

use these same adjustment mechanisms to respond to changes in the price of travel or changes in transportation policy. If so, then transportation analysis, which fails to account for these mechanisms, may have difficulty predicting the magnitude or even the direction of changes in travel patterns in response to these price or policy changes.

Empirical evidence suggests that household members used such mechanisms during the gasoline shortages of 1973-1974. A study by Peskin, Schofer, and Stopher of travel patterns of households in the suburbs north of Chicago found that the combining of nonwork destinations with work trips increased sharply during the shortage, as did the combining of single-destination trips into multiple-destination tours (4).

The analysis of transportation policies intended to divert commuters from the private automobile to other modes to help achieve air pollution or energy conservation goals must recognize the advantages of the private automobile in visiting nonwork destinations as part of workplace-related trips and the increasing importance of such use of these trips for many households. Incentive schemes that subsidize transit or penalize private automobile may not be as effective in diverting commuters as conventional, generalized cost analysis would imply.

The assumption that the sole function of the work trip is to get people to and from the workplace may have once been reasonable. However, as demographics change and emphasis on using transportation policy to help achieve air pollution goals and energy conservation goals increases, this assumption is becoming increasingly untenable (5). An understanding of the extent to which and the reasons why household members use workplace-related trips to visit nonwork destinations seems essential for effective transportation planning.

## Generalized Attributes and Shopping Trip Behavior

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Attitudinal data obtained from an impact travel survey of the San Francisco area was analyzed to determine the composition of generalized attributes that identify an individual's cognitive structure of shopping behavior. Once it was determined (by employing two measures of factorability) that factor analysis was an appropriate analytical tool, the data (stratified by residence and trip destination) were factor analyzed. The results indicate that each population's cognitive structure is unique, although in all cases a common set of generalized attributes was found to be important. For the respective populations, an index of satisfaction was developed for each of the generalized attributes. The index was used to investigate the relation between a population's cognitive structure and its socioeconomic profile. Based on tests of independence and gamma measures of association, the following attributes were significantly related to a population's satisfaction relative to alternative attributes of the shopping excursion: travel, mode, length of residence at current address, and age distribution. Among the implications of the analysis is that a set of attributes exists, independent of residence or trip destination, that should be incorporated into travel-demand models if shopping travel behavior is to be forecast accurately. Moreover, the extent of travel incurred in a shopping journey appears to significantly affect an individual's attitude structure of shopping activities.

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Recent emphasis in transportation research has focused on the development of travel-demand models that seek to explain and subsequently predict, as accurately as possible, individual travel behavior (1-4). Concomitant with the shift toward disaggregate modeling has been the recognition that individual attitudes are important inputs into the decision process (5-11). As a result of its explanatory and predictive potential for travel behavior, therefore, attitudinal modeling and its associated analytical techniques are of widespread interest to transportation analysts.

In general, attitudinal modeling serves the travel forecaster in two ways:

1. Univariate or multivariate psychometric scaling techniques can be applied to define multifaceted transportation attributes, such as comfort and convenience,



- this shopping characteristic;  
 $n$  = number of components in the  $k$ th generalized attribute;  
 $m$  = number of generalized attributes;  
 $3$  = midpoint of Likert scale on which individuals assessed characteristics of their shopping activities.

Thus, for generalized attribute  $k$ , if an individual's mean rating for  $k$  exceeded 3, it is assumed that his or her shopping activity was satisfactory with respect to the generalized attribute; if less than or equal to 3, his or her shopping activity is assumed to be unsatisfactory in this regard.

Second, an individual's satisfaction rating was cross-tabulated with various socioeconomic characteristics. Let  $O_r$  be observed frequency,  $E_r$  be expected frequency (assuming no association between satisfaction rating and the socioeconomic characteristic),  $c$  and  $r$  be the number of columns and rows, respectively, in the contingency table, and  $L$  be the number of cells in the table. Then the statistic

$$\sum_{i=1}^L (O_r - E_r)^2 / E_r \quad (3)$$

has a chi-square distribution with  $(c - 1)(r - 1)$  degrees of freedom and has an associated null hypothesis that the satisfaction rating of a particular generalized attribute and a socioeconomic characteristic are statistically independent (17). If the null hypothesis is rejected at the 0.05 level (that is, the variables are not independent), then the direction and strength of the relationship is investigated by using a gamma measure of association. Gamma is defined as

$$\gamma = (n_s - n_d) / (n_s + n_d) \quad (4)$$

where  $n_s$  and  $n_d$  are the number of concordant and discordant pairs, respectively, and are particularly use-

ful in this context because, in absolute value, they reflect the proportion by which error in prediction of generalized attribute satisfaction is reduced from knowledge of the particular socioeconomic characteristic (18).

## DATA

Data for this analysis were obtained from a 1973-1974 Bay Area Rapid Transit (BART) impact travel survey (19). The survey included four areas throughout the San Francisco Bay area, two in the East Bay and two in the West Bay; sample sizes were 814 and 910, respectively. In each bay one study area was selected to represent a central city, comprised of a sizable minority population, that had bus service available, and the second study area represented a suburban environment, predominantly white, that had little or no bus service, that is, automobile oriented. In the East Bay, Oakland's Fruitvale District and adjoining hill areas represented the central city, and the area in and around the city of Walnut Creek and extending south through Danville represented the suburban study area. In the West Bay, the Mission District in San Francisco was selected for the central city area, and the suburban study area began in the southwest corner of San Francisco and extended south through Daly City and Pacifica. For this analysis, the central city and suburban areas in each bay were combined to form aggregated central city and suburban populations, for total sample sizes of 807 and 917, respectively.

In the survey individuals were asked to rate, on a five-point Likert scale, 19 attributes that represent various aspects of a trip from home to a shopping center (located in downtown San Francisco or in the local CBD) and of the shopping area itself. Table 1 presents the statements that individuals were asked to evaluate. Only individuals who, in the previous 12 months, had made a shopping excursion to downtown San Francisco or to their local CBD to buy or look for major appliances and who rated the relevant shopping area on each of the 19 items were included in the analysis. The sample sizes for each model run are summarized below.

Table 1. Shopping activity attributes rated by respondents.

Attribute Number	Statement
V1	A person like me can dress informally when shopping in...
V2	A good variety of merchandise I like can be found in...
V3	The merchants stand behind goods they sell and provide reliable repair service in...
V4	A person will find the walkways and sidewalks uncrowded when shopping in...
V5	A person like me will find the area clean when shopping in...
V6	A person like me can easily get from store to store when shopping in...
V7	Low prices can be found for the merchandise I want in...
V8	Persons who drive will find it easy to park when shopping in...
V9	Shoppers will find the stores open evenings and weekends when shopping in...
V10	A person is safe from accidents when traveling as I do to shop in...
V11	Transportation, plus any parking, doesn't cost much when going as I do to shop in...
V12	I can start and return when convenient for me when going as I do to shop in...
V13	A person is safe from robbery or assault when going as I do to shop in...
V14	A person has a clean, attractive passenger area to ride in when traveling as I do to shop in...
V15	Getting there doesn't take as much time when going as I do to shop in...
V16	I know for sure when I will get there when traveling as I do to shop in...
V17	A person has a comfortable ride when traveling as I do to shop in...
V18	A person is protected from bad weather when traveling as I do to shop in...
V19	It's easy to stop at other places on the way when traveling as I do to shop in...

Population	Downtown San Francisco	Local CBD
Central city	285	417
Suburban	247	576

## RESULTS

Tables 2-5 summarize the factor-analytic results obtained for central city and suburban populations who undertook shopping journeys to downtown San Francisco and local CBDs. Relative to the measures of factorability, it is observed from the tables that, in all cases, the Bartlett test of sphericity resoundly rejects the hypothesis that the sample correlation matrix came from a multivariate normal population whose variables are stochastically independent. This conclusion is buttressed by the Kaiser-Meyer-Olkin measure of sampling adequacy, which, according to Kaiser's calibration of the index (14), is in the meritorious range ( $\geq 0.8$  and  $< 0.9$ ) in all instances. With respect to the goodness-of-fit test, in all but one of the runs we could not, at the 0.05 level, reject the hypothesis that the number of factors extracted was adequate for generating the observed correlation matrix. The one exception was local CBD shopping trips made by the respondents in the central city areas, in which nine factors were ex-

**Table 2. Factor analysis for shopping trips to downtown San Francisco—central city population.**

Rotated Factor		Attribute	
Number	Description	Number	Factor Loading
1	Trip comfort	V18	0.772
		V14	0.674
		V17	0.648
		V19	0.528
		V15	0.319
2	Shopping area attraction	V7	0.615
		V6	0.417
		V15	0.359
		V9	0.352
		V3	0.339
3	Trip convenience	V8	0.331
		V15	0.651
		V16	0.621
		V12	0.492
		V11	0.302
4	Shopping congestion	V5	0.670
		V4	0.536
		V8	0.443
5	Range of merchandise	V2	0.975
6	Trip safety	V13	0.783
		V10	0.310
		V11	0.303

Notes: Percentage of total variance explained = 70.4; Bartlett test of sphericity =  $\chi^2(171) = 1511.32$  (significant at 0.01 level); Kaiser-Meyer-Olkin measure of sampling adequacy = 0.85; goodness-of-fit test =  $\chi^2(47) = 39.06$  (not significant at 0.05 level).

**Table 3. Factor analysis for shopping trips to downtown San Francisco—suburban population.**

Rotated Factor		Attribute	
Number	Description	Number	Factor Loading
1	Trip comfort	V17	0.793
		V14	0.766
		V18	0.678
		V19	0.468
		V12	0.309
2	Trip convenience	V16	0.750
		V12	0.531
		V15	0.473
		V11	0.423
		V10	0.721
3	Trip safety	V11	0.512
		V13	0.427
		V15	0.368
		V16	0.302
		V2	0.977
4	Range of merchandise	V3	0.470
5	Shopping congestion	V5	0.689
		V4	0.643
		V6	0.387
		V7	0.583
6	Availability of merchandise	V9	0.552
7	Trip flexibility	V19	0.494

Notes: Percentage of total variance explained = 71.3; Bartlett test of sphericity =  $\chi^2(171) = 1295.32$  (significant at 0.01 level); Kaiser-Meyer-Olkin measure of sampling adequacy = 0.81; goodness-of-fit test =  $\chi^2(47) = 45.19$  (not significant at 0.05 level).

tracted and the significance level was 0.032. This could not be improved on because convergence could not be achieved when more than nine factors were extracted.

Only interpretable factors are displayed in Tables 2-5 and those variables that load highly on each factor are presented, where a loading is defined to be salient if its value equals or exceeds 0.3 (20). For shopping excursions to downtown San Francisco, Tables 2 and 3 reveal similarities and differences in the cognitive structures of central city and suburban residents. Both populations exhibit many of the same dimensions in their attitude structures, including trip comfort, trip convenience, shopping area attraction, shopping congestion, and trip safety, but their order of importance is not identical. Each population views trip comfort to be of primary importance; however, trip convenience and safety constructs are second and third in

**Table 4. Factor analysis for shopping trips to local CBD—central city population.**

Rotated Factor		Attribute	
Number	Description	Number	Factor Loading
1	Shopping congestion	V8	0.720
		V5	0.611
		V4	0.593
		V10	0.405
		V9	0.324
2	Trip convenience	V12	0.650
		V11	0.622
		V15	0.573
		V16	0.330
		V6	0.695
3	Shopping area attraction	V2	0.505
		V7	0.501
		V3	0.363
4	Trip comfort	V9	0.355
		V18	0.602
		V14	0.425
		V17	0.370
		V19	0.316
5	Riding comfort	V17	0.847
6	Trip safety	V13	0.486
		V10	0.397
		V12	0.325
7	Quality of merchandise	V3	0.887
8	Dependability	V16	0.692
		V15	0.327

Notes: Percentage of total variance explained = 7.20; Bartlett test of sphericity =  $\chi^2(171) = 2272.74$  (significant at 0.01 level); Kaiser-Meyer-Olkin measure of sampling adequacy = 0.87; goodness-of-fit test =  $\chi^2(47) = 66.49$  (not significant at 0.02 level).

**Table 5. Factor analysis for shopping trips to local CBD—suburban population.**

Rotated Factor		Attribute	
Number	Description	Number	Factor Loading
1	Trip convenience	V12	0.703
		V15	0.643
		V11	0.595
		V16	0.424
		V4	0.653
2	Shopping congestion	V8	0.544
		V6	0.349
		V9	0.302
		V18	0.889
		V19	0.459
3	Trip flexibility	V17	0.323
		V2	0.743
		V3	0.400
		V7	0.341
		V9	0.340
4	Shopping area attraction	V5	0.313
5	Riding comfort	V14	0.921
6	Trip safety	V17	0.420
		V10	0.687
		V13	0.317
7	Shopping area appearance	V5	0.621

Notes: Percentage of total variance explained = 68.0; Bartlett test of sphericity =  $\chi^2(171) = 2629.74$  (significant at 0.01 level); Kaiser-Meyer-Olkin measure of sampling adequacy = 0.86; goodness-of-fit test =  $\chi^2(47) = 54.74$  (not significant at 0.05 level).

importance for the suburban occupants, whereas they rank third and sixth for central city residents. Travel considerations are more important to the suburban community because, in their shopping journeys to downtown San Francisco, they must incur more travel and overcome more spatial friction. This point is further illustrated by noting that the ability to make stops along the way (V19) constitutes a separate factor for suburban residents, so that individuals who want to satisfy other objectives will undertake a multipurpose trip when traveling to shop in downtown San Francisco. Note also that central city inhabitants emphasize the overall attractiveness of downtown San Francisco as a shopping area (as observed in factor 2), whereas suburban dwellers highlight specific characteristics, including the range of merchandise (factor 4) and the availability of merchandise (factor 6), where the latter dimension characterizes



time and monetary constraints under which a shopper operates. This possibly alludes to the spatial proximity of the respective shopping areas to an individual's residence. If a shopping activity entails low travel investment, then an individual will be concerned about the overall attractiveness of a shopping area. Conversely, if high travel investment is required, then more planning will occur and specific features of the shopping center will be accentuated. Finally, both areas emphasize shopping congestion, although suburban residents are not concerned about the ease of parking in downtown San Francisco.

Tables 4 and 5 indicate that, in local CBD shopping trips, each population emphasizes trip convenience, shopping congestion, shopping area attraction, riding comfort, and trip safety, although, analogous to the previous case, the rank order of these dimensions is varied. In addition to the differential emphasis placed on these factors, the two groups are distinguished by stressing other aspects of the shopping excursion. For central city residents, the quality of merchandise (V3) and dependability (V15 and V16) are important components in their cognitive structures; suburban dwellers underscore the appearance of the shopping area and trip flexibility, where the presence of the latter dimension may again reflect the fact that, even for local CBD trips, suburban vis-a-vis central city residents incur more travel and accordingly are more prone to make a multipurpose trip.

In summary, the cognitive structures of central city and suburban householders, both for downtown San Francisco and local CBD shopping journeys, are differentiated in two respects:

1. The cognitive structure of each group is not represented by the same set of latent factors; and
2. The importance of the factors common to each population are varied.

Notwithstanding these differences, important similarities exist in the structures of the respective groups. Scrutiny of the results suggests that five factors, or generalized attributes, are relevant to each population's shopping trip perceptions. The table below lists these underlying dimensions and identifies those variables primarily associated with them.

Generalized Attribute	Associated Variables
Trip convenience—TCONV	V11, V12, V15, V16
Trip comfort—TCOMF	V14, V17, V18, V19
Trip safety—TSAFTY	V10, V13
Shopping area attraction—SATT	V2, V3, V6, V7, V9
Shopping congestion—CONGEST	V4, V5, V8

Generalized trip convenience (TCONV) encompasses travel time and travel cost (V11 and V15, respectively) as well as other time considerations (V12 and V16) associated with making a shopping trip. Generalized trip comfort (TCOMF) not only reflects riding and vehicle comfort but also weather exposure and trip stopovers. Note that V19, the ability to make other stops along the way, is consistently associated with comfort rather than convenience aspects of the trip. The third generalized attribute is trip safety (TSAFTY), which reflects both vehicular safety (that is, safety from accidents on the mode traveled) and personal safety from robbery or assault when making the trip. Fourth is generalized shopping area attraction (SATT), which includes variety and servicing of merchandise available (V2 and V3, respectively) as well as a shopper's ability to move easily from store to store (V6). More-

over, a shopping area's attraction will be enhanced if its major appliances are priced low (V7) and its stores have weekend and evening business hours (V9). The last generalized attribute common across populations is generalized shopping congestion (CONGEST), which includes ease of parking (V8), crowding (V4), and clean shopping environment (V5).

As observed in Tables 2-5, all of the primary variables associated with each of the generalized attributes do not consistently have salient loadings and, in some instances, the salient loadings are split between two factors. Nevertheless, since, in the majority of cases, these variables are grouped together, they are combined to form the generalized attributes listed in the preceding table. Also notice that most variables that comprise a particular generalized attribute also act to reinforce other generalized attributes. For example, a salient loading on V12 denotes an underlying trip convenience dimension. However, when associated with V14, V17, V18, and V19 [as in Table 2 (factor 1)], it acts to reinforce generalized trip comfort such that an increase in an individual's option to start and return when convenient enhances overall comfort of the trip. This highlights the multifaceted characteristic of the rated items and underlies the difficulty in obtaining clear-cut interpretations.

#### GENERALIZED ATTRIBUTES AND SOCIO-ECONOMIC CHARACTERISTICS

Once those attributes common to each population's cognitive structure are identified, we can investigate whether these latent dimensions are significantly related to a group's socioeconomic characteristics. If a systematic relationship is discovered, it can provide useful information for the segmentation of a travel market into homogeneous subpopulations. Following the procedure outlined, each individual was assigned a satisfaction rating on each of the generalized attributes such that if his or her rating exceeds three on a given attribute, the individual's shopping activity is assumed to be satisfactory in this regard; if less than or equal to three, the shopping activity is considered to be unsatisfactory for the given attribute. Once determined, the satisfaction ratings were cross-tabulated with various socioeconomic characteristics of the population, including gross annual family income, mode of travel to the shopping area, length of residence at current address, education, race, sex, age, and marital status. For the analysis, these variables are stratified as follows:

Variable	Name	Stratification
Gross annual family income	INCOME	<\$10 000 ≥\$10 000 but <\$20 000 ≥\$20 000
Mode of travel to shopping area	MODE	Automobile only Some form of public transit All others
Length of residence at current address	RESIDE	<2 years ≥2 years but <10 years ≥10 years
Education	EDUC	No college Some college
Ethnicity	RACE	White Nonwhite
Gender	SEX	Male Female
Age	AGE	<30 years of age ≥30 years of age
Marital status	MARSTA	Married Not married

**Table 6. Gamma measures of association, downtown San Francisco and local CBD trips.**

Socioeconomic Characteristic	TCONV	TCOMF	TSAFTY	SATT	CONGEST
<b>Downtown San Francisco Trips</b>					
Central city population					
MODE	0.313	-0.476		0.181	
AGE	0.285	0.324	0.328	0.345	
RESIDE	0.257			0.305	
Suburban population					
MODE	0.339	-0.448			
EDUC	-0.389			-0.448	
RACE		0.448			
AGE	0.322	0.424	0.375		0.754
MARSTA					0.502
RESIDE	0.141	0.351	0.221		
<b>Local CBD Trips</b>					
Central city population					
MODE		-0.450			-0.339
EDUC	0.513		0.229		-0.261
RACE				-0.242	
AGE				0.279	0.242
RESIDE				0.192	0.270
Suburban population					
MODE	-0.351	-0.621			
RACE		0.557			
SEX				-0.289	
RESIDE			0.210		

As indicated, gamma is a measure of association that relates the order of one variable to that of another, where its sign is determined by the number of concordant (relative to discordant) pairs. Thus, for example, given our definitions of satisfaction ratings and age categories, a positive gamma measure of 0.285 between AGE and TCONV (Table 6) indicates that the number of same-ordered pairs (low age category—low satisfaction rating; high age category—high satisfaction rating) exceeds the number of reverse ordered pairs (low age category—high satisfaction rating; high age category—low satisfaction rating). For interpretive convenience, we can simply say that younger vis-à-vis older individuals are less satisfied by the convenience of a shopping trip. Moreover, the measure indicates that our prediction errors can be reduced by 28.5 percent, given the knowledge of the group's age stratification and that it is positively related to trip convenience satisfaction. Similar interpretations apply to all gamma measures reported.

Table 6 summarizes the results and reports the gamma measure of association for those relationships that are significant at the 0.05 level. In general, the information in these tables lends further support to the hypothesis that a population's cognitive structure of shopping behavior is related to its socioeconomic characteristics.

Travel mode was generally found to be significant relative to those attributes concerned with the trip to a shopping area. Thus, in the central city and suburban areas and for each trip destination, individuals who use automobiles in their shopping journeys are more satisfied with the comfort of the trip than are individuals who undertake this journey by some form of public transportation (or by some other mode of travel such as walking and bicycle).

Also note that, relative to the relationship between mode and travel convenience satisfaction, the sign of gamma is not constant. For central city and suburban populations that shop in downtown San Francisco, automobile vis-à-vis public-transit users perceive their trips to be less convenient. In their local CBD shopping

activity, however, automobile users in the suburban population perceive their trips to be more convenient. This may reflect the greater degree of automobile travel in local CBD trips whereas excursions to downtown San Francisco characterize more extensive use of BART and other forms of public transit.

An individual's length of residence at his or her current address (RESIDE) is also significantly related to the cognitive structure and, in general, the shorter the duration at his or her current residence, the more dissatisfied he or she is with various aspects of the shopping excursion. Relative to downtown San Francisco shopping trips, RESIDE is significantly related to trip convenience and the attraction of a shopping area for central city residents; for suburban residents, on the other hand, it is related to all travel components of the activity, including TCONV, TCOMF, and TSAFTY. For shopping journeys to local CBDs, RESIDE is significantly associated with a central city resident's perceived satisfaction of shopping area attraction and congestion attributes; for a suburban resident, it is significantly related to trip safety.

Except for local CBD trips by suburban residents, age distribution in the population is an important influence. For shopping journeys to downtown San Francisco, the younger population (less than or equal to 30 years of age) are less satisfied with the convenience, comfort, and safety features of the trip. In addition, in the central city and suburban areas, these same individuals are less satisfied on the shopping area attraction and congestion aspects, respectively, of their shopping experience. For shopping trips to local CBDs (as observed in Table 6) a significant relationship does not exist between AGE and generalized travel attributes of the trip, although for the central city areas, the younger population is less satisfied with shopping congestion and attraction components of the activity.

In two instances, formal education is significantly related to cognitive structures. For suburban residents that undertake shopping activities in downtown San Francisco, those who have no college experience were more satisfied with the convenience aspects of their trips as well as with shopping area attraction. This is not the case, however, for central city residents making local CBD trips. In this case, those who have no college experience are less satisfied with the convenience and safety aspects of their shopping journeys. The same individuals, however, are more satisfied with local CBD shopping congestion.

Finally, RACE, SEX, and MARSTA are observed to be significantly related, in isolated cases, to satisfaction ratings of alternative attributes. For the suburban and central city populations who make trips to downtown San Francisco and the local CBD, respectively, nonwhites are more satisfied with the comfort aspects of the trip; for the central city populace that undertake shopping trips to downtown San Francisco, nonwhites are less satisfied with shopping congestion. Last, for the suburban population, males are more satisfied with the attraction of shopping in their local CBDs and, for downtown San Francisco trips, those not married are more satisfied with shopping congestion.

## SUMMARY AND CONCLUSIONS

In this study, attitudinal data obtained from a 1973-1974 BART impact travel survey was factor analyzed to determine the cognitive structure of central city and suburban populations for shopping trips to downtown San Francisco and local CBDs. In general, the results indicate that, regardless of residence or trip destination, important constructs in a shopper's attitude struc-

ture are (a) generalized trip convenience, (b) generalized trip comfort, (c) generalized trip safety, (d) generalized shopping area attraction, and (e) generalized shopping congestion. This does not imply that the populations are perceptually homogeneous, however, since the importance of these attributes was not uniform across populations. Indeed, each population's cognitive structure was further differentiated by the presence of other factors unique to that population.

When the common attributes of each population's cognitive structure were related to its socioeconomic characteristics, mode of travel, length of residence, and age were important determinants of an individual's satisfaction rating. In general, travel mode was related significantly to trip comfort and trip convenience attributes of the shopping activity. Regardless of destination, automobiles were more satisfactory in providing a comfortable trip and, for shopping in local CBDs, more convenient. Automobile travel was less convenient, however, for making a shopping journey to downtown San Francisco.

In addition, length of residence was related significantly to an individual's attitude structure. Although no pattern was evident to demonstrate a relation between RESIDE and particular generalized attributes or specific populations, RESIDE was positively associated with an individual's satisfaction rating in each case so that, the longer one maintains a residence in a given locale, the more satisfied one is with the underlying dimensions of shopping activity. This may reflect the fact that, over time, an individual becomes more familiar with the transportation infrastructure, including routes, travel modes, and points of access, as well as with the general region, such that one is more knowledgeable regarding the advantages and disadvantages of alternative means of travel and alternative trip destinations. This effect will tend to lessen the dissatisfaction associated with various aspects of the shopping activity.

The results also characterize older individuals as more satisfied with all aspects of the shopping activity. However, depending on trip destination, the significant relationships vary. For downtown shopping excursions, trip and shopping area characteristics were significantly related to age, whereas, for local CBD trips, only shopping area attributes were significant.

Education, race, sex, and marital status were also significant in various circumstances, but no general pattern was evident. Finally, conspicuous in its absence was any significant relationship between income and satisfaction ratings.

From the analysis, four hypotheses for future research are suggested.

1. The generalized attributes listed are important dimensions for all shopping excursions and should be incorporated into travel-demand models if shopping trip behavior is to be forecast accurately. Moreover, care must be taken to develop separate models for each group that exhibits similar cognitive structures if biased predictions are to be avoided.

2. The distance from home to a shopping area critically affects individual perceptions of alternative shopping trips. Individuals who reside further from their shopping destination, for example, will undertake a multipurpose trip and, accordingly, emphasize in their attitude structure the ability to make stops along the way.

3. The more travel required to reach a shopping destination, the more will specific trip components be stressed. Conversely, if little travel is needed, indi-

viduals consider overall feasibility or desirability of the journey and do not highlight specific elements.

4. The results imply that the cognitive structures of a population segmented by residence and trip destination are unique, although they do include a common set of generalized attributes. Moreover, mode of travel, age distribution, and length of residence are important determinants of a population's attitude structure and act to further segment the travel market.

Continued research in this area is requisite to identify more completely the relation that exists between a population's cognitive structure and its socioeconomic characteristics and to determine, if a relation is defined, whether it is transferable among populations that have similar socioeconomic characteristics. Furthermore, the policy implications that emanate from these and other attitudinal modeling efforts need to be examined thoroughly.

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