An Investigation into the Use of Market Segmentation Analysis for Transportation Energy Planning

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An overview of the results of a recent study on the use of market segmentation analysis in transportation energy planning is presented. Two statewide telephone surveys completed in the State of New York are used to identify groups sharing a similar response to energy price increases and supply short falls. The basis for segmentation was a set of items describing energy conservation actions. Subjects were asked to indicate actions taken over the previous year to save gasoline. These responses were then used to construct matrices of interitem correlations. These matrices were factor analyzed yielding eight common factors. The action factors contained items describing shop travel, nonautomobile mode choice, vehicle replacement, automobile maintenance, moving, nonautomobile work travel, changing leisure activity, and cancelling a vacation. The results yielded a consistent set of factors across survey years that were used to construct factor scores. These scores were used in a cluster analysis algorithm to identify segments sharing a similar response to conservation. A total of eight segments were identified, one segment included subjects with a high willingness to conserve gasoline and were characterized by high automobile ownership, high income, and upstate location. Another large segment had a very low willingness to conserve and contained subjects with low automobile ownership, small household size, and downstate location. The results of this study can be used to design programs and policies to meet future planning needs in the event of limited gasoline availability.

The history of the last decade has included a large-scale response on the part of government, the private sector, households, and individuals to rapidly increasing energy prices and supply shortfalls. A major emphasis has been placed on decreasing the vulnerability of society to imported oil. In the transportation sector this has meant the development of various legislative and administrative initiatives to help contribute to a reduction of growth in energy requirements. In particular, a strong federal role was developed that encouraged other levels of government to participate in a transportation energy planning process.

Transportation energy policy has been formulated to address the mobility needs of a broad spectrum of consumers. Limited attempts have been made to seek out selected target groups in the general population to assess the ability and willingness of the individual consumer to participate in energy-related conservation programs.

Travel demand reflects a complex set of private decisions. Experience shows that consumers respond in various ways to energy price increases and supply shortages. The individual interacts with other members of a household in defining activity needs. These needs can be broken down into necessary activities (e.g., work, food shopping) and discretionary activities (e.g., personal business, nonfood shopping, recreation). However, the spatial-temporal choices associated with these activities are limited by constraints related to the household (e.g., income, automobile ownership, individual roles in the household) and constraints related to the transportation system (e.g., travel time and cost, energy supply and price).

The individual and the household must continually balance activity needs and desires with system constraints to arrive at an optimum combination of travel-related decisions. For example, a household characterized by a certain level of automobile ownership, household composition, and geographic location may adapt to increasing gasoline prices by (a) reducing the use of the automobile, (b) replacing an automobile with a more fuel-efficient model, (c) linking work and nonwork trips, or (d) moving the location of the household to reduce work-trip length.

The result of a recent study that incorporates the concepts of market segmentation analysis in transportation energy planning *(1)* is summarized here. This analysis approach is motivated by a desire to understand the nature of energy conservation behavior on a disaggregate level so that scarce planning resources can be applied in a manner consistent with target segment needs.

In order to implement a complete market segmentation analysis it is necessary to establish the existence of subgroups in the general population under study. In addition, it must be shown that knowledge of such segments can be exploited to better achieve organizational objectives. Finally, resources must be expended in a manner that is consistent with satisfying the needs of target segments.

Therefore the market segmentation strategy consists of the following steps: (a) selection of a segmentation basis, (b) development of segment profiles, (c) examining the response of segments to selected policies and programs, and (d) selection of target segments to be pursued by the organization.

STUDY DESIGN

The essence of the market segmentation process consists of identifying unique attributes shared by a common group that are related directly or indirectly to some behavior of interest. In this study, the behaviors under investigation are those actions taken by individuals to conserve transportation-related energy. In October 1979, and again in October 1980, separate random

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samples of New York State households were asked to endorse, from a list of 18, the actions undertaken to conserve gasoline since January of those respective years. Subject responses were coded either 0 for no action or 1 for action. In addition, selected socioeconomic variables were collected to describe survey respondents.

In earlier work, Neveu and Hartgen *(2)*, and Neveu *(3)* centered these data on examining cross tabulations of actions with selected independent variables to identify the relationship between individual characteristics and action endorsement. In addition, the survey results were applied to estimate energy savings. In this current effort, a subject's response set is considered a reflection of an underlying willingness and ability to conserve gasoline and serves as the basis for market segmentation.

Market segments are developed from a three-step process. First, in order to reduce the number of measures used to describe the conservation construct, correlation matrices consisting of product moment correlation coefficients between each action are factor analyzed using principal factor analysis. The results of this effort include the estimation of factor scores for each subject. Next, factor scores for these subjects are grouped using a cluster analysis algorithm. The results of this analysis serve as the method for identification of segments.

Finally, once each subject is assigned to a particular segment, group membership is cross-tabulated with each energy conservation action in order to confirm the relationship between groups and actions. This process also represents a method to validate cluster analysis results by establishing the connection between factor scores and energy conservation actions.

The development of market segments leads to an investigation of group profiles. Profiles are developed for each segment by cross classifying group membership with selected socioeconomic characteristics. After profiles are identified, target segments are matched with selected programs and policies consistent with the characteristics of the conservation behaviors of these groups. The final results suggest a level of consistency over the surveys, both in terms of segment profiles and behavior.

SURVEY RESULTS

The data base used in this research was collected as part of the Crossley Empire State poll. The poll was conducted four times per year in 1979 and 1980 and was designed to allow several organizations in the New York State government the opportunity to conduct a shared-cost telephone survey. In October 1979 a statewide sample of 1,520 adults was collected, and in October 1980 a separate group of 1,560 adults was interviewed. The samples compared favorably to characteristics of the statewide population as given in Table 1.

The results of these surveys for the energy action items is given in Table 2 and suggest the importance of actions requiring changes in shopping-related travel. In particular, combining trips or trip chaining, shopping closer to home, and making fewer shop trips are among the items with the highest proportion of endorsement. In addition, driving slower, shopping on the way home from work, and tuning a vehicle played a large role. Except for vacation-related actions and purchasing fuel-efficient automobiles, remaining actions were endorsed only at a very low proportion.

TABLE 1 SUMMARY OF SURVEY RESULTS FOR SELECTED INDEPENDENT VARIABLES

VARIABLE	CATEGORY	1980 CENSUS	1979 SURVEY	1980 SURVEY
Area in State	° Downstate Urban	0.607	0.601	0.548
State	° Upstate Urban	0.180	0.221	0.262
	° Other	0.213	0.178	0.190
Age	° 18-34 Years	0.357	0.397	0.363
	° 35-64 Years	0.417	0.482	0.454
	° Over 65 Years	0.156	0.115	0.170
	° Missing		0.006	0.013
Sex	° Male	0.462	0.495	0.469
	° Female	0.538	0.505	0.531
Marital	° Married	0.522	0.618	0.576
Status	° Single	0.306	0.236	0.249
	° Widowed, Divorced Separated	0.172	0.141	0.165
	° Missing		0.005	0.010
Household	° 1 - 2	0.550	0.439	0.503
Size	° 3 - 4	0.313	0.378	0.343
	° 5 or More	0.137	0.176	0.137
	° Missing		0.007	0.017
Annual	° Less than $10K	0.304	0.156	0.503
Income	° $10K to $25 K	0.402	0.445	0.343
	° Over $25K	0.294	0.261	0.137
	° Missing		0.138	0.017

TABLE 2 SUMMARY OF SURVEY RESULTS FOR ENERGY CONSERVATION ACTIONS

ACTION	DESCRIPTION	1979	1980
1	Drive more slowly than before	0.418	0.428
2	Carpool to work	0.139	0.133
3	Take bus or subway to work	0.120	0.135
4	Walk or bike to work	0.083	0.108
5	Have car tuned more often	0.372	0.256
6	Move closer to work	0.025	0.031
7	Get job closer to home	0.052	0.043
8	Shop on the way home from work	0.252	0.301
9	Make fewer shopping trips	0.350	0.532
10	Combine shopping and other non-work	0.468	0.537
11	Shop closer to home	0.410	0.470
12	Eliminate use of recreation vehicles	0.093	0.117
13	Take vacation closer to home	0.170	0.187
14	Cancel a vacation trip	0.156	0.118
15	Use train, bus or plane for vacation trips	0.159	0.207
16	Replace a car with a more fuel efficient one	0.153	0.173
17	Sell car (don't replace)	0.084	0.051
18	Take bus or subway more often for non-work trips	0.174	0.150

FACTOR ANALYSIS AND CLUSTER ANALYSIS RESULTS

Matrices consisting of the set of the product moment correlation coefficients between action item responses were developed and factor analyzed to (a) help identify the common factors describing the relationship between actions, and (b) reduce the dimensionality of the action response data for use in cluster analysis.

The principal factor solution, developed using the set of squared multiple correlations as commonality estimates, resulted in the identification of eight common factors for both survey year data sets. This interpretation is confirmed by Table 3, in which the final eigenvalues and proportion total common variance explained for the 1979 and 1980 data are also given. The eight factors explain nearly 97 percent of the total variance.

In order to develop a better understanding of the relationship between factors and variables, the matrices of factor loadings were rotated. This process does not change the amount of variance explained by the solution, but enhances the interpretation of the results. In this case, an oblique rotation of the common factors was performed using the criterion developed by Jenrich and Sampson *(4)*. The results of this effort are summarized in Table 4 in which the relationship between factors across survey years is shown. The important concept in this comparison is not the specific factor number, but the content of items comprising a factor. This suggests the presence of eight factors or dimensions describing energy conservation behavior.

The first factor contains actions related to shopping behavior. The second set of actions contains items related to nonautomobile mode choice. The third factor consists of items dealing with mode choice. The fourth contains items dealing with maintenance of an automobile. The sixth factor contains moving behavior actions. The seventh factor consists of actions related to change in leisure activity, and the eighth factor contains an item concerned with dropping a vacation.

The results of this factor analysis lead to several observtions. First, it appears that emerging factors consist of dimensions describing actions that can be implemented easily such as automobile maintenance or require a disruptive change in behavior such as moving.

A second observation concerns the factor consisting of items related to nonautomobile mode choice. The content of these items suggests that change of travel mode is an important element considered in all travel purposes. It is interesting to note that the factor consisting of items related specifically to work travel comprises a separate dimension.

The factor dealing with the choice of the nonautomobile

TABLE 3 EIGENVALUE CONFIGURATIONS

	1979		1980	
FACTOR	EIGENVALUE	CUMULATIVE PROPORTION OF TOTAL VARIANCE	EIGENVALUE	CUMULATIVE PROPORTION OF TOTAL VARIANCE
1	2.9664	0.4848	3.2162	0.5243
2	0.9596	0.6416	0.8305	0.6471
3	0.7386	0.7623	0.6130	0.7451
4	0.4348	0.8334	0.4391	0.8153
5	0.2518	0.8745	0.3195	0.8664
6	0.2422	0.9141	0.2476	0.9060
7	0.1872	0.9447	0.2171	0.9407
8	0.1368	0.9671	0.1552	0.9655
9	0.0894		0.0809	
10	0.0601		0.0612	
11	0.0447		0.0451	
12	0.0074		0.0264	
13	-0.0023		0.0019	
14	-0.0110		0.0062	
15	-0.0134		-0.0167	
16	-0.0424		-0.0507	
17	-0.0572		-0.0691	
18	-0.0798		-0.0879	

TABLE 4 ACTIONS COMPRISING FACTORS

Factor by Year			
1979	1980	Actions	Factor Name
1	1	Shop less frequently Combine shop and other Shop closer to home	Shop travel
2	2	Bus or subway to work Bus or subway for nonwork Use train, bus, plane for vacation	Nonautomobile mode choice
3	7	Buy fuel-efficient car Sell car	Vehicle replacement
4	6	Drive slower Tune car	Maintain automobile
5	3	Move closer to work Job closer to home	Move
6	5	Carpool to work Walk or bike to work Shop on way home from work	Nonautomobile work travel
7	4	Eliminate use of recreational vehicle Vacation closer to home	Change leisure
8	8	Cancel vacation	Drop vacation

TABLE 5 DEGREE OF FACTORIAL SIMILARITY CALCULATED FROM ROTATED LOADING MATRICES, 1979 AND 1980

1979 Factor	1980 Factor 1	2	3	4	5	6	7	8
1	0.961[a]	0.049	0.066	0.086	0.238	0.154	0.033	0.137
2	0.040	0.965[a]	0.027	0.010	0.129	−0.052	0.088	−0.004
3	0.044	−0.052	0.025	0.163	0.153	0.180	0.861[a]	−0.116
4	0.312	0.063	0.121	0.282	0.300	0.843[a]	0.086	−0.098
5	0.054	0.018	0.952[a]	0.106	0.070	−0.076	0.075	−0.082
6	0.120	0.083	0.030	0.257	0.795[a]	0.000	−0.030	−0.262
7	0.077	0.001	0.129	0.825[a]	−0.014	0.122	0.078	0.199
8	0.179	0.084	0.170	0.525	0.209	0.023	0.270	0.405[a]

[a]Values are factors with the highest similarity.

mode for work travel also contains an item dealing with shopping on the way home from work. This type of behavior is inconsistent with carpooling for work travel because these types of side trips often disrupt a carpool relationship. This observation indicates that these surveys measure opinions as well as behavior because there is evidence of a factor consisting of contradictory behaviors. Perhaps the subject is responding, in part, based on an attitude or opinion that reflects an agreement with the statement that shopping on the way home from work is a good way to save transportation energy.

The outline of the factor analysis results thus far has included a subjective interpretation of the rotated factor results. An additional step to confirm these results included pair-wise comparison of each set of factor loadings throughout calculation of root mean square deviation between factor loadings and calculation of the degree of factor similarity, Harman (*5*, p. 346). The results of these efforts are given in Tables 5 and 6.

The values of factor similarity that have the highest positive value for each factor pair are outlined in Table 5. Highlighted in Table 6 are the smallest values of the root mean square deviation for each set of factor pairs. Generally, the earlier subjective interpretations are supported in Tables 5 and 6.

The factor analysis results suggests that different survey samples interpret the content of an item in a similar fashion. In addition, the outcome uncovers some counter intuitive patterns that cannot be identified without a factor analysis evaluation.

Following the determination of the common action factors, a set of factor scores were then developed to serve as input to a cluster analysis algorithm. For purposes of this research, K-means cluster analysis was applied *(6)*. This technique partitions the set of measures into a prespecified number of groups based on distances between cluster centroids. Several group sizes were specified and evaluated based on minimizing within-group dispersion. Table 7 summarizes the results of this effort for a combination of group sizes. This table suggests that within-group dispersion decreases with each increase in the number of groups. It appears that the greatest rate of change of within-group variation occurs at the eight-group solution. Note that it requires the addition of 12 more groups beyond the eight-group solution to reduce the within-group variation an amount similar in size to the drop occurring between the five-group and eight-group specification.

Based on this observation, an eight-group solution was selected for further analysis. Although somewhat subjective, this interpretation represents a reasonable application of the principles of cluster analysis that results in a manageable number of groups for additional analysis.

ENERGY CONSERVATION ACTIONS

Cross classification of group membership with energy action item responses followed the cluster analysis. This was under-

TABLE 6 ROOT MEAN SQUARE DEVIATION CALCULATED FROM ROTATED LOADING MATRICES

1979 Factor	1980 Factor 1	2	3	4	5	6	7	8
1	0.006[a]	0.111	0.097	0.092	0.072	0.076	0.082	0.069
2	0.125	0.003[a]	0.094	0.092	0.074	0.085	0.072	0.070
3	0.113	0.106	0.080	0.071	0.065	0.060	0.015[a]	0.067
4	0.077	0.084	0.066	0.051	0.044	0.010[a]	0.051	0.052
5	0.094	0.077	0.005[a]	0.055	0.049	0.053	0.043	0.041
6	0.084	0.067	0.057	0.042	0.013[a]	0.043	0.041	0.040
7	0.085	0.070	0.050	0.012[a]	0.046	0.034	0.035	0.035
8	0.077	0.063	0.047	0.027	0.034	0.038	0.026	0.017[a]

[a]Values are factors with the lowest root mean square deviation.

TABLE 7 SUMMARY OF TOTAL WITHIN GROUP VARIATION FOR SELECTED GROUP NUMBERS

NUMBER OF GROUPS	TOTAL WITHIN GROUP VARIATION 1979	1980
5	2,710	2,641
8	2,088	2,109
10	1,916	1,991
15	1,632	1,583
20	1,459	1,372

taken to develop a better understanding of the relationship between action response and group membership within survey years and between survey years. The results of this effort are given in Table 8, in which the relationship between group membership and action factors is shown. In addition, the proportion of subjects in each group is summarized. A measure of the ability and willingness of segment members to undertake actions comprising a factor is given. These indicants are found by summing the individual level of endorsement for each item in a factor and then dividing this quantity by the number of items comprising a factor.

A summary of the similarities between market segments over the survey years is also attempted by suggesting that the eight groups identified earlier can be matched, in a reasonable manner, by comparing the level of endorsement exhibited by each group for various action items. This interpretation leads to the identification of eight overall market segments labeled A to H.

The names of the conservation actions endorsed by these eight overall groups are given in Table 9. Note that, for the most part, all groups have undertaken actions related to shopping travel and automobile use and maintenance. In addition Segments B and C suggest a willingness to implement nonautomobile mode choice decision. Vehicle replacement appears to be an option for overall Segment A along with moving place of work or residence.

Briefly, a reasonable degree of stability of group energy conservation behavior has been established over the survey years. For the most part, segments have endorsed a variety of

TABLE 8 CROSS CLASSIFICATION OF SEGMENTS AND FACTORS

Factor 1979	Factor 1980	Market Segments[a] and Groups[b]							
		A		B		C		D	
		1979 5	1980 1	1979 2	1980 2	1979 3	1980 3	1979 1	1980 4
4	6	0.59	0.69	0.33	0.19	1.73	1 71	1 77	0.72
1	1	9.78	0.86	0.27	0.41	0.69	0.89	0.84	0.89
6	5	0.35	0.42	0.15	0.13	0.57	0.40	0.41	0.32
7	4	0.50	0.41	0.07	0.008	0.39	9.38	0.51	.064
8	8	0.32	0.27	0.17	0.04	0.49	0.38	0.37	0.48
3	7	0.49	0.30	0.03	0.31	0.31	0.21	0.71	0.43
5	3	0.68	0.63	0.02	0.01	0.14	0.000	0.07	0.00
2	2	0.23	0.35	0.53	0.53	0.85	0.73	0.16	0.10
Group size		37	78	139	111	70	103	62	104
Proportion		0.02	0.05	0.09	0.07	0.05	0.07	0.04	0.07
Average no. of actions		9.0	9.2	3.9	3.8	9.9	9.0	8.7	8.0
		E		F		G		H	
		1979 4	1980 5	1979 8	1980 6	1979 7	1980 7	1979 6	1980 8
4	6	0.73	0.16	0.73	0.66	0.09	0.07	0.41	0.50
1	1	0.49	0.42	0.83	0.84	0.04	0.14	0.51	0.73
6	5	0.15	0.31	0.30	.050	0.03	0.03	0.11	0.06
7	4	0.13	0.06	0.29	0.21	0.02	0.02	0.07	0.12
8	8	0.16	0.01	0.30	0.17	0.03	0.03	0.11	0.09
3	7	0.50	0.09	0.01	0.17	0.02	0.02	0.00	0.09
5	3	0.02	0.04	0.03	0.00	0.001	0.00	0.01	0.01
2	2	0.07	0.21	0.13	0.14	0.04	0.03	0.02	0.05
Group size		124	155	255	158	518	530	315	321
Proportion		0.08	0.10	0.17	0.10	0.34	0.34	0.21	0.21
Average no. of actions		5.0	3.5	6.1	6.7	0.6	0.76	3.0	4.0

Note: Cell values calculated from the average rate of endorsement for items comprising a factor.

[a]Designated by letters.
[b]Designated by numbers.

TABLE 9 SUMMARY OF ACTION ENDORSEMENT

Segment	Description	Conservation Emphasis
A	Young upstate family	Automobile use and maintenance, shop travel, nonautomobile work travel, vacation and leisure, vehicle replacement, moving
B	Mature downstate family	Automobile use and maintenance, nonautomobile work travel, nonautomobile mode choice
C	Upper-income downstate family	Automobile use and maintenance, shop travel, nonautomobile work travel, vacation and leisure, moving, nonautomobile mode choice
D	Moderate-income upstate family	Automobile use and maintenance, shop travel, nonautomobile work travel, vacation and leisure, vehicle replacement
E	Unclear	Automobile use and maintenance, shop travel, vehicle replacement
F	Moderate income upstate compile	Automobile use and maintenance, shop travel, nonautomobile work travel
G	Nonconsumer	Low endorsement proportions for all actions
H	Upper-income upstate family	Automobile use and maintenance, shop travel

actions. However, more than 30 percent of each sample appear to have a very low willingness to undertake conservation actions. The following section describes the socioeconomic characteristics of these segments so that effective conservation policies can be suggested to meet the needs of such groups in the event of any future energy shortage.

SEGMENT PROFILES

In addition to examining the average action endorsement proportions, a set of figures describing the characteristics of the eight overall segments have been prepared. These figures have been developed from the results of cross classifying group membership with various socioeconomic characteristics.

A major inconsistency in the characteristics of Group E was observed at this point. Additional analysis is required before drawing any conclusions about this group. Therefore, further discussion concentrates on the seven remaining segments.

The results for overall Segments A, F, D, and H are shown in Figure 1, and the results for overall Segments C, B, and G are shown in Figure 2. In general terms, it is suggested that the segments can first be described by area location with the results for segments from the upstate urban or other areas shown in Figure 1, and groups from the downstate urban area shown in Figure 2.

In Figure 1 the four upstate urban or other area segments are characterized by high vehicle ownership, single-family housing and high school or college education. Next, age becomes an important element in defining a segment. After this, groups are distinguished by income levels, and family or household size.

The relationship between group characteristics and actions for downstate urban area segments is outlined in Figure 2. As shown, all groups are characterized by the young to middle aged, multi-family housing, and low to moderate household size. Next, income and automobile ownership vehicles are used to define segments. Finally, the three segments are characterized by different levels of educational attainment.

Briefly, the results suggest the importance of geographic location in understanding the nature of energy conservation response. Downstate urban subjects tend to endorse a lower number of actions and tend to concentrate on transit options to maintain mobility. The upstate urban or other area subjects are more willing to endorse a higher number of actions than the downstate urban area segments. Income, automobile ownership, and education are also related to action endorsement

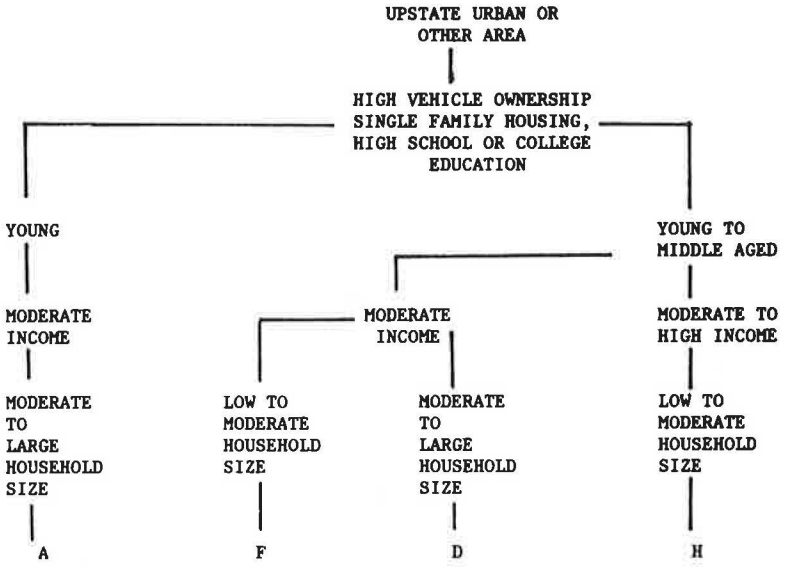

FIGURE 1 Summary of profiles for upstate market segments.

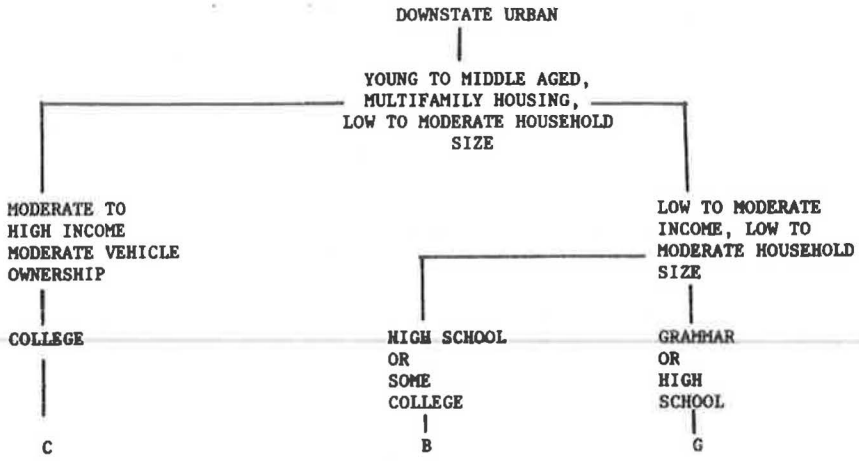

FIGURE 2 Summary of profiles for downstate market segments.

levels. In the upstate area age, income, and household size are important variables contributing to an understanding of conservation action endorsement.

APPLICATIONS

Now that a consistent set of segments has been defined, it is necessary to describe a set of feasible conservation policies and programs to meet the needs of these groups. Based on the analysis results, there are two recommended sets of programs: informational campaigns and improved service provisions such as expansion of public transportation or carpool matching.

The set of informational campaigns is designed to help affirm certain behaviors and raise the consciousness of potential participants in such conservation actions. This includes providing newspaper, radio, or television messages concerning the advantages of planning daily travel so that trips can be consolidated or eliminated. Other messages concerning automobile use and maintenance can be described and implemented to service the needs of target segments. Fuel availability literature can be distributed through the media to ease concern about future availability of gasoline in vacation or resort areas. One additional example concerns moving behavior and may consist of campaigns targeted at segments able and willing to change their place of residence. As a result of this research, seven target markets that may benefit from these programs have been identified. In the event of future energy shortages this information may be used to reach segments in a cost-effective manner.

The second general program area consists of improvement of selective transportation-related services that include expanding bus, train, or plane service for vacation travel or improving local transit service. In addition, carpool matching and promotional programs can be targeted at selected segments in order to use planning funds in an effective manner.

A series of recommended programs for target market segments is outlined in Table 10. Note that most groups are targeted for some type of informational campaign. Improved services are suggested for a selected number of segments.

TABLE 10 RECOMMENDED PROGRAMS DEVELOPED FROM MARKET SEGMENTATION ANALYSIS

	SEGMENT							
	A	B	C	D	E	F	G	H
RECOMMENDED PROGRAMS								
INFORMATIONAL CAMPAIGNS								
° Trip Planning	°		°	°	°	°		°
° Fuel Availability	°							
° Driving Techniques and Maintenance	°	°	°	°	°	°		°
° Housing Availability	°							
SERVICES								
° Carpool Matching	°	°	°		°			
° Improved Public Transit		°	°					
° Improved Plane, Bus, Train Service for Vacation		°	°					

CONCLUSIONS

These results can be used to guide future energy policy making in the event of gasoline price increases or supply shortfalls. Specifically, the results concerning target group respondent segments can be used to implement a set of informational strategies and service improvement programs to effectively meet the needs of various groups. For example, the target markets identified in this study can provide an indication of the types of planning programs or policies to implement. Furthermore, the results can be used to match programs and specific segments. In this manner, informational campaigns and service improvements can be concentrated in areas with the greatest need.

In addition to suggesting potential conservation strategies these results can be used as a data base for increased understanding of the stability of market segments over time. A similar analysis may now be pursued through the use of another statewide telephone survey to conduct further analysis of a similar nature. If the results of this new study are consistent with these conclusions, then additional information concerning the dynamics of conservation opinion and behavior can be collected.

These results represent an example of the use of market segmentation that can be reviewed by analysts interested in undertaking similar studies. For example, researchers in other states may pursue a similar analysis to identify target segments using data collected in the same time period. Results that emerge can be compared to identify any consistencies or differences.

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