The Characteristics of Shopping Trips by Bus Transit

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Abstract

This paper presents a summary of the findings of a one-year research project that was sponsored by the Federal Transit Administration (FTA) and conducted on the characteristics of shopping trips using bus transit. The study involved the collection of extensive amounts of data on shopping trips and on the shoppers themselves in a large sampling area in California. It describes the integrated environment a shopper faces starting from his or her home and ending at the entrance of a mall. This includes analyzing the distances from home to bus stops, travel time on the bus, frequency of transfers, and the walking environment from bus stops to mall entrances. Also characterized are the distributions of shoppers and bus users on the basis of gender and age and the implications of these distributions in regard to what should be improved in bus service. Several other attributes of shoppers and shopping trips were collected, analyzed, and included in the recommendations. A total of 45 malls, 22 transit authorities and more than 1,000 shoppers were surveyed through relatively lengthy questionnaires for their opinions and for data on a wide range of issues. The most important finding of this work is that no organized or significant efforts exist between mall operators and transit authorities, to continuously monitor and improve shopping by bus, especially in regard to the location of bus stops around malls and the safety and

convenience of the walking environment for a shopper who uses the bus and walks to and from the mall entrance.

Introduction

This research project examined the main components and phases encountered in the process of shopping by bus in order to identify problems that could be eliminated partially or completely so that the environment of shopping by bus would keep its current users and attract more users. The study explored the views of the basic partners of this process, namely, transit authorities, shopping center operators, and shoppers themselves. The methodology of this research relied heavily on collecting, examining, and analyzing the thoughts, opinions, and data provided by various parties who answered surveys and questionnaires. Moreover, on-board observation was also employed to get first-hand insight of shopping by bus. Site investigation of 10 malls was conducted to study the conditions and characteristics of the paths that shoppers follow from bus stops to the mall entrances. Selected areas in the cities of Fremont and San Jose, California, were analyzed regarding bus service and the spatial relationships of residential areas to shopping areas. The routes, transfers, and travel times involved in the process of shopping by bus were also analyzed in the sample areas. The study involved questionnaires sent to 220 shopping centers in various states, 45 of which responded. The content of these questionnaires is described in the next section, "Survey of Malls." Also, 22 transit authorities operating bus services in California urban areas, having a total population of more than 18 million, answered and returned questionnaires. The results can be classified as follows in accordance with the major survey or substudy performed in connection with the area under consideration.

Walking Environment from Bus Stops to Mall Entrances

To examine the issues involved in the bus-stop-to-mall environment, the walking paths from bus stops to 10 randomly-selected malls in the San Francisco Bay Area of California were surveyed, and field measurements were taken of parking lots, walkways, sidewalks, and the relative locations of bus stops near

each mall. Besides “as built” field measurements, original plans were checked whenever possible. Observations were made to verify and track all of the different paths taken by shoppers coming from or going to bus stops from various points or entrances of a mall. The main findings in this respect are described in the following section.

The average ratio of walking distances on a sidewalk to the total distance of 40 paths (from bus stops to mall entrances) is about 50 percent, reflecting a relatively high amount of walking over stretches without any sidewalks. The total walking distance for these paths ranges from 20 to 3,245 feet. According to the findings gathered by direct questionnaire from a sample of 1,068 bus users,

Figure 1. Relationship of total distance to sidewalk length.

the average walking distance considered acceptable is about 1,190 feet. Figure 1 depicts the individual ratios of length of sidewalks to the total length of the path.

Survey of Malls

There are split opinions regarding the use of a shuttle bus between bus stops and mall entrances. Several issues surfaced in discussing this idea, including

legalities, insurance, pavement damage, and schedule information. Regarding improving paths between stops and entrances, it appeared that there is not always clear agreement between mall operators and transit authorities on the responsibilities of providing well-defined, safe, and short walking paths wherever possible. Also, there are no clear-cut guidelines or standards for providing a walking environment.

There are also split opinions about the proposed idea of under-carriage space in buses for storing shoppers' purchases. Some replies from mall administrators indicated unsubstantiated perceptions regarding reasons that some people do not favor using a bus for transportation to shopping such as that most customers are females or that the behavior of some young people on the bus discourages others from using the bus.

Surveys also revealed that most mall operators do not have a realistic idea about the number of shoppers or percentage of people using buses for shopping trips, nor of the extent of bus service to malls. A lack of concern for where the bus stops are located seems to exist among many mall operators and, thus, little is done to make the stops closer to mall entrances or to make the path from bus stops to mall entrances a safer environment.

Some mall operators believe that many young people ride buses to malls but seldom make purchases there. These perceptions might explain the intentional lack of concern towards improving bus stop locations around malls.

It should be pointed out that the term "shopping mall" incorporates both enclosed shopping centers and very large strip shopping centers. This research did not include any data or investigation of whether the owner of the center has a role in setting bus passenger access to given shopping sites or if it is a decision by local managers.

Survey of Transit Authorities

The survey showed that shoppers face many problems with the environment of shopping by bus in various magnitudes. Among these problems are safety, space in bus for placing packages, difficulties in boarding and alighting, sched-

ule problems, and inconvenient bus stop locations around shopping centers. Some communication exists between some shopping center operators and transit operators, while others have no contact or mechanisms to work on any issues related to improving service to shoppers by bus. The main issues noted from the replies of several transit authorities on communication related to access to malls are:

- The communication about and coordination of the bus stop locations between mall operators and transit operators practically ends once the mall starts operating. Very little follow up is done.
- There is great need for formulating a clear concept of convenient bus stop locations and, consequently, the concept of proper paths.
- To achieve better service, coordination is needed related to shuttling shoppers from bus stops to mall entrances and locating convenient stops. For example, in cases where physical or jurisdictional obstacles prevent closer bus stops, both sides can resort to shuttle services.
- Formulating the procedures for contact: times and issues should be streamlined.

It was also noted that not enough surveys and studies are conducted by transit authorities to collect data on various components of shopping by bus. It should be noted, however, that there has been some significant effort by many transit authorities to improve access to malls. This was evident from attempts by authorities to keep bus stops inside shopping mall grounds after being asked by malls to move bus stops outside the grounds. Also, some local jurisdictions have adopted transportation control measures that may aid in getting bus stops closer to malls. On the other hand, some shopping centers welcome bus patrons and even allow a portion of their parking lots to be used for park-and-ride service. Others allow a major time transfer point or even mini-terminal to be located at the mall.

According to information provided by transit authorities, the average number of times per month a person uses the bus for shopping is approximately 10. Trips with one or no transfer may have distances up to 20 miles, but on the

average, two-transfer trips range from 4 to 20 miles and three-transfer trips range from 8 to 20 miles. Once a trip exceeds eight miles, it is likely to involve two transfers or more.

Figure 2 shows the distribution of agencies surveyed with respect to the average number of transfers encountered in trips of various lengths in their areas of service.

Figure 2. Number of agencies vs. number of transfers for particular distances.

Counts and Observations Performed at Two Malls

After spending several days conducting counts of bus patrons boarding and alighting buses at two malls in the subject areas, the following were found:

- There exists an appreciable portion of shoppers who stop at more than one shopping center using the bus.
- The approximate percentages of people using buses for shopping out of the total number of shoppers for the same malls in the given periods were 3 percent and 1.41 percent, respectively.
- The approximate percentages of people arriving at the two shopping centers by bus and not purchasing anything are about 20 percent and 58 percent.

The wide variations in the above results indicate a strong need for more data on the statistics of these aspects to allow for proper conclusions.

Surveys were done to estimate the percentage of shoppers using the bus vs. those using other means of transportation for shopping at two malls other than the previously-mentioned malls. Based on 1,331 interviews at both malls, 84.4 percent used private autos and 9.5 percent used buses, while 6.1 percent walked or used bicycles.

Also, this survey showed that 45 percent of those using private autos would consider using bus service for shopping under various conditions, such as when a private vehicle is not accessible, in peak traffic conditions, and during periods when parking at the mall is problematic.

Shopper's Gender and Age Surveys

A separate set of surveys was conducted to examine whether appreciable differences exist for the gender and age of shoppers, in general, and of shoppers by bus, in particular. This was to trace any impact such differences might have on using bus service for shopping.

The surveys indicated the following results:

- For shopping in general (the sample included 10,441 people):
 - About 56 percent of shoppers at food stores were female, 52.9 percent at K-Mart, and 74.5 percent at Mervyn's. The total percentage of females for all types of stores is 60.5 percent. Shoppers 25 to 60 years old comprise 63 percent of those who use bus service. About 14 per-

Figure 3. Age distribution of bus riders near stores.

cent of shoppers are less than 18 years old, and at least 22 percent of adults traveled to the malls in groups.

- For those riding the bus near a shopping center (the sample includes 2,309 responses):

The results of this survey indicated that the percentage of females at food stores is 52.6 percent, which is less than the percentage of females shopping at those stores. This might imply that bus ridership by females is impeded by certain factors or conditions in bus service such as safety. Figure 3 depicts the distribution of ages of shoppers and of bus riders near shopping centers. It shows that the percentage of shoppers is higher than that of bus riders for age groups between 18-25 and 35-50. For other ranges of ages below and above these ranges, the percentage of bus riders is higher.

Direct Interviews of Shoppers Traveling by Bus

A total of 1,068 shoppers who traveled by bus at several malls were interviewed to determine specific aspects of their trips to the shopping centers at which the interviews were conducted. The following results were obtained:

Walking Time from Home to First Bus Stop—The median walking time was 4 to 5 minutes, the mode was 5 minutes, and the weighted mean was about 6 to 8 minutes. A total of 15.9 percent of people had walking times of more than 10 minutes, and 5.4 percent had walking times of more than 20 minutes.

Number of Transfers—One or two transfers were involved in 90 percent of all bus trips; approximately 10 percent had more than two transfers.

Total Travel Time on Bus—The median travel time of the trips was between 15 and 20 minutes, and at least 5.7 percent of the people experienced travel times of more than 45 minutes.

Distance from Home to Shopping Center—The median distance from home to shopping center was about 3.2 miles, and the cumulative percentages of users within 1, 2, and 3 miles was 11.3 percent, 28.5 percent, and 47.7 percent, respectively. The majority of respondents (85.1 percent) came from home origins within 10 miles from shopping centers. Table 1 represents the distribution of shoppers using the bus, based on the distances from home to shopping centers.

Bus Service

At least 40 percent of respondents rated schedules during weekends and holidays as “fair” and space for groceries and safety as “low.” About 16 percent rated the information on schedules as “confusing” or “not clear.” Table 2 shows the ratings of the various components of bus service by users.

General Aspects of Using a Bus for Shopping

- A total of 28.5 percent stated that there were places for shopping that buses do not serve.
- About 45 percent stated they would buy more things had there been more space on bus for their purchases.

Table 1
Distance Between Home and Shopping Center

<i>Distance in miles</i>	<i>Number of people</i>	<i>Percent</i>	<i>Cumulative Percent</i>
0.5	46	4.5	4.5
1	69	6.8	11.3
1.5	86	8.4	19.7
2	90	8.8	28.5
2.5	93	9.1	37.6
3	103	10.1	47.7
4	109	10.7	58.4
5	183	17.9	76.3
10	90	8.8	85.1
>10	104	10.2	95.3
>5 ¹	48	4.7	100.00

¹This group resulted from people selecting the "more than 5 miles" response in the relatively small pilot survey before the "10 miles" and "more than 10 miles" options were added to the possible responses for this question.

- A total of 71 percent support the idea of having a free shuttle bus between the bus stop and the mall entrance.
- A total of 60 percent made the subject trip for shopping and other purposes.
- The mean number of times of using the bus for shopping per month was 8.7, and 13.5 percent use the bus daily for shopping. Table 3 represents the frequency of using the bus per month. Linear multiple regression analysis showed that no correlation exists between the number of times per month a shopper uses a bus and a set of factors that were speculated to affect such frequency. These factors are: travel time spent on the bus, distance from the center, walking time from home to the bus stop, the

Table 2. Distribution of Ratings of Bus Service

<i>Rating</i>	<i>Schedule (weekdays)</i>	<i>Boarding</i>	<i>Seating yourself</i>	<i>Alighting</i>	<i>Space for groceries</i>	<i>Safety on bus</i>	<i>Schedule (week- ends/holidays)</i>	<i>Safety (both ends)</i>	<i>Fare</i>
Excellent	145 (14%)	162 (16%)	186 (18%)	159 (15%)	105 (10.5%)	149 (15%)	67 (7%)	98 (10%)	75 (8%)
Good	519 (50%)	613 (59%)	606 (59%)	623 (61%)	47 (47%)	507 (50%)	301 (31%)	480 (49%)	392 (40%)
Fair	289 (28%)	232 (23%)	215 (21%)	216 (21%)	345 (34%)	270 (26%)	313 (33%)	337 (34%)	330 (33%)
Poor	82 (8%)	25 (2%)	26 (2%)	26 (2%)	86 (9%)	95 (5%)	279 (29%)	73 (7%)	191 (19%)
Total	1,035	1,032	1,033	1,024	1,008	1,021	960	988	988

average ratings of bus service, and number of transfers. More studies are needed to ensure the generality of this result.

Captive vs. Choice Riders

A total of 19.5 percent of bus users interviewed owned cars but use the bus for shopping in addition to using either their own cars or friends' cars. However, 23.4 percent stated they do not own cars; a relatively high percentage (46 percent) stated that they would still use a bus for shopping even if they owned a car.

The average usage of buses for shopping by "choice" riders is 6.6 times per month, compared to 9.0 for captive riders, indicating a greater potential for more choice riders to use buses for this purpose. However, the average trip length, distance from center, and walking times are almost identical for captive and choice users. The average ratings by choice users of all aspects of bus service are somewhat higher than those by captive users.

Table 3
Frequency of Bus Usage per Month for Shopping

<i>Number of Times/Mo.</i>	<i>Number of People</i>	<i>%</i>	<i>Cumulative %</i>
1	90	8.6	8.6
2	89	8.5	17.1
3	115	11.0	28.1
4	135	12.9	41.0
5	141	13.5	54.4
6	83	7.9	62.4
7	111	10.6	73.0
8	2	0.2	73.2
10	76	7.3	80.4
15	62	5.9	86.3
25	2	0.2	86.5
30	141	13.5	100.0
Total	1,047		

General Characteristics of Shoppers by Bus

- Age: A higher percentage of young people used the bus (80 percent of shoppers are about 35 or younger).
- Amount of purchases: The median amount spent on purchases was about \$26.10. As shown in Figure 4, the percentage of people decreases as the amount of purchase increases. More study is needed on this aspect.

Summary and Conclusions

Based on the surveys, several conclusions can be reached regarding the use of buses by shoppers:

- Shoppers traveling by bus face many problems, most important of which are an excessive numbers of transfers, schedules (especially on week-ends), safety, and accessibility from bus stops to shopping centers.

Figure 4. Distribution of value of purchases.

- Extra space on the bus and better seating arrangements would surely encourage shopping by bus.
- It appears that there is not enough coordination and communication among mall operators and transit authorities related to shopping by bus. More coordination is required to streamline efforts, especially in locating bus stops nearby and/or inside mall parking lots, improving walking paths from bus stops to mall entrances, and implementing the service of shuttle buses wherever applicable.
- Characteristics of shoppers using buses such as age, gender, and shopping in groups should be taken into consideration when improving bus service and shopping environment.
- Females constituted a larger percentage of shoppers and showed slightly more concern for safety.

- Very young people make up a sizeable portion of bus shoppers and are often the object of complaints concerning certain behaviors on the bus.

More data and surveys should be available and ready to be analyzed by transit authorities when planning to improve aspects of shopping by bus. Some mall administrators think that the small number of shoppers by bus makes the issue unimportant or insignificant; many who were surveyed had no idea about the estimated segment of shoppers by bus.

Other conclusions and recommendations are:

- There is a need to produce guidelines on the acceptable distances between bus stops and entrances to shopping centers. There is also a need to classify walking paths—whether or not they are on sidewalks—and then to set guidelines on the ranges of acceptable distances that a shopper walks on segments that are *not* sidewalks.
- Shuttle buses can be implemented not only between bus stops and shopping center entrances but also from between different shopping centers.
- There is a tremendous need to have a computer-aided procedure and method by which travel time and number of transfers can be calculated for a trip from a random origin to a random destination in an urban area. With such a procedure, by generating a very large number of trips between residential areas and shopping centers, travel time and transfers can be computed. This could be based on the input of published bus schedules and street map and zoning data in computerized form such as in GIS databases.
- More effort should be made by agencies to publicize to the general public the extent and attributes of “choice” riders using the bus. This would encourage more choice riders to use the bus service.
- More emphasis should be placed on starting pilot projects to use shuttle buses from homes to bus stops and from bus stops to malls. Shuttle buses could also be used in pilot projects between a series of shopping centers.

- Further research is needed to examine whether patterns of ownership lead to some shopping centers being more accessible to bus patrons than others.

About the Author

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