AN EXPLORATORY STUDY INTO THE DESIRED AMENITIES IN PUBLIC TRANSPORT TERMINALS BY CENTRAL BUSINESS DISTRICT WORKERS

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Abstract: Many researches and foreign case studies have shown that improvements in public transportation facilities can go a long way to increase transit ridership. These improvements can be in the overall planning and design of the facilities, or in the provision of additional transit amenities to existing ones. However, the range of transit amenities is broad and diverse, such that it would be too costly and impractical to include all of them in any terminal. Additionally, each particular site would have their specific characteristics which would require some specific type of amenities. This study aims to understand the preferred passenger terminal conditions and amenities of the trip makers within the central business districts, and identify some patterns or trends in these preferences. This analysis can help in the better planning of terminals within CBD's, providing the transit users better levels of reliability, comfort and convenience. Hopefully, in the end, this can entice private car users to shift to transit for their regular trips to CBD's, and in the end, ease the traffic congestion in the area.

Key Words: *terminals, amenities, public transportation, central business districts.*

1. INTRODUCTION

Many researches and case studies have shown and proven that improvements in terminal facilities can go a long way in building transit ridership, and subsequently to reduce traffic congestion. These improvements range from hard measures (terminal area expansion, facilities up-grade, addition of amenities, etc.), to soft measures (transit rerouting, integration of services, improvement of linkages between modes, etc.), to a mix of both.

If successfully implemented, these measures can go a long way to enhance the quality of service of interchange facilities, and subsequently to entice private car users into using transit. This strategy is none more significant to address the increasingly high volume of to-work and business trips within Metro Manila. According to the 1996 Metro Manila Urban Transportation Integration Study (MMUTIS), Metro Manila generated about 7.6M daily to-work trips in 1996, second only to to-home trips. Out of this 7.6M trips, 1.8M or 24.4% were made using private car.[1] This is the highest modal share of private car among the different trip purposes (See Table 1.1).

[1] MMUTIS Technical Report No. 4: Transportation Demand. p. 9-1.

Table 1.1: Number of daily trips (circa 1996) by trip purpose and by travel mode

(figures in ,000)	Home	Work	Business	School	Private	Others	TOTAL
Rail	215	101	23	79	26	8	452
Bus	1,751	955	210	456	233	69	3,674
Jeepney	4,552	1,566	664	1,589	1,021	195	9,587
Tricycle	2,034	380	366	990	430	87	4,287
Public	**8,552**	**3,002**	**1,263**	**3,114**	**1,710**	**359**	**18,000**
Car	1,717	797	630	302	416	277	4,139
Taxi	503	166	266	39	126	49	1,149
Private	**2,220**	**963**	**896**	**341**	**542**	**326**	**5,288**
Others	169	182	294	8	23	14	690
Walking	3,074	773	249	1,529	715	170	6,510
TOTAL	14,015	4,920	2,702	4,992	2,990	869	30,488

Source: MMUTIS Technical Report no. 4

Based on the same study, it is estimated that by the year 2015, there would 12.9M daily trips for to-work and business trips, or an approximate increase of 70%. The modal share of the private car for these trips would be 33.8%, a jump of 9.4% from 1996 figures.[2]

One factor for this rather high percentage of private car usage for to-work trips is the poor level of service of the public transportation system, which includes the necessary transfers between transit modes. Summarized below in Table 1.2 are the problems encountered in public transport terminals in or near CBD's.

Table 1.2: Summary of current problems encountered in public transport terminals

Terminal user	Problems identified
Public transport passengers	a) Increasing walking distance in access, transfer b) Increasing discomfort in waiting and access c) Increasing danger in waiting, loading/unloading d) Increasing difficulties in transfer
Operators/drivers	a) Lack of turn-around spaces b) Lack of waiting spaces c) Lack of loading/unloading places/facilities
Other road users	a) Traffic congestion in terminal areas b) Non-availability of parking spaces

Source: MMUTIS Technical Report no. 5

With the prevalence of these problems, it will be really hard to convince Makati CBD workers who have other alternative modes to use transit to go to work, especially since these trip makers have a higher valuation of time and a distinct perception of inconvenience and personal security, which arises from the need to arrive at the workplace in the shortest time possible, and with the least perceived effort expended and feelings of maximum safety.[3] The design and planning of these terminal facilities that cater to workers should not just be able to ensure that the trip-maker is able to get a ride within the least time possible, but also provide amenities and other features which increase the level of comfort and convenience of transferring between modes.

[2] MMUTIS Final Report. p. II 6-11.

[3] Tuazon, Marites (1995). Analyzing Transfer Disutilities in Disaggregate Mode Choice Models for Work Trips Using Revealed and Stated Preference Data.

Many foreign studies have already studied in various scales and scopes what are the ideal amenities for a certain terminal which can have a positive effect on ridership. But given that the characteristics of the local transportation system, as well as the users themselves, are very much different from its western counterparts, it is uncertain whether the terminal improvements enumerated in these foreign studies can be implemented in the local setting.

Additionally, Philippine society has various physical, financial, technical and institutional limitations to actualize these improvements. If future designs and plans of terminals are executed via the off-the-shelf approach, chances are they may not be able to address the specific demands and needs of the users, and in effect, may not be able to build transit patronage. Worse, time, money and other resources spent on the terminal project are wasted and not used efficiently.

It is within this context that a research is therefore proposed to make a local setting-specific study of the amenities at public transport terminals. Specifically, this research seeks to determine which terminal amenities are the most needed or wanted by these users of the terminal facilities near major workplaces, and determine some underlying patterns or trends in their preferences which may suggest some

2. SCOPE OF THE STUDY

For purposes of this research, the study will be limited to central business districts (CBD's), specifically the Makati CBD, which have one of the highest concentration of to-work trips. Based on the MMUTIS traffic demand projection, the top two MMUTIS traffic zones with the highest number of gainful workers are within the Makati CBD.

Table 1.2: Top 20 MMUTIS traffic zones with gainful workers (circa 1996)

RANK	Zone Name	# of Gainful Workers
1	Legaspi Village	101,665
2	Salcedo Village	59,018
3	Ermita	52,367
4	QMC	47,199
5	Ortigas Center	45,575
6	San Agustin	40,062
7	Project 6	39,510
8	Pamplona/Zapote	39,142
9	Western Bicutan	38,401
10	Cubao (Araneta Center)	37,270

Source: MMUTIS

Following the MMUTIS zoning system, the Makati CBD is delineated by the following boundaries: on the North by Sen. Gil Puyat Avenue or Buendia, on the East by EDSA, on the South by Antonio Arnaiz Avenue or Pasay Road, and on the West by Chino Roces or Pasong Tamo. Based on the MMUTIS zoning system, this would comprise the following four traffic zones: Salcedo Village, Legaspi Village, Urdaneta Village and Ayala Center. Aside from the buildings located within these boundaries, the buildings which immediately front or are adjacent to the aforementioned boundaries would also be part of the delineated Makati CBD.

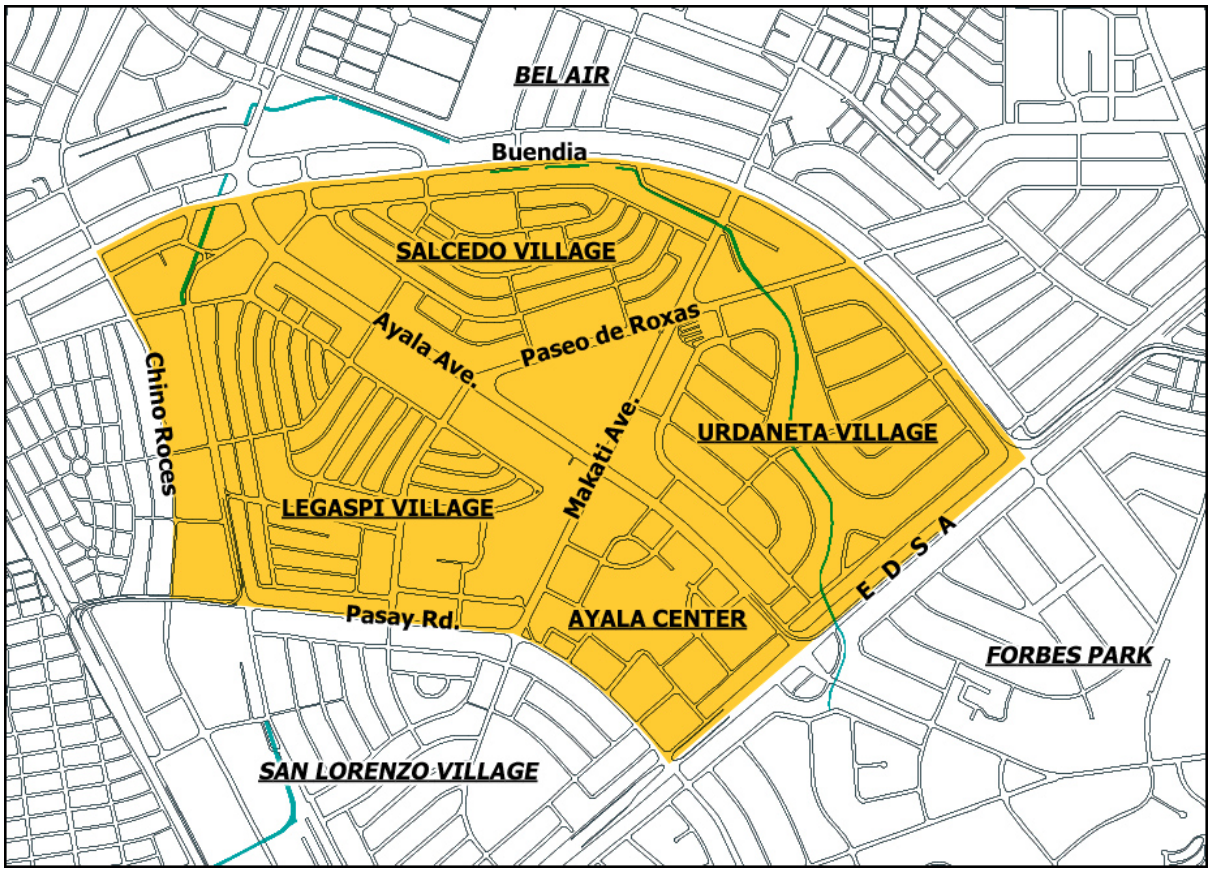

Figure 1. The Delineated Makati CBD

The target study subjects for this research are the people who work at the Makati CBD, hereinto referred as “Makati CBD workers”. This would include anyone who holds or reports to an office located in the delineated Makati CBD on a regular basis. This would include regular employees, staff, unskilled workers, as well as the people who own and/or manage the companies.

Additionally, the particular trip that will be studied for this research would be limited to to-work and business trips to and within the Makati CBD. Other trip purposes such as to-school trips, shopping trips, recreational trips, and social trips would not be part of the study.

3. STUDY METHODOLOGY

3.1 Questionnaire design

For this study, the primary data gathering technique used was the survey questionnaire, which is divided into four major sections. The first section asks the respondents characteristics about their trip to work. The second section asks the respondents their preferred amenities, while the third section asks questions about their mode choice decision vis-à-vis their preferred amenities. The fourth and last section then asks for the socioeconomic profile of the respondents.

For the section on amenities, a list of 15 amenities of different types was presented to the respondent, and they were asked to rate each of them. This selection was shortened from an original list of more than 50 amenities, which were culled from an initial inventory of

terminal amenities and features cited in various researches and references. Since it will be too difficult and time-consuming to request the respondents to rank all 50 amenities, a shortening of the list was undertaken to a manageable number to be used for survey.

In the absence of a priori knowledge about preferred local terminal features or amenities, a systematic method of shortlisting was adopted. The first screening method was done by selecting those amenities that are directly related to the planning and design of the terminal itself, as the focus of this study is with regards to the building, and not the entire public transportation system. Amenities which are outside of the terminal building (i.e. elevated walkways, covered pathways) will be excluded from this list.

The second layer of data reduction was done by eliminating amenities which are redundant and are already covered by similar types. The third layer of elimination was by removing those amenities which are not applicable to local conditions. Lastly, a pre-survey questionnaire was distributed through convenient sampling to identify the top 15 most preferred amenities. The final list of amenities used for the survey is shown below, with some short descriptions.

Table 3.1: List of amenities used for the study

CODE	Name of amenity	Description
A1	Policemen and/or terminal security personnel	Visible presence of policemen or other security personnel
A2	Trip information boards	Information showing route maps, fares, etc. in the form of billboards
A3	Signs and directions inside the terminal	Signs showing location of comfort rooms, loading bays, fire exits, and the like
A4	Public assistance booth	Booth to entertain queries from the commuters, as well as complaints.
A5	Comfort rooms	
A6	Telephone booths	Public pay phones
A7	Shops, stalls and stands	Food stalls, convenience stores, vending machines and the like.
A8	Baggage deposit and claim area / lockers	Place where you can store your baggage for a period of time, either for free or for a certain fee
A9	Seats in the waiting area	
A10	Bicycle racks with security locks	Area where you can store your bicycles in case you use bicycle to access the terminal.
A11	Kiss-and-ride bays / private car drop-off point	Area where private car users can drop off or pick up passengers who used transit modes.
A12	Park-and-ride facilities	Area where car users can park their car and ride the other transit modes in the facility.
A13	Air-conditioned terminal interior	
A14	Ambient music/radio/TV playing	Music or radio playing in the background, and/or television monitors scattered throughout the terminal
A15	Nice architectural design	Above average physical design of the terminal

3.2 Data processing

Factor analysis was the statistical technique chosen for this particular study. Factor analysis is a type of multi-variate analysis which aims to reduce large groups of data into smaller groups. In particular, it seeks to discover if the observed variables can be explained largely or entirely in terms of a much smaller number of variables called “factors”, hence the term. Many foreign transit ridership studies use factor analysis to aid in their customer satisfaction evaluations or planning future transit improvements. Among other things, a typical factor analysis suggests answers to three major questions:

1. How many different factors are needed to explain the pattern of relationships among these variables?
2. What is the nature of those factors?
3. How well do the hypothesized factors explain the observed data?

4. DISCUSSION OF THE RESULTS

4.1 Preferred amenities by the respondents

For the section on the amenities, the respondents were asked whether the presence of a certain amenity can significantly influence their decision to use transit. They were asked to respond using a 5-level Likert scale, from “Very significant” to “Very insignificant”. In the processing of the data, “Very significant” answers receive a “5” score, “Significant” answers receive a “4”, and so on. Shown below are the computed scores for each amenity, arranged from highest to lowest score.

Table 4.1: Most preferred amenities by respondents

RANK	CODE	Description	Score	Average score
1	A5	CR	1,540	4.56
2	A1	Policemen/security personnel	1,518	4.49
3	A9	Seats	1,512	4.47
4	A3	Signs and directions	1,484	4.39
5	A2	Trip information boards	1,465	4.33
6	A6	Telephone booths	1,433	4.24
7	A4	Public assistance booth	1,416	4.19
8	A15	Nice architectural design	1,320	3.91
9	A13	Airconditioned interior	1,315	3.89
10	A14	Ambient music/TV playing	1,303	3.86
11	A12	Park-and-ride facilities	1,283	3.80
12	A7	Shops	1,252	3.70
13	A11	Kiss-and-ride	1,243	3.68
14	A8	Baggage deposit	1,189	3.52
15	A10	Bike racks	1,104	3.27

Based on the answers of the respondents, the most preferred terminal amenity is the comfort rooms, with a total score of 1,540 points, or an average score of 4.56. Second is policemen/security personnel with a total score of 1,518 or an average of 4.49, and followed closely by seats with a total score of 1,512 or an average of 4.47.

7 of the 15 amenities received an average score of more than 4, while the rest have an average score between 3 to 4. Surprisingly, shops and stalls have a score (3.70) lower than the more

specialized amenities like “Nice architectural design” (3.91) and “Park-and-ride” facilities (3.80). The least preferred amenity is bicycle racks with an average score of just 3.27. In general, the three least preferred amenities (kiss-and-ride, baggage deposit, and bicycle racks) are those which are still not being applied in local terminals, and may not have been too familiar with the respondents, which may have contributed to their low scores.

4.2 Determination of number of underlying factors

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was used to test sample adequacy for factor analysis. Values above 70% mean that the data are suitable for use. The computed KMO value for the dataset was 78.77%, meaning it is suitable for factor analysis.

Next step in factor analysis is to determine the number of factors to extract. In factor analysis, there are a number of ways to do this. While these methods may suggest a certain number of factors, the final number of factors to be extracted is still a subjective decision of the part of the analyst, as the results of these tests do not necessarily reveal the same number of factors. Also, the analyst may have already a predetermined number of factors to be used, especially if he has a priori knowledge of the data structure. For purposes of this study, two tests were done to have an indication of the number of factors, before making a subjective decision on the final number to be used.

Using the greater one rule, there are four large eigenvalues, 3.9732, 1.777, 1.4424 and 1.2149 which together account for 56.05% of the standard variance. Thus the first four principal components provide an adequate summary of the data for most purposes. Factor retains four components on the basis on the eigenvalues-greater-than-one rule, since the fifth eigenvalue is only 0.86. This then indicates that the number of underlying factors is four.

Another method of determining the number of factors is by using the Cattell’s Scree Test. Cattell’s Scree Test is a graph showing a plot of unrotated factors (i.e. amenities) versus the proportion to the total variance or eigenvalues. The number of variables can be determined by locating at what number does the slope of graph significantly starts to level off. As shown in Figure x below, the graph starts to become more horizontal at factor 5. Still, this can be considered as a subjective judgement.

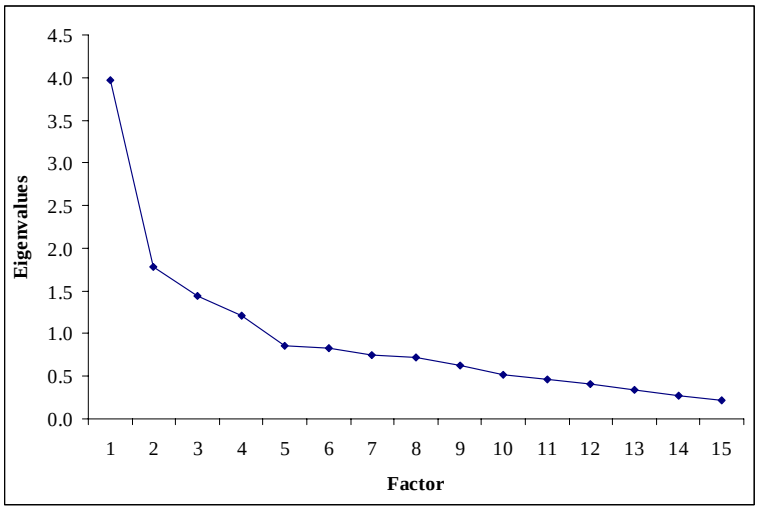

Figure 2: Factor Scree Plot

The greater one rule and the scree plot suggest different number of factors to be used. To validate what would be the more appropriate number, computation for both four and five factors will be done, and see which one will yield the higher range of communality estimates.

4.3 Factor loadings

4.3.1 Four factors

Table 4.2: Factor loadings using four factors

	Factor 1	Factor 2	Factor 3	Factor 4
A1 (police)	**0.54424**	*-0.10468*	0.03353	0.30191
A2 (info)	**0.74750**	*-0.12133*	0.20611	0.08041
A3 (signs)	**0.73984**	0.08162	0.20299	0.04758
A4 (booth)	**0.57120**	0.32302	0.11449	*-0.05780*
A5 (CR)	**0.62846**	0.37165	*-0.20191*	0.11329
A6 (phone)	0.46525	**0.59301**	*-0.15395*	0.02249
A7 (shops)	0.18137	**0.55653**	0.23692	0.20738
A8 (baggage)	*-0.07548*	**0.79012**	0.08383	0.04933
A9 (seats)	**0.56011**	0.38446	*-0.08511*	0.06159
A10 (bike)	0.13485	0.43881	0.44807	0.14427
A11 (kiss)	0.13392	0.01793	**0.82028**	0.09343
A12 (park)	*-0.00235*	0.04591	**0.77710**	0.02619
A13 (aircon)	0.05831	*-0.08024*	0.12412	**0.84122**
A14 (music)	0.13969	0.40519	*-0.15285*	**0.70154**
A15 (design)	0.10768	0.23532	0.31951	**0.51860**

The table above shows the factor loadings of each amenity for the four factors.

The first factor has large positive loadings for secure, (1) Policemen and/or security personnel, (2) Trip information boards, (3) Signs and directions inside the terminal, (4) Public assistance booth, (5) Comfort rooms, and (9) Seats in the waiting area. It has negative loadings for (8) Baggage deposit and claim area/ lockers and (12) Park-and-ride facilities.

The second factor has a positive loading on (8) Baggage deposit and claim area/ lockers, (7) Shops, Stalls, and stands, (6) Telephone booths. It is in contrast with the negative loadings of (1) Policemen and/or security personnel, (2) Trip information boards and (13) Air-conditioned terminal interior.

The third factor has a very large factor loadings for (11) Kiss-and-ride bays/ private car drop-off point and (12) Park-and-ride facilities. Negative loadings for (5) Comfort rooms, (6) Telephone booth, (9) Seats in the waiting area, and (14) Ambient music/ radio/ TV playing.

The fourth factor has large positive loadings for (13) Air-conditioned terminal interior, (14) Ambient music/ radio/ TV playing and (15) Nice architectural design, and a negative loading for (4) Public assistance booth.

The final communality estimates show that all the variables are slightly well accounted for by the four components, with final communality ranging from 0.4323 to 0.7328.

4.3.2 Five factors

Table 4.3: Factor loadings using five factors

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
A1 (police)	0.24127	0.03394	0.05029	0.13259	**0.80756**
A2 (info)	**0.63882**	0.22901	*-0.16911*	0.04293	0.36256
A3 (signs)	**0.73988**	0.22327	*-0.03858*	0.07190	0.15184
A4 (booth)	**0.58722**	0.11671	0.25974	*-0.04125*	0.1395
A5 (CR)	**0.69611**	*-0.19555*	0.23162	0.16164	0.06678
A6 (phone)	0.45299	*-0.17207*	**0.60103**	0.00409	0.27018
A7 (shops)	0.30942	0.22415	0.46458	0.28222	-0.13589
A8 (baggage)	0.03973	0.04785	**0.80131**	0.09315	-0.09804
A9 (seats)	**0.70159**	*-0.07585*	0.19410	0.15611	-0.12662
A10 (bike)	0.06878	0.42412	**0.53789**	0.09814	0.27006
A11 (kiss)	0.14245	**0.82542**	*-0.00229*	0.11704	-0.03087
A12 (park)	*-0.04574*	**0.77159**	0.10988	0.00869	0.07131
A13 (aircon)	*-0.06835*	0.12448	*-0.05585*	**0.78182**	0.32790
A14 (music)	0.18129	*-0.16349*	0.32767	**0.72812**	0.07127
A15 (design)	0.23510	0.32351	0.08365	**0.61046**	-0.21409

The five factors account for 62.14% of the standard variance which is almost six percent higher than for the four factors.

Factor 1 has large positive loadings for (2) Trip information boards, (3) Signs and directions inside the terminal, (4) Public assistance booth, (5) Comfort rooms, (9) Seats in the waiting area and negative loadings for (12) Park-and-ride facilities and (13) Air-conditioned terminal interior.

Factor 2 has large positive loadings for (11) Kiss-and-ride bays/ private car drop-off point and (12) Park-and-ride facilities. Very small loadings are given by (5) Comfort rooms, (6) Telephone booths, (9) Seats in the waiting area and (14) Ambient music/ radio/ TV playing

Factor 3 has noticeable large loadings for (8) Baggage deposit and claim area/ lockers, (6) Telephone booths and (10) Bicycle racks with security locks. Negative loadings for (2) Trip information board, (3) Signs and directions inside the terminal, (11) Kiss-and-ride bays/ private car drop-off point and (13) Air-conditioned terminal interior.

Large loadings for (13) Air-conditioned terminal interior, (14) Ambient music/ radio/ TV playing, and (15) Nice architectural design for Factor 4. Negative loadings for (4) Public assistance booth. .

For Factor 5, large positive loadings for (1) Policemen and/ or terminal security personnel. negative loadings for (7) Shops, stalls and stands, (8) Baggage deposit and claim area/ lockers, (9) Seats in the waiting area, (11)) Kiss-and-ride bays/ private car drop-off point and (15) Nice architectural design.

The final communality estimates ranging from 0.4599 to 0.7420 suggests that variables are well accounted for by the 5 factors as compared with 4 factor loadings. As such, five factors will be used.

4.4 Factor interpretation

Since the profile of the respondents can be divided into private car users and commuters, two sets of factor interpretation will be used to compare the underlying factors for each group, and see whether there are similarities or differences in the factor results.

4.4.1 Public transport users

Table 4.4: Rotated factor pattern for public transport users using five factors

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
A1 (police)	0.22854	0.01860	0.13321	0.05658	**0.79184**
A2 (info)	**0.58493**	0.18689	0.07947	-0.18022	0.45401
A3 (signs)	**0.71468**	0.22952	0.09327	-0.09256	0.22654
A4 (booth)	**0.55383**	0.12916	-0.07149	0.30781	0.19461
A5 (CR)	**0.70390**	-0.20688	0.18148	0.24032	0.07694
A6 (phone)	0.44314	-0.14228	0.05130	**0.60297**	0.33086
A7 (shops)	0.31702	0.29634	0.34052	**0.37361**	-0.09958
A8 (baggage)	0.06875	0.12487	0.13374	**0.79738**	-0.12967
A9 (seats)	**0.75287**	0.01588	0.14007	0.16399	-0.07709
A10 (bike)	-0.00323	0.45453	0.14117	**0.49106**	0.33901
A11 (kiss)	0.17626	**0.81271**	0.14684	0.00188	-0.01505
A12 (park)	-0.05646	**0.74626**	-0.04364	0.10301	0.06902
A13 (aircon)	-0.04142	0.06683	**0.80568**	-0.03590	0.31221
A14 (music)	0.19701	-0.09466	**0.72431**	0.34618	0.07256
A15 (design)	0.25627	0.38277	**0.56825**	0.05738	-0.21486

Almost all of the amenities have high rotated factor values on their respective factors, meaning greater than 0.50. The only exception is amenity no. 7 (Shops, stalls and stands), which has a rotated factor value of just 0.37361 at factor 4, and amenity no. 10 (Bicycle racks) with a rotated factor of 0.49106, also at factor no. 4 .This may indicate that these two particular amenities, while having the highest value at these respective factors, may not necessarily be a good fit in them.

Described below are the identified amenities for each factor.

Factor 1:
The first factor has large positive loadings for (2) Trip information boards, (3) Signs and directions inside the terminal, (4) Public assistance booth, (5) Comfort rooms and (9) Seats in the waiting area. Since these amenities are the most commonly found amenities in local terminals and other public transport facilities, these can be categorized as “Basic terminal amenities”.

Factor 2:
The second factor has large positive loadings for (11) Kiss-and-ride bays/ private car drop-off point and (12) Park-and-ride facilities. Since these amenities have relation to private cars, factor 2 will categorized as “Private car facilities”.

Factor 3:
The third factor has a very large factor loadings (13) Air-conditioned terminal interior, (14) Ambient music/ radio/ TV playing (15) Nice architectural design. These amenities are related to the overall terminal environment, enhancing the sensory experience of the user while inside the terminal. This group can then be labeled as “Good terminal experience/environment”.

Factor 4:
The fourth factor has large positive loadings (6) Telephone booths, (7) Shops, stalls and stands, (8) Baggage deposit and claim area/ lockers, and (10) Bicycle racks with security locks. A common denominator of these amenities is that these offer some sort of service to the customers or passengers, either for free or for a specified fee. Thus, this can be categorized as "Service amenities".

Factor 5:
The fifth factor has only one large positive loading, and that is for (1) Policemen and/ or terminal security personnel. This implies then that terminal security facilities or measures are treated as stand-alone amenity by the public transport users. To make the label more generic, the term "Security features" will be used as the name of the category, which can encompass all other equipment, device, and machine installed to enhance the terminal security and safety.

4.4.2 Private car users

Table 4.5: Rotated factor pattern for private car users using five factors

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
A1 (police)	0.30539	-0.03664	**0.50496**	0.33510	-0.18709
A2 (info)	**0.83770**	-0.07853	0.04269	-0.00685	0.13689
A3 (signs)	**0.68272**	0.36442	0.08874	-0.07191	0.04897
A4 (booth)	**0.70589**	0.27351	-0.27217	0.08178	0.07354
A5 (CR)	**0.63542**	0.36751	-0.23675	0.00383	0.11241
A6 (phone)	0.36576	**0.67444**	-0.02670	-0.14115	0.08354
A7 (shops)	0.08197	**0.76048**	-0.06831	0.00721	0.02552
A8 (baggage)	0.16759	0.07835	-0.12530	-0.07937	**0.82564**
A9 (seats)	0.23071	**0.23624**	-0.61294	-0.03250	0.22695
A10 (bike)	0.20008	**0.53997**	0.08059	0.11386	0.38559
A11 (kiss)	-0.14413	0.08923	**0.80572**	-0.07711	0.29024
A12 (park)	0.04729	0.21560	0.48025	0.36012	**0.62884**
A13 (aircon)	-0.30993	-0.18334	0.00469	**0.79606**	0.21666
A14 (music)	-0.15608	0.45453	-0.30811	**0.59563**	-0.31979
A15 (design)	0.34761	0.01743	0.18924	**0.68972**	-0.02921

Comparing this table with the previous table would reveal a slightly different set of variables/amenities for each factor. This then implies that the preference structure of public transport users varies with that of the private car users. Also, all loadings, except (9) Seats, have values greater than 0.50, which can indicate a better fit with their respective factors.

Factor 1:
The first factor has large positive loadings for (2) Trip information boards, (3) Signs and directions inside the terminal, (4) Public assistance booth, and (5) Comfort rooms. This is also similar to Factor 1 for the public transport users, with the only difference being the absence of amenity no. (9), Seats. Thus, this category can also be labeled as "Basic terminal amenities".

Factor 2:
The second factor has large positive loadings for (6) Telephone booths, (7) Shops, Stalls and stands, and (10) Bicycle racks with security locks. This is almost similar to Factor no. 4 for the public transport users, "Service amenities", with the only difference being the absence of amenity no. (8) Baggage deposit and claim area/ lockers, and the addition of amenity no. 9. However, while amenity no. (9), Seats in the waiting area, has its highest load in this factor, it

is considered very low (0.23624) which may indicate a very poor fit within this category, and can be discarded.

Factor 3:
The third factor has a very large factor loadings for (1) Policemen and/or security personnel and (11) Kiss-and-ride bays/ private car drop-off point. There is no easily discernable similarity or pattern between these two amenities.

Factor 4:
The fourth factor has large positive loadings (13) Air-conditioned terminal interior, (14) Ambient music/ radio/ TV playing and (15) Nice architectural design. This is exactly similar to factor no. 3 for the public transport users, which is "Good terminal experience/environment".

Factor 5:
The fifth factor has large positive loadings for (8) Baggage deposit and claim area/ lockers and (12) Park-and-ride facilities. The common link between the two is that these two amenities offer some sort of ""storage" or deposit" service. For amenity no. 8, one deposits one's bag, while for amenity no. 12, the thing to be deposited is one's vehicle. As such, this category can be labeled as "Storage or deposit facilities".

4.5 Summary

Table 4.6: Comparison of factors between private car and public transport users

	Public transport users	Private car users
Factor 1	**Basic amenities** (2) Trip information boards (3) Signs and directions (4) Public assistance booth (5) Comfort rooms (9) Seats in the waiting area	**Basic amenities** (2) Trip information boards (3) Signs and directions (4) Public assistance booth (5) Comfort rooms
Factor 2	**Private car facilities** (11) Kiss-and-ride bays (12) Park-and-ride facilities	**Service amenities** (6) Telephone booths (7) Shops, Stalls and stands (10) Bicycle racks (9) Seats in the waiting area*
Factor 3	**Good terminal environment** (13) Air-conditioned terminal (14) Ambient music/TV playing (15) Nice architectural design	**(Unlabeled category)** (1) Policemen/security personnel (11) Kiss-and-ride bays
Factor 4	**Service amenities** (6) Telephone booths (7) Shops, stalls and stands (8) Baggage deposit (10) Bicycle racks	**Good terminal environment** (13) Air-conditioned terminal (14) Ambient music/TV playing (15) Nice architectural design
Factor 5	**Security features** (1) Policemen/security personnel	**Storage or deposit facilities** (8) Baggage deposit (12) Park-and-ride facilities

** Very low factor loading*

Shown in the previous table are the summary of the different set of factors for both the public transport users and the private car users. At a glance, we can see that there is some common pattern between the two, with slight differences in the location of some amenities. 10 out of the 15 amenities have consistent groupings between the two user groups, meaning that these 10 amenities are consistently grouped together within the same factors (Group 1: Amenity 2, 3, 4, 5; Group 2: 6, 7, 10; and Group 3: 13, 14, 15).

There are three common categories between the two, which are “Basic amenities”, “Service amenities”, and “Good terminal environment”, and that most of the variables/amenities for these categories are the same for both user groups. This would indicate that both private car users and public transport users have the same preference structure system when it comes to these particular amenities.

In comparing the groupings, it would seem that the public transport users have a more structured preference system than the private car users, since the groupings of the amenities for each factor are logical, and have some definite pattern. Whereas for the private car users, there are some categories which have amenities that have no discernable similarity with one another.

Comparing this table with Table 4.1 (Most preferred amenities), we can see that 4 of the 5 basic amenities under the public transport users group are within the top 5 most preferred amenities. For the private car users, 3 of the 4 basic amenities are in the top 5. This underlies that the most preferred amenities are the most basic of amenities.

5. CONCLUSIONS AND RECOMMENDATIONS

Based on this study, it can be found out that factor analysis is a valid tool in determining patterns in the preferences of terminal amenities by the users. Results from the factor analysis indeed show that there emerge some trends or patterns in the user’s selection of amenities.

In comparing the factor loadings and groupings between private car users and the public transport user, there appears to be some similarities in the categorization of amenities, as generally, most of the amenities load or group within the same factors for both subgroups. This may suggest that there are just slight differences in the pattern of amenities preferences.

Since the list of amenities used for this study is limited to 15, this somehow limited the number of variables that can be grouped for each factor. As Table 4.6 shows, there are some factors which have less than 3 variables, and as such, some of these factors cannot be easily defined or categorized. Factor analysis works best if the variables or data sets are large, since more variables mean that more data can help explain a particular factor. It is akin to having more samples; it increases the probability of normal distribution of the answers, and thus increases reliability and accuracy.

It is then recommended that future studies on terminal amenities using the factor analysis technique use more than 15 amenities for their analysis. Assuming that four or five factors will be revealed, and that each factor would have an average of 5-6 variables, then a minimum ideal number would be 25-30 amenities. Case in point, Syed’s (2000) research on determinants of public transit ridership using the factor analysis method used 47 variables/amenities.

This study focused more in the application of the factor analysis to identify patterns of preferences. What is more significant and useful for public transportation planning is to determine the impact of these factors/amenities into the mode choice of the trip maker. Future researches can investigate on how the presence/absence of these terminal amenities can affect the worker's decision to use a private car or take public transport. Through statistical calculations, amenities which have the highest impact on mode choice can be ascertained, which could then be given priority in the planning and design of future public transportation facilities.

REFERENCES

Algers, Staffan, Stein Hansen and Goran Tegner. (1975). **Role of waiting time, comfort and convenience in modal choice for work trip**. Transportation Research Record 534:38-51.

Balce, M.C. (1988). **Improvement of data collection and modelling techniques of disaggregate logit models: A case study on work trip mode-choice behavior in Metro Manila**. Phd diss., University of Tsukuba.

Center for Urban Transportation Research (2000). 1999 **Transit customer satisfaction index: Final Report, Results of survey and conclusions**. Prepared for Department of Transportation, State of Florida.

Hair, Jr. Joseph, Rolph E. Anderson, Ronald L. Tatham and Bernie J. Grablowsky. (1984). **Multivariate Data Analysis with Readings**. New York: Macmillan Publishing.

Horowitz, Alan and Nick Thompson (2004). **Evaluation of intermodal passenger transfer facilities, Final Report**. Center for Urban Transportation Studies. September 1994.

Jimenez, Nenita R. (1996). **Predicting the impact of the EDSA mass rail transit on the mode of choice behavior of car users for work trips**. Master's thesis, University of the Philippines.

Magbanua, Joel R. (1998). **Work trip distribution in large scale CBD**. Master's thesis, University of the Philippines.

Rabinowitz, Harvey Z., Edward A. Beimborn, Peter S. Lindquist, and Donna M. Opper (1989). **Market-based transit facility design, Final Report**. Prepared for U.S. Department Of Transportation, February 1989.

Syed, Sharfuddin J., and Ata M. Khan (2000). **Factor analysis for the study of determinants of public transit ridership**. Journal of Public Transportation, Vol. 3, No. 3.

TCRP Report 40. (1998). **Strategies to attract auto users to public transportation**. Washington DC: National Academy Press. http://gulliver.trb.org/publications/tcrp/tcrp_rpt_40.pdf

TCRP Report 46. (1999). **The role of transit amenities and vehicle characteristics in building transit ridership: Amenities for transit handbook and the transit design game workbook**. Washington DC: National Academy Press. http://www4.trb.org/trb/crp.nsf/All+Projects/TCRP+B-10

Tuazon, Marites (1995). **Analyzing transfer disutilities in disaggregate mode choice models for work trips using revealed and stated preference data**. Master's thesis, University of the Philippines.