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# USING SURVEYS TO ESTIMATE PARTICIPATION IN PROPOSED UTILITY PROGRAMS<sup>1</sup>

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## Introduction

Utilities have relied extensively on survey methods to estimate program participation. However, despite the widespread use of surveys, it is still unclear how to translate respondents' stated intentions into actual behavior. As a result, it is often difficult to estimate the extent of error in survey findings. Since the usefulness of a survey ultimately depends on how well it can predict actual behavior, it is necessary to design the instrument so as to maximize accuracy of the findings. This issue becomes even more challenging in the case of proposed utility programs, where it is sometimes impossible to determine how realistic survey results actually are. A related issue pertains to the effect of survey format on the usefulness of the results. Since sophistication in survey design can be achieved only at higher cost, it is important to assess when this is a desirable option.

The objectives of this paper are two-fold—first, to explore the role of survey format in recovering meaningful estimates of participation likelihood; and, second, to consider the implications of varied formats on the usefulness of the results. Three independent efforts to determine interest levels in a proposed utility program are used as the basis for the discussion. Each approach uses a different survey format, presenting differing amounts of information about the program. The basic premise of this research is that a successful survey format must present the proposed program elements in a manner that appears plausible to respondents and can be easily grasped by them. The paper also emphasizes the need to choose a format that can best fulfill the desired objectives of the survey.

## Conceptual Development

The ability of surveys to predict participation depends on how meaningfully respondents answer questions about a proposed program. From the utility's point of view, the survey must yield estimates of participation that are useful for planning purposes. Estimates of participation are likely to be more valid if the survey instru-

ment communicates the nature of the program in a manner that the utility intends it to be understood. The hypothetical nature of most participation surveys prevents respondents from answering them as if they were confronted with an actual scenario. In many cases, respondents are not very knowledgeable about the proposed program, but feel pressured to give an opinion about it anyway. When confronted with such an unfamiliar, hypothetical program, some respondents tend to provide socially desirable answers. Another source of bias stems from an attempt by the respondent to comply with the expectations of the utility administering the survey. For all these reasons, it is necessary to design participation surveys so as to motivate respondents to answer the questions meaningfully.

Empirical work reported in the consumer behavior literature suggests that individuals typically react better to the attributes that define a concept, rather than the concept itself.<sup>2</sup> This finding raises the question of what a program participation survey ought to try and measure—respondents' reaction to the program concept or their preferences for program attributes? This measurement issue is of substantive concern to utility researchers because of its implications for survey design. The hypothesis here is that survey results will be more valid if the survey presented respondents with *program attributes* rather than just a *program concept*. The reason for this is two-fold—first, respondents are more likely to relate to program attributes (such as incentive offered) rather than the program itself; and, second, presenting program attributes rather than the concept itself may enhance the perceived realism of the program.

Another important issue confronted by program planners involves the validation of survey results. Since the survey concerns a *proposed* utility program rather than an *existing* one, there is no holdout sample of current participants available to serve as a validity check for participation estimates. One option is to use realistic field experiences (of other utilities) as a benchmark for validating survey results. However, as Nadel (Ref. 6) points out, there are great variations in the way utilities collect and report such data. Consequently, it may be better to

focus on a broad *range* of observed participation levels rather than on specific *point* estimates reported by individual utilities. This will help mitigate utility-specific and program-specific effects.<sup>3</sup>

The rationale for pointing out the challenges associated with the survey method is not to discourage its use, but to promote more sophistication in its design. The remainder of this paper examines three survey formats used by utilities in estimating likelihood of participation in proposed programs. These formats are compared on several dimensions, including the validity of the findings.

### Survey Formats

In this section, three alternative formats are presented.

In Format 1 (Figure 1), program *concepts* are tested rather than reaction to *attributes*. Interest levels in the proposed programs are determined independent of the desired incentives, which appear as a separate question

on the survey. The exact nature of the proposed program is also left undefined.

In Format 2 (Figure 2), the nature of the proposed program attributes is explicitly identified, but only a single program concept is tested at any time. The aim is to estimate base interest in the program concept. Incentives are presented as part of the program concept. This format also focuses on the *sensitivity* of program interest to changes in the levels of the program attributes.

A conjoint methodology is used in Format 3 (Figure 3) to estimate participation likelihood. Survey respondents are asked to *simultaneously* rank different program profiles in terms of willingness to participate. The exact nature of program attributes and their levels is clearly specified on each profile. The aim here is to make inferences about respondents' preferences for program attributes as well as their likelihood to participate in a variety of programs.

Each survey format was administered by telephone on a statistically derived sample.<sup>4</sup> The following section

Q1] Please indicate whether or not you are aware of the following measures, whether they have been installed in your facility, and if not, whether you would be interested in considering these technologies.			
	<u>Aware</u>	<u>Already Installed</u>	<u>Interested in Considering</u>
	Y N DK	Y N DK	Y N DK
High efficiency fluorescent lights and ballasts			
(13 other DSM measures tested)			
Q2] In considering whether to install measures such as those mentioned, which of the following services would you find most desirable?			
- Full service audit			
(5 other services tested)			
(Record first mention, second mention and third mention)			
Q3] Again, in considering whether to install such measures, which of the following types of incentives would you find most desirable?			
1. A shared savings arrangement in which a contractor pays for installation and you repay over time from your utility bill savings			
2. A rebate for part of the cost of the equipment			
(4 other incentives tested)			
(Record first mention, second mention and third mention)			

Figure 1. Survey Format 1

Program Concept - Water Heater Cycling Program

The electric utility installs, free of charge, a cycling switch that interrupts electric water heater operation between the hours of noon and 6 p.m. on the hottest 10-15 summer weekdays. No shortage of hot water should occur for normal domestic usage. You receive a bill credit of \$4.00/month during the months of June-September, even if your water heater is not cycled.

- Q1] How interested would you be in participating in this program? Would you be ...
- a. Very interested ( )
  - b. Somewhat interested ( )
  - c. Not interested ( )

Q2] Would your interest increase if:

	<u>Yes</u>	<u>No</u>	<u>Don't Know</u>
The number of days that your water heater could be cycled was limited to 10 per year?	( )	( )	( )
The monthly bill credit was increased to \$6?	( )	( )	( )
You were given a free water heater blanket at the time the switch is installed?	( )	( )	( )

Figure 2. Survey Format 2

Concept statement on central air conditioner program is mailed to respondents along with sixteen program profiles and a sorting board. The statement describes the nature of the program, why it is being considered, and how it would be implemented. After respondents receive the materials, the survey is conducted by telephone. Respondents are asked to read each of the 16 profile cards (example shown below) and to rate them on a 5-point scale (Definitely will not participate (1) to Definitely will participate (5)).

Example of Program Profile Rated By Respondent

Program 6

- Number of interruptions: up to 5 per summer
- Length of interruption: up to 1-1/2 hours
- Total hours of interrupted air conditioning: up to 2-1/2 hours
- Controlling device is obtained and returned by mail or package delivery
- You can override the interruption (one time)
- For your cooperation in participating, you receive a check for \$100 at the end of the summer.

(Respondents rated 15 other program profiles - program attributes were kept the same, the levels were varied)

Figure 3. Survey Format 3

compares the validity of survey estimates recovered by each format.

## Comparing Performance of Survey Formats

The difficulty in validating survey performance by focusing on individual utility experiences has been alluded to above. To reiterate, there is no way to determine which single estimate to use as a benchmark participation rate against which to compare survey results. Hence, any comparison of these formats must examine a range of past utility efforts with similar types of programs. Following Nadel (Ref. 6), this approach highlights typical program results that are to be expected by utilities experimenting with similar programs. This framework is adopted here in order to compare the validity of participation estimates recovered by each survey format.

Table 1 presents the results for Format 1. The findings suggest that in spite of the limited information provided to the respondent, the resulting participation estimates are not grossly overstated. Stated and projected program participation rates are only slightly displaced from the ranges typically expected for such programs. However, it is unclear what type of program respondents were reacting to when answering the survey. Since this format only vaguely specifies the program concept, it is very likely that respondents reacted to their idea of the program concept rather than in a manner intended by the utility. Consequently, there is no guarantee that what customers say they will do in the survey will actually happen when the program is implemented.

The performance indicators for Formats 2 and 3 appear in Table 2. Estimates of participation recovered by each format closely approximates the expected participation rates for such programs. The response range is also smaller for these two formats when compared with Format 1. This may reflect greater homogeneity in the way respondents perceive the proposed program. Since both formats present program attributes in addition to the program concepts, it is possible for planners to track changes in participation when program elements are varied. This is particularly true of Format 3, where respondents react to *simultaneous* changes in all program attributes. In addition, the conjoint structure of Format 3 can provide valuable information on the importance of program attributes to customers. By varying the level of each attribute in every program profile rated by respondents, this format is able to record the *consistency* of response as well.

Although the structure of Format 2 is more restrictive (than Format 3) in the type of information it will yield, it is still more rigorous than Format 1. Since a respondent is queried more than once about their interest in the proposed program, the initial reaction to the program concept is not the final record of expected participation. Instead, varying the program attributes gives a respondent a chance to correct the initial response to the program concept. This format also is useful in providing insights into why customers may not participate in the proposed program. By monitoring the sensitivity of stated interest to changes in the program concept, planners can better understand the elements leading to program acceptance.

Table 1. Performance Indicators for Format 1<sup>a</sup>

Program Type Tested	Expected cumulative participation rates in programs <sup>b</sup>		Stated participation in past programs		Projected future participation	
	Typical programs (%)	Best programs (%)	Typical programs (%)	Best programs (%)	Typical programs (%)	Best programs (%)
Energy audits	1-4 (17)	60-90 (2)	4-8 (2)	11-17 (3)	6-10 (4)	35-40 (1)
Rebates	1-4 (34)	10-25 (3)	-3 (3)	5-6 (1)	5-6 (1)	13-40 (4)
Energy efficient lighting installation	2-5 (4)	30-55 (2)	60-62 (1)	70-76 (4)	5-15 (4)	40 (1)
Shared savings	2-7 (2)	NA	0.4-2 (2)	NA	5-10 (3)	11-30 (2)

<sup>a</sup>Numbers in parenthesis reflect the number of program experiences/surveys that were used to obtain the estimates.

<sup>b</sup>Obtained from Nadel (Ref. 6).

**Table 2. Performance Indicators for Formats 2 and 3<sup>a</sup>**

Program Type Tested	Format	Expected Cumulative Participation Rates In Programs <sup>b</sup>		Projected Future Participation	
		Typical programs (%)	Best programs (%)	Typical programs (%)	Best programs (%)
Water heater cycling program	2	25 (1)	40-55 (3)	~27 (1)	44-53 (1)
Central air conditioner load control program	3	10-25 (4)	~50 (1)	12-18 (2)	28-38 (2)

<sup>a</sup>Numbers in parenthesis reflect the number of program experiences/surveys that were used to obtain the sample size.

<sup>b</sup>Obtained from Ref. 1.

Table 3 compares the three survey formats in terms of some desirability criteria, including those stated above.

### Implications

This paper has compared the use of alternative survey formats in order to estimate participation levels in proposed utility programs. The preliminary findings indicate that although the conventional survey format (Format 1) is most vulnerable to response effects, it does not lead to grossly overstated responses if administered well. This research demonstrates that the effects of survey format are more pronounced on the usefulness of the results rather than on their validity.

Most utilities employ a conventional survey format to obtain estimates of program participation. These surveys provide projections of base interest in programs, which serve as indicators of willingness to participate. However, they provide little information on why people choose to participate or how sensitive they are to program elements (such as incentive). Besides, there is no way to determine if respondents are reacting to the proposed program in the manner intended by the utility.

A major implication of this paper is that the choice of survey format must be based on survey objectives. If program planners are yet unclear about the exact nature of the proposed program, but are interested in obtaining an initial estimate of participation potential, then the use of a simple format (such as Format 1) provides the most cost-effective way of obtaining valid results. On the contrary, if the nature of the program concept is well established and the aim of the survey is to establish a link between program elements and participation potential, it may be better to opt for a more sophisticated survey

format (such as Format 2 or 3). These formats make respondents *reveal* their preferences for program elements and to *state* their intent to participate. This will greatly enhance the value of the survey results, and make them more useful to program planners.

### Endnotes

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<sup>2</sup>I am grateful to Dr. Roberta Walsh for her useful comments that led to this development. For a further discussion on this approach, see Refs. 3 and 4.

<sup>3</sup>It is well known in statistics that the mean of a sample approaches normality as the sample size increases.

<sup>4</sup>Format 3 was administered using a telephone-mail-telephone approach. Although respondents received the survey materials by mail, the survey was conducted over the telephones.

### References

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- (2) Hirst, E. *Possible Effects of Electric-Utility DSM Programs, 1990 to 2010*, Oak Ridge, TN: Oak Ridge National Laboratory, 1991.
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**Table 3. Comparison of Survey Formats**

Criterion	Format 1	Format 2	Format 3
Reliability of results	Easily susceptible to <b>response effects</b> due to unfamiliarity with program concepts	Estimates of base interest are likely to be <b>more reliable</b> since the program concept is explained more lucidly. <b>Errors due to non-familiarity will be minimized.</b>	Estimates of participation in tested programs may reflect response effects resulting from <b>respondent fatigue</b> . In contrast, estimates of respondents' preferences for program attributes and their levels is likely to be <b>robust</b> . If a conjoint simulator is used to estimate likely participation using stated intent in the surveys, more reliable forecasts can be developed.
Validity of results	Difficult to assess. Since this format captures respondents' interest on the basis of a single yes/no type of question, the <b>initial response of respondents is also the final record of expected participation</b> . This increases the influence of external biases (due to the interviewer, design, etc.) on the validity of the results.	In this case, respondents are queried more than once about their interest in the same program. In a sense, <b>varying the program concept by changing program attributes gives respondents a chance to correct their initial response to the proposed program</b> . This will somewhat improve validity of the results.	This format forces respondents to react to a set of program profiles. Program attributes are kept the same, but attribute levels are modified. In this way, the survey measures not only respondents' preferences for a program, but also why they prefer it. <b>By matching respondents' preferences for different programs with the importance they attach to program attributes, the researcher can make preliminary checks on the validity of the results.</b>
Data comparability	Restricted comparability. Since the program concept is vaguely specified, there is <b>no guarantee that each respondent reacts to the concept in the manner intended.</b>	Data comparability increases in this format. <b>Each respondent is confronted with not only a program concept, but the exact nature of program attributes.</b> It is also possible to compare how respondents' interest changes with each option included in the scenario.	<b>Same as Format 2.</b> Respondents still react to a set of well-defined program profiles and program attributes, instead of vaguely defined program concepts.
Information obtained	This format leads to <b>estimates of average participation</b> . It is impossible to obtain sensitivity results or make any inferences about respondents' preference for program attributes.	In this format, the <b>researcher can obtain estimates of base interest and how sensitive this interest is to changes in the program concept</b> . However, no inference can be made about respondents' preference for program attributes.	<b>This format provides the maximum information</b> —basic interest in a set of programs, sensitivity of interest to changes in attribute levels, and preferences attached to each program attribute.

Table 3 (Cont.)

Criterion	Format 1	Format 2	Format 3
Ability to translate stated intentions into estimates of actual behavior	Very limited. There is <b>no way to make any inference about what makes the respondents participate</b> , since this is not tested. The survey estimate should therefore be considered an optimistic upper bound for potential participation.	This format provides some inference about the importance respondents attach to select program attributes. Based on this information, <b>planners can make preliminary judgments about how to increase/decrease actual participation.</b>	Same as Format 2. However, in this case, <b>planners can predict changes in actual participation when all program attributes are changed simultaneously.</b> In Format 2 this can be done only on an attribute-by-attribute basis.
Will survey result in honest and meaningful responses?	There is a <b>higher probability of careless responses</b> here. The definition of the program concept is loose and vulnerable to subjective interpretation. Respondents are also asked about the program independent of incentive. This will affect perceived realism of the program.	The probability of careless responses is minimized. <b>The program concept that is presented to the respondent is more realistic.</b> Reaction to program attributes is tested as part of the concept, not independently.	In this case <b>respondents are made to reveal their preferences as well state them.</b> This will enhance the quality of response. Since the program profiles are clearly defined, more objectivity is introduced in the survey process.
Probability of information overload	<b>Minimal</b> , unless the battery is very lengthy.	<b>Not very great</b> , unless follow-up questions are very extensive or contain complex wording.	<b>Overload will most likely occur</b> here, where respondents evaluate more program concepts, related attributes and their levels. This is usually identified by a reversal of preference.
Cost to administer	<b>Low-medium</b>	<b>Low-medium</b>	<b>Medium-high</b>
Scope for further analysis	<b>Very limited.</b> The lack of preference information restricts the scope for any further work.	<b>Limited in scope.</b> This format will provide an inference on how base interest changes, but no information on the structure of respondent preferences. This restricts the scope for any additional analyses.	<b>Lends itself easily to further analysis.</b> Since this format recovers respondents' preferences for program attributes, it can be used to predict participation in programs untested in the survey. It is also valuable for program planning and design purposes.

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