A UTILITY PROGRAM BY ANY OTHER NAME... THE PERCEPTUAL SPACE FOR CONSIDERING PARTICIPATION

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ABSTRACT

Sixty-four residential electrical utility customers rated each of sixteen space heating and cooling technologies on twelve different attributes, as part of pilot research for a national area probability survey of customer preference and behavior, sponsored by the Electric Power Research Institute.

Dissimilarities among technologies were used to determine the range of appliances that could be included in analyses of tradeoffs made by customers when they consider relevant utility programs, and the potential generalizability of consumer decisions regarding participation in such programs. These dissimilarities were computed as distances between technologies, developed from the mean attribute ratings for each technology. Analyses were conducted for the eleven heating and five cooling technologies independently, and for the entire set of sixteen taken together, to determine perceptual clustering of the technologies. Interpretation of the clusters was based on analyses of the orginal attribute ratings.

The results indicate the need to consider both engineering factors and perceptual factors in understanding customer judgment. Customer perceptions are not purely determined by engineering factors: The simultaneous analysis of perceptual dissimilarities among technologies did not divide them between heating and cooling technologies, for example. Neither did analysis of heating technologies divide fossil fuel technologies from others.

Among heating technologies cleanliness is the most critical perceptual dimension, separating natural gas and electrical technologies from oil, as well as from wood, coal and kerosene technologies. Furthermore, electric room heaters are so dissimilar from other gas and electric technologies considered that both should not be included within a single analysis of customer tradeoffs. Similarly, perceptual differences between central refrigerated air conditioning and other cooling technologies are so great that the two sets of technologies should not be considered together.

The information from this study helps circumscribe the sets of demand-side space conditioning programs among which residential customers make technology choices. This knowledge will assist utility planners to develop customer acceptance forecasts, and thus meet the needs and wants of customers.

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INTRODUCTION

The Elecric Power Research Institute is sponsoring research into customer preference and behavior to assist member utilities to forecast acceptance of conservation and load management programs.

An important component of this research is identification of the range of applications and programs perceived as similar by customers. This information is needed to circumscribe a set of programs or appliances among which customers may tradeoff attributes when considering participation in utility company programs. When forecasting the market penetration and market share of a bill credit program designed to promote high efficiency central air conditioning, for example, it is necessary to know whether customers are trading off the attributes of such a program only against air conditioners not included in the program, or also against room air conditioners, evaporative coolers and whole house fans.

Furthermore, information on the perceptual similarities and dissimilarities of appliance technologies and utility programs can be used to define the limits of generalization from research on consumer decisions regarding program participation. This information indicates, for example, whether the lessons learned in marketing a ground source heat pump rebate program can be applied to an air source heat pump rebate program, to any heating system program, to any appliance rebate program, or even to something as different as a loan program.

METHOD

Similarities and dissimilarities among selected technologies were obtained from ratings by adult residential ratepayers in three cities, following their participation in focus group discussions of electric appliances and the needs and benefits associated with them.

The present study was limited to space heating and cooling technologies, because of restrictions on respondent time. Both central and room comfort conditioning technologies were included for heating and for cooling; several fuel sources were included for heating, but not for cooling. In all, eleven heating technologies and five cooling technologies were considered. The heating technologies included are shown in Table I.

Table I. Heating technologies considered.

Electric technologies

- Electric baseboard heat
- Zoned electric heat
- Add-on heat pump
- Independent heat pump system
- Electric room heater

Fossil fuel technologies

- Gas burning furnace
- Oil burning furnace
- Coal stove
- Wood-burning stove
- Wood-burning fireplace
- Kerosene room heater

The cooling technologies are shown in Table II.

Table II. Cooling technologies considered.

- Central refrigerated air conditioning
- Refrigerated room air conditioning
- Evaporative air conditioning
- Heat exchanger
- Whole house fan

Twelve perceptual attributes were identified for consideration, on the basis of earlier focus groups and other qualitative data. These attributes are shown in Table III.

Table III. Attributes of heating/cooling technologies.

Unsightly
Provides a great deal of comfort
Cheap to operate
Poses a safety hazard
Makes a room or house too dry
Reliable
Noisy
Easy to control
Doesn't get rid of dampness
Cheap to buy and install
Easy to maintain
Clean

The technologies were presented to respondents in random order; the attributes were presented in one of two orders. A brief paragraph of explanation was presented along with the less common technologies, such as heat pumps ad evaporative coolers.

Sixty-four respondents participated. Each was an adult residential ratepyer from San Diego, Atlanta or the Chicago suburbs.

RESULTS

The initial step in the data analysis is a tabulation of customer perceptions of each technology. Table IV illustrates this; it presents the percentage of respondents who agree that each of the five cooling technologies is characterized by the selected attributes. This analysis indicates both the attributes on which the technologies differ and the ways in which each pair of technologies is perceived to differ. For example, the cooling technologies are not strongly distinguished by perceived safety or humidity control, but they do vary considerably in perceptions of operating cost and noise. Similarly, whole house fans are distinguished from other technologies most strongly on both initial costs and operating costs, and wall/window air conditioners are distinguished most strongly on appearance and noise.

Table IV. Percent saying attribute is true for specified cooling technology.

ATTRIBUTE	Technology				
	Evaporative Cooler	Wall/ Window Air Conditioner	Heat Pump	Central Air Conditioner	Whole House Fan
Unsightly	58	66	19	14	22
Provides a great deal of comfort	52	70	84	97	67
Cheap to operate	56	21	22	19	81
Poses a safety hazard	20	18	14	5	14
Makes the room or house too dry	5	11	31	10	6
Reliable	64	82	84	91	84
Noisy	53	89	21	30	58
Easy to control	62	73	86	97	77
Doesn't get rid of dampness	39	36	24	25	39
Cheap to buy and install	39	54	18	16	84
Easy to maintain	66	86	82	89	95
Clean	59	79	87	95	72

(N = 64)

The perceptual distance between each pair of technologies was then computed, as a function of their total dissimilarity (over all perceptual dimensions). The distances between all pairs of cooling technologies are shown in Table V. The most dissimilar pairs of technologies are:

- Whole house fans and central air conditioners
- Whole house fans and heat pumps
- Evaporative coolers and central air conditioners

In contrast, the least dissimilar pair of technologies is:

- Central air conditioners and heat pumps

Table V. Perceptual distances among cooling technologies.

	Technology				
	Evaporative Cooler	Wall/ Window Air Conditioner	Heat Pump	Central Air Conditioner	Whole House Fan
Evaporative cooler	0				
Wall/window air conditioner	67	0			
Heat pump	90	96	0		
Central air conditioner	103	98	33	0	
Whole house fan	77	87	104	108	0

In the final analytic step, perceptual maps were prepared, based on the dissimilarity distances between technologies. These maps will be presented, along with further interpretation of the results and their implications for the understanding and measurement of residential customer judgment.