Initial Reactions to a Central Business District Bus Transit Mall in Honolulu

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The city and county of Honolulu have recently adopted a plan designed to eventually convert a central business district street to a bus transit mall. The first phase of the plan, which was the imposition of turning restrictions on private automobiles, was implemented in February 1979. This paper presents the results of a study that investigated the reactions of the daytime population of the central business district toward the mall and that population's perceptions of the mall's impact on congestion, noise, air quality, safety, convenience, speed, pedestrian circulation, and the general downtown environment. The study was based on an interview survey administered to 170 persons. The major findings of the study were as follows. The mall has caused 26 percent of the automobile users to change their circulation patterns. All factors examined were thought to be enhanced by the mall. Chi-square tests showed that, at the 0.05 level, purpose and arrival time explain the perceptions of congestion and safety impacts but in different ways; mode of travel strongly affects the experience of convenience and speed; the vast majority (85 percent) of the respondents were favorably disposed toward the mall concept. These findings should be useful to urban transportation planners and decision makers because they may represent a shifting of public attitudes toward favoring the preferential treatment of high-occupancy vehicles, in general, and urban bus systems, in particular.

With the recent emphasis on improving the efficiency of existing transportation facilities, more urban areas are applying strategies to enhance the level of service delivered by their bus systems. One such strategy is the dedication of rights-of-way to the exclusive use of buses, both inside and outside major activity centers.

Acting on the recommendations of a study of five alternatives conducted in 1978 by its Department of Transportation Services (1), the city and county of Honolulu adopted a plan that will eventually convert a 0.8-km (0.5-mile) stretch of the central downtown street (Hotel Street) into a two-way bus transit mall. The first step of the plan was implemented on February 13, 1979. This step consisted of the prohibition of private automobiles from turning onto Hotel Street from most cross streets between the hours of 6:00 a.m. and 6:00 p.m., Monday through Saturday.

Approximately three weeks after the turning-movement restrictions went into effect, the Civil Engineering Transportation Program (CETP) of the University of Hawaii conducted a survey to discern the initial reactions of the daytime population of the downtown area toward the transit mall.

STUDY DESCRIPTION

The city and county of Honolulu encompasses the entire island of Oahu (Figure 1). The estimated 1977 de facto population of the island, which includes military personnel, their dependents, and visitors, was 777 000 persons or about 80 percent of the state total. The corresponding density was 503.6 persons/km^2 (1304.3 persons/mile^2) (2).

The most densely populated part of Honolulu is located in an east-west corridor on the southern side of the island. It lies between the ocean to the south and the Koolau mountain range to the north and extends on both sides of the central business district (CBD) (Figure 1).

The CBD has experienced heavy growth over the past decade. Recent estimates of the labor force place the number of jobs there at more than 30 000 (1). The 0.5-km^2 (0.2-mile^2) CBD is bounded by Nimitz Highway to the south, which runs along the Honolulu Harbor, and Vineyard Boulevard to the north (Figure 2). Honolulu's major freeway (H-1) also runs in the east-west direction north of Vineyard Boulevard. North King and Beretania Streets form a major arterial, one-way couplet that traverses the CBD on both sides of Hotel Street, which bisects the downtown area.

Hotel Street is a two-way street approximately 11 m (36 ft) in width. It serves as the major bus roadway in the downtown area. It currently carries a peak-period bus volume of 72-80 buses/h (3).

The survey instrument used in this study was a personal interview questionnaire (Figure 3). The questionnaire was divided into four parts: The first part elicited basic socioeconomic information about the respondents such as age and occupation and travel characteristics such as travel mode and trip purpose. The second part asked whether the mall had an effect on the respondents' CBD travel habits such as trip frequency and choice of mode. The third part requested that respondents assess the effects of the mall on typical impacts such as congestion and air quality, and the last part asked for the respondents' opinion on whether the transit mall should remain in operation.

In order to cover the major segments of the day population of the downtown area, five students who were participating in a university training program funded by the Urban Mass Transportation Administration (UMTA) were instructed to circulate in the general downtown area within a city block on either side of Hotel Street and approach potential respondents randomly during the midday off-peak period. The timing of the survey was selected to coincide with the lunch period in order to ensure the inclusion of representatives of all segments of the daytime population. For example, office workers who drive to work were considered less likely to be encountered during other hours of the day. A total of 170 valid interviews were conducted in this manner during the period from March 7 to March 20, 1979.

RESPONDENT PROFILES

Modal Choice

By nature, the transit mall provides for the preferential treatment of one mode of travel over another. For this reason, the respondent profiles given next make reference to the mode used. Three modal families are included: bus, automobile, and other.

Of the 170 persons interviewed, 52 percent were bus riders, 40 percent were automobile drivers or riders, and 8 percent were users of other modes, including walking. These percentages do not necessarily represent the overall modal split since bus riders and walkers may have been encountered more often than automobile users during the survey that was administered at the street level.

Age and Sex

The calculated average age of approximately 36 was

Figure 1. City and county of Honolulu.

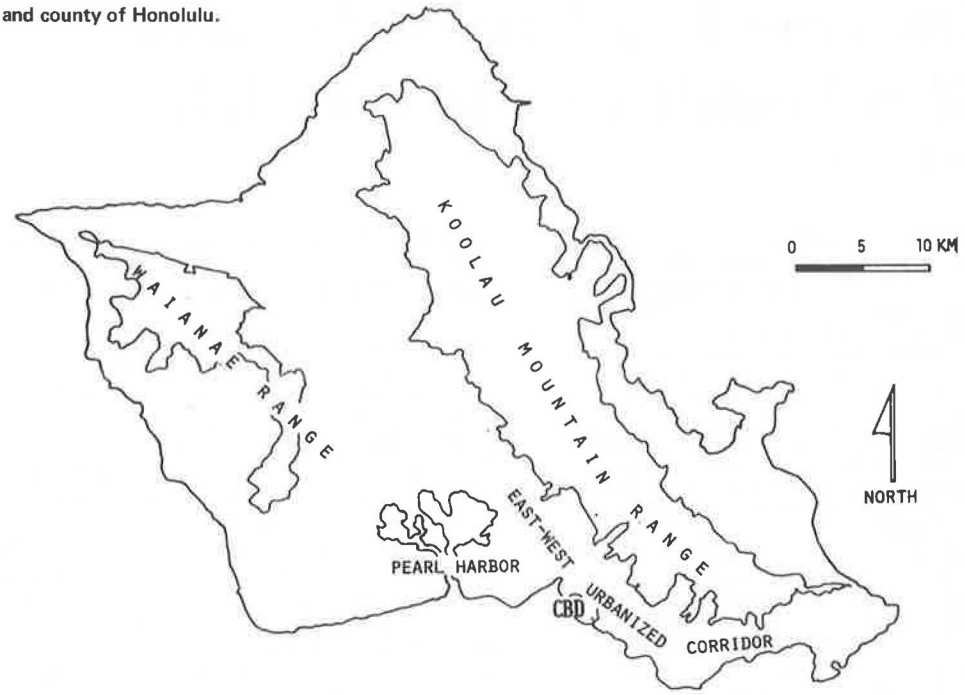
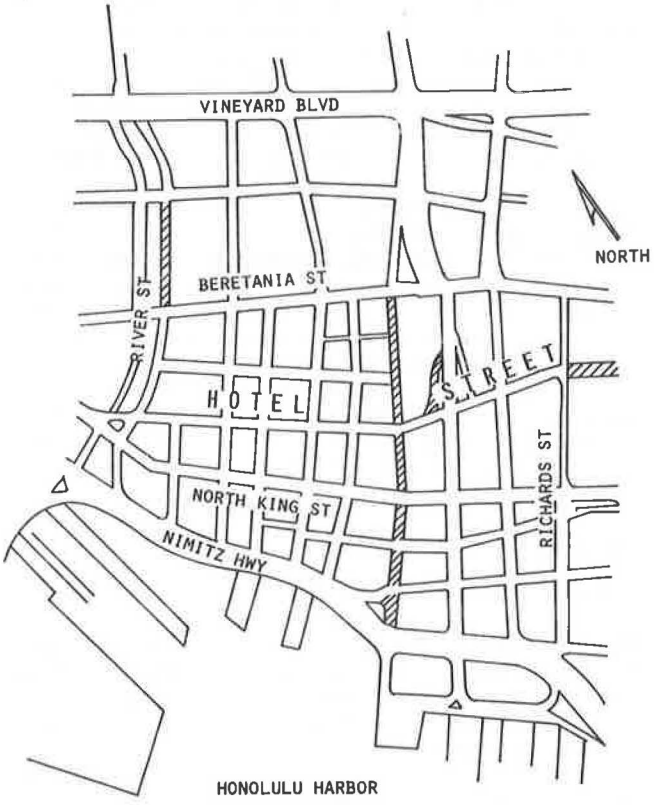


Figure 2. Honolulu CBD.



found to be independent of mode. The sex profiles, however, were found to be different at the 0.05 level of significance on the basis of the chi-square test. The male-female split was 30-70 in the case of bus riders and 65-35 in the case of automobile users. Males and females were equally represented among the users of other modes.

Occupation

Professional or technical and clerical or service workers had an equal share in the automobile sample; each group constituted about 30 percent of the total. By contrast, the representation of these two groups among the bus riders was 10 and 50 percent, respectively. Persons not in the labor force (unemployed, housewives, and retirees) made up about 15 percent of each modal sample. Students constituted approximately 20 percent and other workers about 5 percent of the bus patronage. In the case of automobile use, the last two proportions were reversed.

PERCEPTIONS OF MALL IMPACTS

Changes in Travel Habits

One section of the survey questionnaire asked whether the existence of the transit mall had caused changes in the respondents' travel habits, such as the frequency of travel to the CBD, the mode, or the route used to get there. The only significant change was in the choice of route—26 percent of the automobile users were diverted from Hotel Street to other downtown streets. The reason why no other change occurred is most probably due to the fact that travel on Hotel Street constitutes only a small part of the average overall trip length.

Impact Perceptions

Another section of the questionnaire asked the respondents whether they perceived improvement, stability, or degradation in eight transportation impact areas as a result of implementing the transit mall. The impact areas specified were traffic congestion, noise level, air quality, safety, convenience, travel time (or speed), pedestrian circulation, and the general downtown environment.

Table 1 shows that positive responses exceeded negative replies in each case and that less than 15 per-

Figure 3. Survey questionnaire.

1. Sex: M F
2. Age: _____
3. Occupation: _____
4. In what general area do you live: _____
5. By what means (mode) did you come downtown: _____
6. When did you arrive downtown (time): _____
7. When are you planning to leave: _____
8. What is the purpose of being downtown today _____

HAS THE TRANSIT MALL CAUSED YOU TO:

1. Come downtown ____ more often ____ less often ____ same
2. Come by a different mode: ____ No ____ Yes; specify _____
3. Come via a different route: ____ No ____ Yes; specify _____

IN YOUR OPINION HAVE THE FOLLOWING CONDITIONS IMPROVED, REMAINED THE SAME OR WORSENED AS A RESULT OF THE TRANSIT MALL:

	Improved	Same	Worse
1. Congestion	____	____	____
2. Noise	____	____	____
3. Air Quality	____	____	____
4. Safety	____	____	____
5. Convenience	____	____	____
6. Speed (travel time)	____	____	____
7. Pedestrian Circulation	____	____	____
8. General Environment	____	____	____

ARE YOU IN FAVOR OF CONTINUING THE TRANSIT MALL: ____ Yes ____ No

COMMENTS:

Table 1. Respondent perceptions of the mall's impacts.

Impact	Improved (%)	Same (%)	Worse (%)
Congestion	57	31	12
Noise	32	60	9
Air quality	23	68	9
Safety	56	35	9
Convenience	46	42	12
Speed	38	48	13
Pedestrian circulation	48	46	6
General CBD environment	51	43	6

cent of the respondents perceived any one condition to be adversely affected by the transit mall. The differences between the percentages of positive and negative responses are designated as the weighted ratings of the effect of the mall on each of the eight conditions in the table below.

Impact	Weighted Rating
Congestion	45
Noise	23
Air quality	14
Safety	47
Convenience	34
Speed	25
Pedestrian circulation	42
General CBD environment	45

Use of this difference is equivalent to assigning the values of +1, 0, and -1, respectively, to each positive, neutral, and negative response. According to this value system, four impact areas (safety, congestion, the general downtown environment, and pedestrian circulation) were on the average thought to have experienced the greatest improvement. Note, however, that the first two (safety and congestion) received the highest proportions of positive reactions and the last two (general environment and pedestrian circulation) received the lowest proportions of adverse reactions.

Noise and air quality, the two main concerns that relate to the physical environment, were implicitly placed in the same category by the respondents. These two impacts were perceived most often to be unaffected by the transit mall (Table 1). They also received the lowest weighted rating in the above table.

The remaining two impacts (speed and convenience) received mixed reactions.

Explanatory Variables

Table 2 presents the experimental significance levels computed with the aid of the Statistical Package for the Social Sciences (4) by using the chi-square test. Each cell of the table shows the result of a separate test that compared the responses to the corresponding impact of the respondents who belong to the various categories of the corresponding attribute (see table below).

Attribute	Categories
Mode	Bus
	Automobile
	Other
Sex	Male
	Female
Purpose	Work
	Shop
	Other
Occupation	Professional or technical
	Clerical or sales
	Service
	Other
Age	Under 20
	21-60
	Over 60
Arrival time	Peak period
	Off-peak period

According to Table 2, the comparison of the responses of males and females (i.e., the sex categories) to the impact of safety resulted in an experimental significance level of 0.3432. Only three attributes (purpose, arrival time, and travel mode) were found to affect the responses relating to some impacts at the 0.05 level.

Congestion

Purpose and arrival time were found to affect the perception of the mall's impact on congestion. Workers showed a higher propensity to indicate an improvement in this impact than did shoppers and travelers for other purposes (65.3 versus a combined 43.9 percent). Their corresponding percentages of adverse responses showed a closer agreement (12.6 versus 10.6 percent).

The responses of peak-period travelers differed from the responses of off-peak travelers in all categories. More peak-period travelers felt a favorable effect on congestion (62.5 versus 34.6 percent). The percentage of adverse responses was higher in the case of peak-period travelers (18.8 versus 9.6 percent). Off-peak travelers perceived no change more often than did the rest (55.8 versus 18.8 percent).

Safety

The two variables that were found to affect the respondents' congestion experience (i.e., purpose and arrival time) were also found to affect the assessment of the safety impact that the transit mall conversion wrought. The assessments of safety impacts by respondents from the various purpose and arrival time categories, however, differed from their reactions to the question of congestion effects.

Shoppers cited safety improvements more often (65.2 percent) than did workers (57.4 percent) and travelers for other purposes (46.7 percent). On the other hand, workers were more likely to feel an adverse effect when compared with shoppers (11.7 versus 4.3). About 30 percent of workers and the same percentage of shoppers agreed that the mall had no effect on safety. The corresponding proportion of those engaging in other activities was 45 percent.

The responses of off-peak-period travelers were almost equally split between the positive and neutral categories (45.3 and 50.9 percent, respectively). On the other hand, peak-period travelers were unevenly divided: 60.3 percent perceived safety improvements, 28.6 percent perceived no change, and 11.1 percent indicated a worsening of safety conditions.

Convenience and Speed

Travel mode was found to strongly explain the respondents' perceptions of the mall's effect on both convenience and speed. A larger proportion of bus riders than automobile users experienced an improvement in convenience (54.1 versus 30.6 percent). On the other hand, the percentage of automobile users who said that they had been inconvenienced by the transit mall (22.6 percent) far exceeded the percentage of bus riders who felt the same way (4.7 percent).

A response pattern similar to that for convenience was detected in the case of speed. About 41.7 percent of the bus riders thought that their speed had improved, but only 3.6 percent of them noticed speed degradation. The corresponding automobile percentages were 31.1 and 27.9, respectively.

Respondents' Views on Mall Continuation

An overwhelming majority (85 percent) of the respondents favored the continuation of the bus transit mall. Moreover, with only a single exception, chi-square tests showed that there was no difference between the overall percentage and the percentages corresponding to the various subgroups in the sample at the 0.05 level of significance.

The exception was in the proportions of bus patrons and automobile users. Although both exhibited a highly favorable disposition toward the continuation of the mall, the 93.7 percent corresponding to bus riders was found to be significantly larger than the 74.1 percent shown by automobile users. Automobile users whose route choice had been affected by the mall exhibited the strongest opposition but, even in this case, the majority (64.7 percent) favored the continuation of the mall.

SUMMARY AND CONCLUSIONS

The survey described in this paper found that the vast majority (85 percent) of the daytime population of Honolulu's CBD were favorably disposed toward the continuation of a bus transit mall in the downtown area. The majority (65 percent) of those automobile users whose downtown circulation patterns were affected by

Table 2. Experimental chi-square significance levels.

Impact	Mode	Sex	Purpose	Occupation	Age	Arrival Time
Congestion	0.5923	0.8535	0.0183*	0.1952	0.0628	0.0002*
Noise	0.1275	0.6415	0.5919	0.5972	0.1602	0.4576
Air quality	0.7643	0.9985	0.4649	0.3116	0.6724	0.7850
Safety	0.2258	0.3432	0.0158*	0.9460	0.6202	0.0313*
Convenience	0.0025*	0.2748	0.4720	0.8272	0.2495	0.1324
Speed	0.0008*	0.1935	0.4202	0.6593	0.7537	0.3126
Pedestrian circulation	0.8983	0.5321	0.1233	0.4538	0.4409	0.1542
General CBD environment	0.2392	0.2879	0.8295	0.8191	0.3789	0.5329

*Significant at the 0.05 level.

the mall were also in favor of continuing the bus mall. This group constituted 26 percent of the automobile users interviewed.

Less than 15 percent of the respondents perceived any one of the following conditions to be adversely affected by the mall: traffic congestion, noise, air quality, safety, convenience, speed, pedestrian circulation, and the general CBD environment. The mall's impact on safety and congestion received the highest proportions of positive responses; the impact on the general environment and on pedestrian circulation received the lowest proportions of adverse reactions. Noise and air quality were perceived most often to be unaffected by the transit mall. Speed and convenience received mixed reactions.

Chi-square tests showed that, at the 0.05 level of significance, trip purpose and arrival time explain the differences in the respondents' perceptions of the mall's impact on congestion and safety. The mode of travel to the CBD made a difference in the perceived effects that the mall had on convenience and speed.

These findings should be useful to urban transportation planners and decision makers because they may represent a movement of public attitudes in the direction of favoring the preferential treatment of high-occupancy vehicles, in general, and urban bus systems, in particular.

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Recent Experience with Accessible Bus Services

Robert Casey

Fixed-route, standard-sized buses equipped with level-change mechanisms to transport wheelchair or semiambulatory passengers between the ground and the bus floor level are currently in service in 23 locations in the United States. This paper includes a brief description of the services in place and a discussion of experience with their operation. Data are limited due to the newness of many of the services and the fact that few transit operators collect the kind of information that is most useful for evaluation. Available data have been collected to inform planners and operators of future accessible bus services of the policy issues and operational impacts they probably will face and the level of ridership they initially can expect. A few findings can be stated: (a) Lift reliability has improved substantially through the emergence of new lift designs and modifications to existing models and (b) ridership continues to be low, with most transit operators reporting between one and three lift-assisted boardings per day. Most of these trips are taken by a few regular riders. The economic impact varies considerably among operators, depending on the reliability of the particular model of lift operated and whether schedule changes were instituted specifically for implementation of the accessible buses. At current lift-utilization rates, accessible bus service will not significantly affect transit operations.

The past year has seen some major developments in the area of fixed-route accessible bus service that uses standard-sized buses. This type of service has been initiated by 18 more transit authorities, which makes a total of 23 now in operation. Three new level-change devices (most often called lifts) are now being used in service. The Transbus concept, which the U.S. Department of Transportation (DOT) thought would be the solution to fixed-route bus accessibility, received a setback when bid solicitations for the bus produced no respondents. The National Research Council review panel concluded that Transbus, as specified in the solicitation, could not be built without considerable technical and financial risk on the part of the manufacturers (1). Also, DOT issued regulations to implement Section 504 of the Rehabilitation Act of 1973, which (among other provisions) mandated the purchase of accessible buses for every bus ordered after July 2, 1979. These regulations are currently being challenged in court by the American Public Transit Association (APTA).

In spite of the number of accessible bus services that are operational, a wealth of data is still not available. The prime reason for this is that the collection and analysis of the type of information most useful to policymakers and other transit operators require a substantial evaluation effort, an undertaking that is beyond the fiscal resources available to many transit properties. Consequently, the most detailed information about accessible services will continue to be disseminated through the Urban Mass Transportation Administration (UMTA) Ser-