who used public bus 11 to 20 days every month is higher than the urban passenger. It supports the finding on a higher percentage of rural passengers in school age group who used the public bus every school day. It also proves the theory trip pattern is driven determinant of public bus services in urban areas compared to rural areas. However, the result shows that more rural passengers spent more than RM11 to RM50.99 every month on bus fare compared to urban passengers. This is because of the travel distance factor that the rural settlement has diverse activity locations compared to bus route provided in urban areas. Hence, the longer travel distance cost rural passengers more although they travel less every month compared to urban passengers. The distribution of percentages of trip characteristics among the urban and rural passengers explicates that the coverage routes, fare system and fleet provided by the bus operator is determined or depend on the locality and local needs.

Table 3: Urban and Rural Passenger's Trip Characteristics Aspect

TRIP CHARACTERISTIC	LOCALITY				Total (freq)	DIFFERENCES IN %
	Urban		Rural			
	Freq	%	Freq	%		
a. Purpose						
Classes	49	24.5%	151	75.5%	200	Rural > Urban with 51%
Leisure	309	62.8%	183	37.2%	492	Urban > Rural with 25.6%

Appointment	24	53.3%	21	46.7%	45	Urban > Rural with 6.6%
Working	213	54.2%	180	45.8%	393	Urban > Rural with 8.4%
Total	595	52.7%	535	47.3%	**1130 (100%)**	
b. Frequency						
1-10 days per month	321	61.6%	200	38.4%	521	Urban > Rural with 23.2%
11-20 days per month	166	40.6%	243	59.4%	409	Rural > Urban with 18.8%
More than 20 days per month	108	54%	92	46%	200	Urban > Rural with 8%
Total	595	52.7%	535	47.3%	**1130 (100%)**	
c. Cost						
OKU (exceptional fare)	1	33.3%	2	66.7%	3	Rural > Urban with 33.4%
RM0-RM10.99	146	56.6%	112	43.4%	258	Urban > Rural with 13.2%
RM11.00-RM25.99	116	48.3%	124	51.7%	240	Rural > Urban with 3.4%
RM26.00-RM35.99	57	44.9%	70	55.1%	127	Rural > Urban with 10.2%
RM36.00-RM50.99	43	43.4%	56	56.6%	99	Rural > Urban with 13.2%
More than RM51	232	57.6%	171	42.4%	403	Urban > Rural with 15.2%
Total	595	52.7%	535	47.3%	**1130 (100%)**	

Source: Field survey 2014.

The respondents from urban have a higher percentage (Table 4) for being dissatisfied and somewhat satisfied/dissatisfied with the services compared to the passengers who are satisfied. While the percentages of satisfied among the respondents from rural areas is higher compared to those urban passengers who satisfied. Overall, there is a higher percentage of being dissatisfied with the services among the respondent in urban compared to rural areas. Small percentages satisfactory response from urban and rural passengers toward the bus services explicates the current level of bus service performance in both localities in Malaysia. Based on the findings (Table 4), the higher percentage of being dissatisfied with the services has proved that the performance and quality of the bus services in Malaysia are still poor and low. From the findings also, it has been proved that there is a difference in satisfaction level among the respondents based on geographical area or locality. More rural passengers responses the bus condition is poor and between poor and good compared to urban passengers. There are higher percentages of urban passengers who response the bus condition is good. This is because most of bus vehicle in urban areas is new and upgraded such as Rapid Penang, Rapid Kuantan and

Perak Transit compared to rural areas with old systems and vehicle such as Rahmat Alarm, Red Omnibus, Johore Motor and Causewaylinks.

Apparently, there is also a group of respondents from urban and rural areas (Table 4) are undecided or feel indifferent regarding bus services performances and the condition of the bus. They are more likely not able to decide whether the service is good or bad and the bus condition is good or poor, but express their satisfaction with the phrases of "*bolehlah*", "*oklah*" or "*boleh tahanlah"* that can be summarized as to somewhat satisfy/dissatisfy. The tendency to sit on the fence could be because of the respondent having less access to a more modern system or exposed to a better service in their areas. All these scenarios show the relationship of geographical factors such as population, environment, economics and culture with the satisfaction level towards bus services. Some reasons such as the old system of bus services existing in the rural area with only single operator and low frequency of the bus trip compared to the urban bus system is influencing the satisfaction level among the respondents. The composition of the population and cultural also has some effects the satisfaction levels and opinion towards bus condition among the passengers from different geographical areas. Exposures and experiences of the new system of bus services and having more than a single operator also differentiate and influence the passengers' ability in expressing their satisfaction levels. In the case of passengers from urban and rural areas in the selected centres in Malaysia, the study shows that more respondents are dissatisfied with the current bus services, but there is a slight variance in the percentages of distribution between urban and rural passenger's responses.

From the result (Table 4), it can be summarized that more rural passengers chose to use the bus services because of it efficient and reliable. This contrary with urban passengers who chose to use the bus services because of the safety, affordability and punctuality. The difference preference cause between rural and urban passengers may influence by the bus system, operation and vehicle provided by the operators. Most of the rural bus services using the non-air conditional system and old vehicles, but provide door to door and interdistrict services that fulfill the passenger's needs of the present. While most of the urban bus services in the selected case study areas are using a new bus system and vehicle that spawn better demand, aspiration and preferences among the passengers. The overall result also shows that a higher percentage of reliability (28.4%) and affordability (26.5%) as a preference cause to choose bus services among the urban and rural passengers. It also can be summarized that the results from the study explicates the locality of bus services has influenced passenger's opinion towards the level of satisfaction, bus condition and preference cause of choosing the services.

Table 4: Urban and Rural Passenger's Satisfaction and Preferences

Opinion Towards Current Bus Services	Locality				Total (%)	Differences In %
	Urban		Rural			
	Freq	%	Freq	%		
a. Satisfaction Level						
Not Satisfy	348	51.0%	334	49.0%	682 (60.4%)	Urban > Rural with 2%
Somewhat Satisfy and Dissatisfy	148	61.2%	94	38.8%	242 (21.4%)	Urban > Rural with 22.4%

Satisfy	99	48.1%	107	51.9%	206 (18.2%)	Rural > Urban with 3.8%
Total	595	52.7%	535	47.3%	**1130 (100%)**	
b. Bus Condition						
Poor	92	32.6%	190	67.4%	282 (25%)	Rural > Urban with 34.8%
In Between Poor and Good	24	26.1%	68	73.9%	92 (8.1%)	Rural > Urban with 47.8%
Good	479	63.4%	277	36.6%	756 (66.9%)	Urban > Rural with 26.8%
Total	595	52.7%	535	47.3%	**1130 (100%)**	
c. Cause of Preference						
Efficient	64	47.4%	71	52.6%	135 (11.9%)	Rural > Urban with 5.2%
Safe	137	60.9%	88	39.1%	225 (19.9%)	Urban > Rural with 21.8%
Reliable	105	32.7%	216	67.3%	321 (28.4%)	Rural > Urban with 34.6%
Affordable	176	58.9%	123	41.1%	299 (26.5%)	Urban > Rural with 17.8%
Punctual	113	75.3%	37	24.7%	150 (13.3%)	Urban > Rural with 50.6%
Total	595	52.7%	535	47.3%	**1130 (100%)**	

Source: Field survey 2014.

From the overall findings, it can be summarized that to equip the urban and rural settlements with a sustainable transportation system is challenging and require effortless initiatives and plans. Many areas in the development of public transportation need an ascertainment, includes the aspect of environment related to the transportation needs. In essence, the sustainability of public transportation in urban and rural settlements of Malaysia can be achieved by implementing smart-public transportation system and coherent transport policies. Looking at the need, Malaysia government has driven their transport development focus towards a smart and integrated system. Through the National Land Public Transport Master Plan (NLPTMP), the macro policy framework is set out. It is as a 20-year blueprint for the public transportation master plan under a coherent policy direction. Further action, Malaysia government also outlined the monitoring plan. Under the monitoring of SPAD, the Performance Management hub System (PMhS) that transmitting live data from operators is developed. Additionally, six Subsidiary Plans are outlined, namely (Land Public Transport Commission (SPAD), 2011):

i. Urban Rail Development Plan,
ii. Bus Transformation Plan,
iii. Taxi Transformation Plan,
iv. Interchange and Integration Plan,
v. Travel Demand Management Plan and

vi. Land Use Plan

In focusing to promote and achieve a sustainable transportation system, Malaysia government is looking forward to articulate the concept of mass-rapid transportation system. The mass-rapid transit concept is the most effective public transportation system that boost a transit-friendly city that give access to workplace and services (Wright & Fjellstrom, 2003). This concept is designed to move a huge numbers of passengers at one time. The operation of the system is usually on specific fixed tracks or separated, established schedule and designated routes. The example of mass-rapid is included Bus Rapid Transit, heavy rail transit, and light rail transit as been structured, developed and operated stage by stage in urban area of Klang Valley, Malaysia.

Conclusion

For the study conducted, the results show that there are variations and differences on demographic and trip characteristics among the passengers from urban and rural areas. These explain how the geographical aspects such as population, environment, economics and culture can influence the services provided and also determine how the passenger perceived the quality of services provided. In essence, the locality of the passenger demographic profile and trip characteristics are the determinant for the bus services provided. Bus performance measures such as affordability, safety and security, punctuality as well as comfort and convenience are the important attributes to examine the quality of services. The preferences and satisfactory level among the passengers also show the difference percentage distribution between urban and rural bus services. These proved the theory of different geographic areas or locality needs a different public bus service system and approaches. Hence, the result from this study is the best approach to ascertain the future demand pattern and benchmark and determined level of quality services provided.

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