The Matchmaker: Methods for Predicting Participation and Finding the Best Demand Response Programs for Customers

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ABSTRACT

Many voluntary demand response programs struggle with low event participation. Often, this occurs because initial enrollment processes did not give enough consideration to which customers were the best fit for their program. Further, as evaluators, we typically only examine these programs after customers have enrolled and participated (or not participated) in events. Thus, in this paper, the authors will present methods that give program administrators a structured way to analyze their current or prospective participant population. Ultimately, these methods have the potential to lead to program design changes that will enhance event participation as well as ensure that customers are placed in programs that make the most sense for them. This paper will showcase two methods used in a process evaluation of a demand response program in California. The first method provides program administrators with a tool for identifying the types of customers that should be targeted for enrollment in their programs, or potentially deciding which types of programs may be a better fit for current program participants. The second gives program administrators an analytical framework for prioritizing the elimination of barriers faced by existing customers when participating in events.

Introduction

Many voluntary demand response programs face a challenge with low participation in events. Often, this occurs because initial enrollment processes did not give enough consideration to which customers were the best fit for their program. Further, as evaluators, we typically only examine these programs after customers have enrolled and participated (or not participated) in events. As a result, program administrators may be missing out on additional, cost-effective participation and impacts.

In this paper, the authors will present two methods for approaching these challenges, developed during an evaluation of a statewide voluntary non-residential demand response program in California. If used, these methods provide an approach for leveraging existing data to maximize event participation in two ways. The first method presents a way to understand which types of customers are the "low hanging fruit"—i.e., are likely to participate in events if enrolled. The second method showcases a way to not only identify the barriers to event participation, but pinpoint the barriers that, if eliminated, will unlock greater likelihood for event participation.
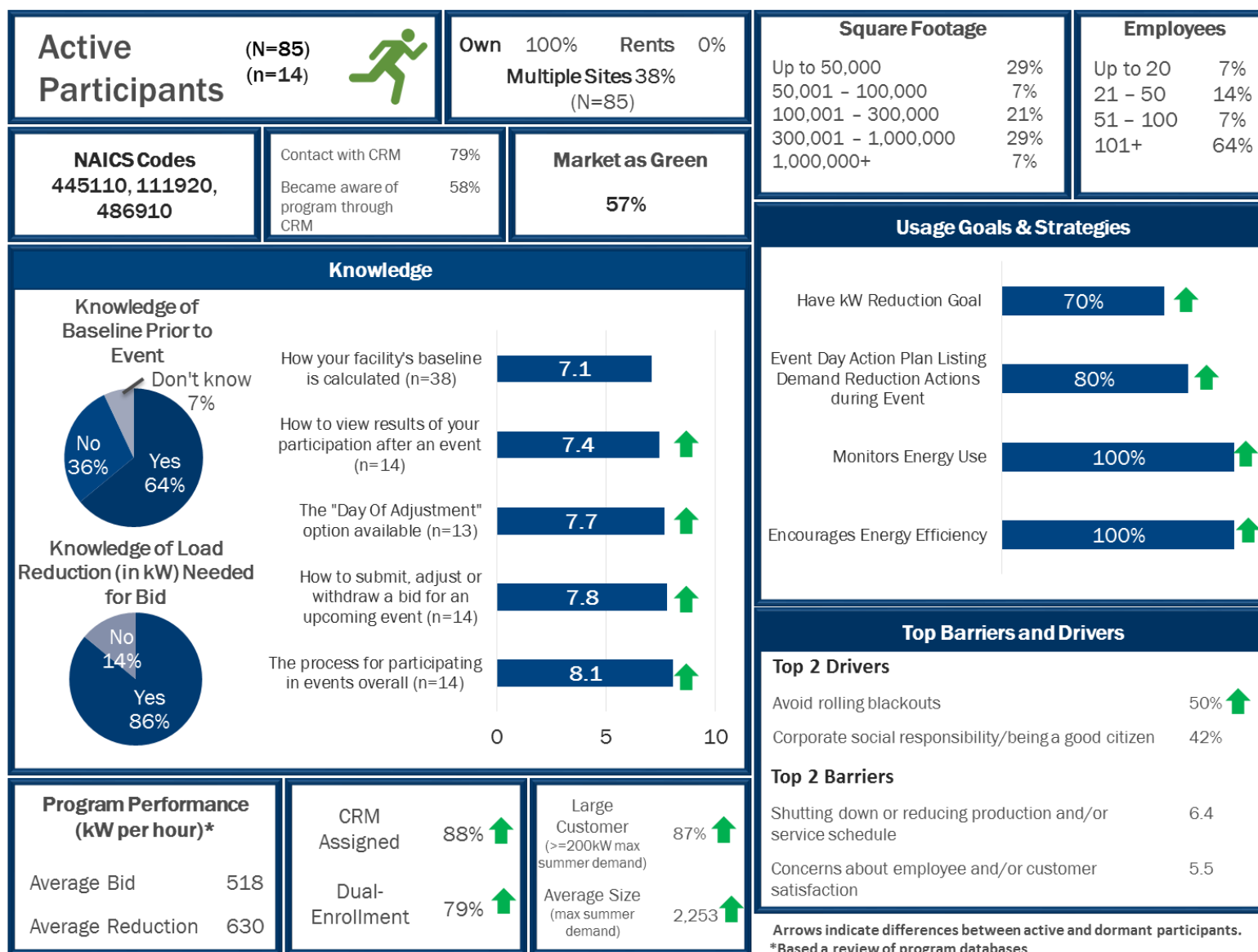
Picking the Low Hanging Fruit

The first priority for program administrators should be to identify potential new customers that are the "low-hanging fruit". In other words, if enrolled, these customers have a high propensity to participate in events. Using an evaluation of a voluntary demand bidding program as an example, we show how evaluators can use existing data (i.e., survey data and program tracking databases) to understand which types of participants have higher participation propensity. The results of this approach can be used by program administrators to enhance new enrollment into their programs.

Methods. Opinion Dynamics surveyed 78 participants, across two utilities, who participated in a voluntary demand response program in 2012-2013. The focus of the survey was to explore decision-making processes, information received regarding the program, barriers to event participation, likelihood

to participate in future events, what program changes might encourage future participation, satisfaction with the program, and firmographics. Customers who participated in events also received questions specifically regarding their participation in 2012 and 2013 events.
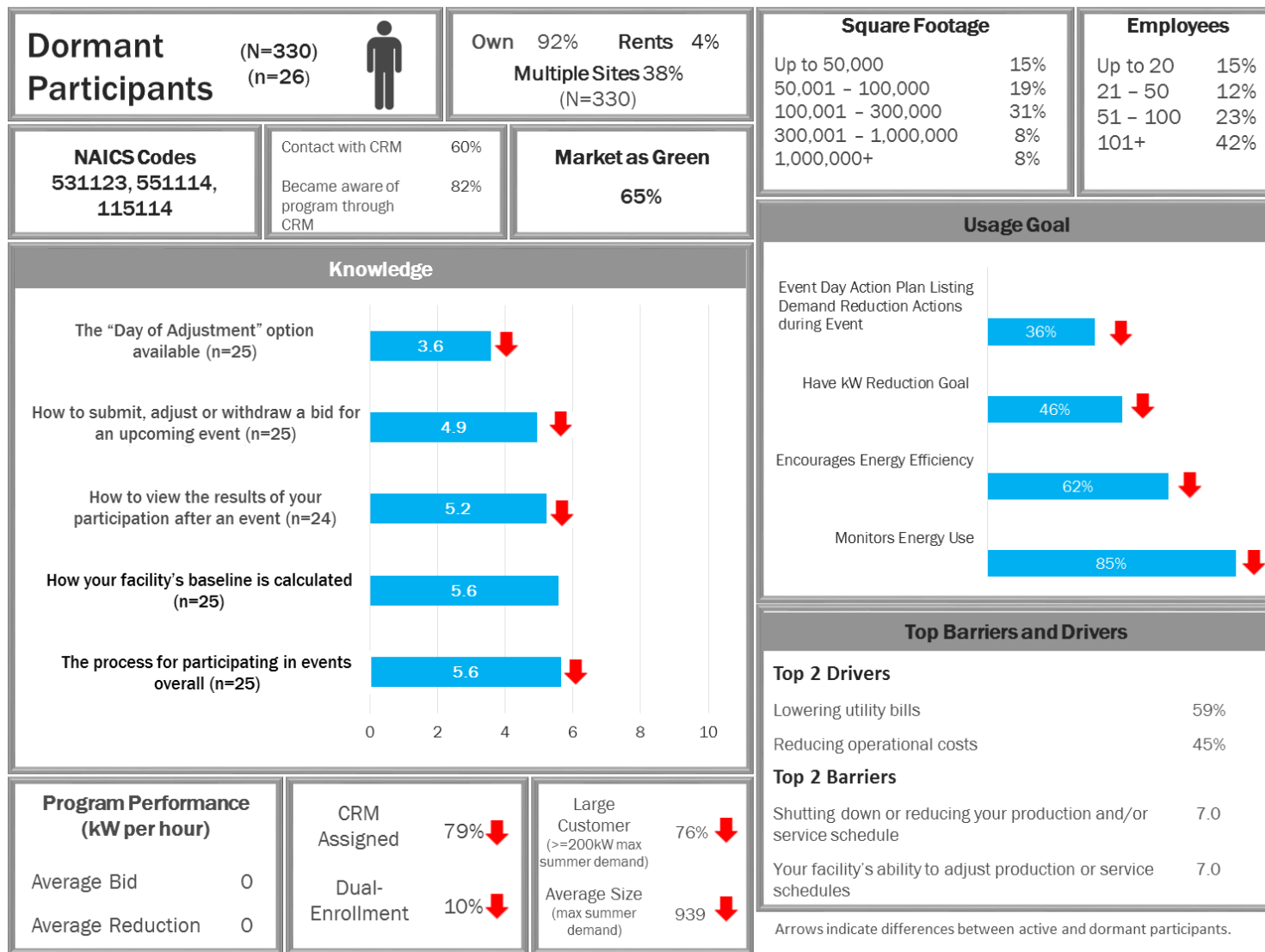
Prior to launching the survey, we reviewed participation databases to flag customers as "active" or "dormant" in terms of their event participation. An "active" participant submitted bids prior to events or attempted to reduce load during events. A dormant participant was enrolled in the program but did not submit manual bids or attempt to reduce load during events.

Results. We broke down the characteristics of active and dormant participants a number of different ways, such as across survey responses on knowledge and barriers, participation data (i.e., average bid and baseline usage), industry type, and other firmographics. We highlighted statistically significant differences when found. To sum up the results of these comparisons, we developed active and dormant customer profiles, which we present for Utility A in Figure 1 and Figure 2 below. The profiles below show several differences between active and dormant participants in terms of knowledge of program processes and preparation for events (i.e., having an event day action plan or goals). However, for the purposes of identifying which new customers are likely to become active participants, it's more important to explore non-program-specific characteristics like firmographics or energy-related behaviors and attitudes. Specifically, active participants for Utility A tend to be larger (in terms of energy usage), represented by account representatives/customer relationship managers (CRMs), monitor their energy use, and have a company culture that encourages energy efficiency. Using this knowledge, program administrators can identify similar companies in their customer population that fit the active participant profile, and target them for enrollment in the program.

Active Participants (N=85) (n=14)

Own 100% **Rents** 0%
Multiple Sites 38%
(N=85)

NAICS Codes
445110, 111920, 486910

| Contact with CRM | 79% |
| Became aware of program through CRM | 58% |

Market as Green
57%

Square Footage
Up to 50,000	29%
50,001 – 100,000	7%
100,001 – 300,000	21%
300,001 – 1,000,000	29%
1,000,000+	7%

Employees
Up to 20	7%
21 – 50	14%
51 – 100	7%
101+	64%

Knowledge

Knowledge of Baseline Prior to Event
- Don't know 7%
- No 36%
- Yes 64%

Knowledge of Load Reduction (in kW) Needed for Bid
- No 14%
- Yes 86%

	Score
How your facility's baseline is calculated (n=38)	7.1
How to view results of your participation after an event (n=14)	7.4
The "Day Of Adjustment" option available (n=13)	7.7
How to submit, adjust or withdraw a bid for an upcoming event (n=14)	7.8
The process for participating in events overall (n=14)	8.1

Usage Goals & Strategies
Have kW Reduction Goal	70%
Event Day Action Plan Listing Demand Reduction Actions during Event	80%
Monitors Energy Use	100%
Encourages Energy Efficiency	100%

Top Barriers and Drivers

Top 2 Drivers
Avoid rolling blackouts	50%
Corporate social responsibility/being a good citizen	42%

Top 2 Barriers
Shutting down or reducing production and/or service schedule	6.4
Concerns about employee and/or customer satisfaction	5.5

Arrows indicate differences between active and dormant participants.
*Based a review of program databases

Program Performance (kW per hour)*
Average Bid	518
Average Reduction	630

| CRM Assigned | 88% |
| Dual-Enrollment | 79% |

| Large Customer (>=200kW max summer demand) | 87% |
| Average Size (max summer demand) | 2,253 |

Note: Green arrows indicate statistical differences from dormant participants; N=85 represents all active customers in the participant population, and n=14 represents active customers that responded to the survey; bases for knowledge scores vary because they exclude invalid responses such as "don't know" and "not aware of this process".

Figure 1: Profile of Utility A's Active Participants

Dormant Participants (N=330) (n=26)

Own 92% Rents 4%
Multiple Sites 38%
(N=330)

Square Footage
Up to 50,000	15%
50,001 – 100,000	19%
100,001 – 300,000	31%
300,001 – 1,000,000	8%
1,000,000+	8%

Employees
Up to 20	15%
21 – 50	12%
51 – 100	23%
101+	42%

NAICS Codes
531123, 551114, 115114

Contact with CRM 60%
Became aware of program through CRM 82%

Market as Green
65%

Usage Goal

- Event Day Action Plan Listing Demand Reduction Actions during Event — 36%
- Have kW Reduction Goal — 46%
- Encourages Energy Efficiency — 62%
- Monitors Energy Use — 85%

Knowledge

- The "Day of Adjustment" option available (n=25) — 3.6
- How to submit, adjust or withdraw a bid for an upcoming event (n=25) — 4.9
- How to view the results of your participation after an event (n=24) — 5.2
- How your facility's baseline is calculated (n=25) — 5.6
- The process for participating in events overall (n=25) — 5.6

(axis: 0 2 4 6 8 10)

Top Barriers and Drivers

Top 2 Drivers
Lowering utility bills	59%
Reducing operational costs	45%

Top 2 Barriers
Shutting down or reducing your production and/or service schedule	7.0
Your facility's ability to adjust production or service schedules	7.0

Arrows indicate differences between active and dormant participants.

Program Performance (kW per hour)
Average Bid	0
Average Reduction	0

CRM Assigned 79%
Dual-Enrollment 10%

Large Customer (>=200kW max summer demand) 76%
Average Size (max summer demand) 939

Note: Red arrows indicate statistical differences from active participants; N=330 represents all active customers in the participant population, and n=26 represents active customers that responded to the survey; bases for knowledge scores vary because they exclude invalid responses such as "don't know" and "not aware of this process".

Figure 2: Profile of Utility A's Dormant Participants

Breaking Bad Barriers

Once program administrators have identified the low-hanging fruit, the next step is to identify how existing participants who are not participating can be encouraged to become more active. This can be done by examining barriers across three dimensions. First, which are the hardest and which are the easiest for customers overcome? Next, which barriers have the greatest impact on likelihood to participate? Finally, which barriers can be addressed by changes to program design and which cannot? By combining these three concepts, we developed a useful decision-making framework for prioritizing cost-effective barrier elimination.

Methods. The data used for this approach came from the same survey we used for the first approach. However, while each utility's versions of the participant survey were largely identical, significant differences existed within the barriers questions. For Utility A, we asked the respondents to rate the importance of 18 potential barriers to program participation. At the request of Utility B's evaluation manager, due to concerns about survey respondent burden, we used an open-ended question asking respondents to describe any barriers they face. Thus, because this approach requires close-ended scalar scores for each barrier, we were only able to execute this approach with Utility A's 40 survey respondents.

In our participant survey, we explored 18 potential barriers to event participation, which we derived from interviews with program managers. We present these barriers in Table 1 below, grouped into four general categories.

Table 1: Potential Barriers to Program Event Participation Explored in Utility A's Participant Survey

Barriers Explored
Barriers related to loss/risk to revenue stream
Shutting down or reducing your production and/or service schedule
Concerns about employee and/or customer satisfaction
Loss of revenue due to shutting down equipment
Barriers related to the nature of company's business operations
Your facility's operating hours
Your facility's ability to adjust production or service schedules
Your facility's product or service
Health and safety regulations concerning your product or service
The current state of the economy
Barriers related to the convenience of participating
Employee comfort during events
The time required to participate in events
Not having an action plan for events
Finding available staff to manage event participation
The amount of manual effort required to participate in events
Barriers related to program understanding and support
The process for participating in events is difficult to understand
The amount of load reduction needed to meet bid is difficult to understand
Lack of support from utility staff/customer relationship managers
My company is often unaware of program events

Barriers Explored
We don't receive notification of program events

We then conducted a quadrant analysis to determine which barriers had the strongest correlations with a respondent's interest in participating in future events (as reported in the survey). This quadrant analysis provides another way to interpret the data to help determine where potential program development opportunities lie. We take participants' stated perceptions of barrier size and compare them to their stated interest in participating in future events. The strength of the correlation between barrier size and participation interest adds a new dimension to understanding barriers, and we are able to identify the most important barriers to address for customers. Key barriers have strong negative correlations with program interest: the more respondents perceive them as barriers, the less interested they are in program events. Further, we explored whether these barriers varied by participation level (active vs. dormant). Then, we determined which of these barriers Utility A could address through program design changes and which were structural in nature and thus more difficult to overcome. "Structural" barriers relate to the nature of a customers' product or service and, thus, may be out of the customer's control. Figure 3 below presents a key for interpreting the results of the quadrant analysis.

As shown in Figure 3, we structure the quadrant analysis by plotting the strength of the correlation of the barrier and program interest (y-axis) against each barrier's mean scalar score (x-axis). The correlations are shown as absolute values and we only plotted negative correlations. In the upper quadrants (A and B), the correlation is stronger and more negative: the stronger the perceived barriers the less interested the participants are in the program. Respondents perceive the barriers in the quadrants on the left (A and C) to be the largest. As a result, those barriers that fall in Quadrant B should be of primary focus as addressing these may help increase interest in participating in future program events.
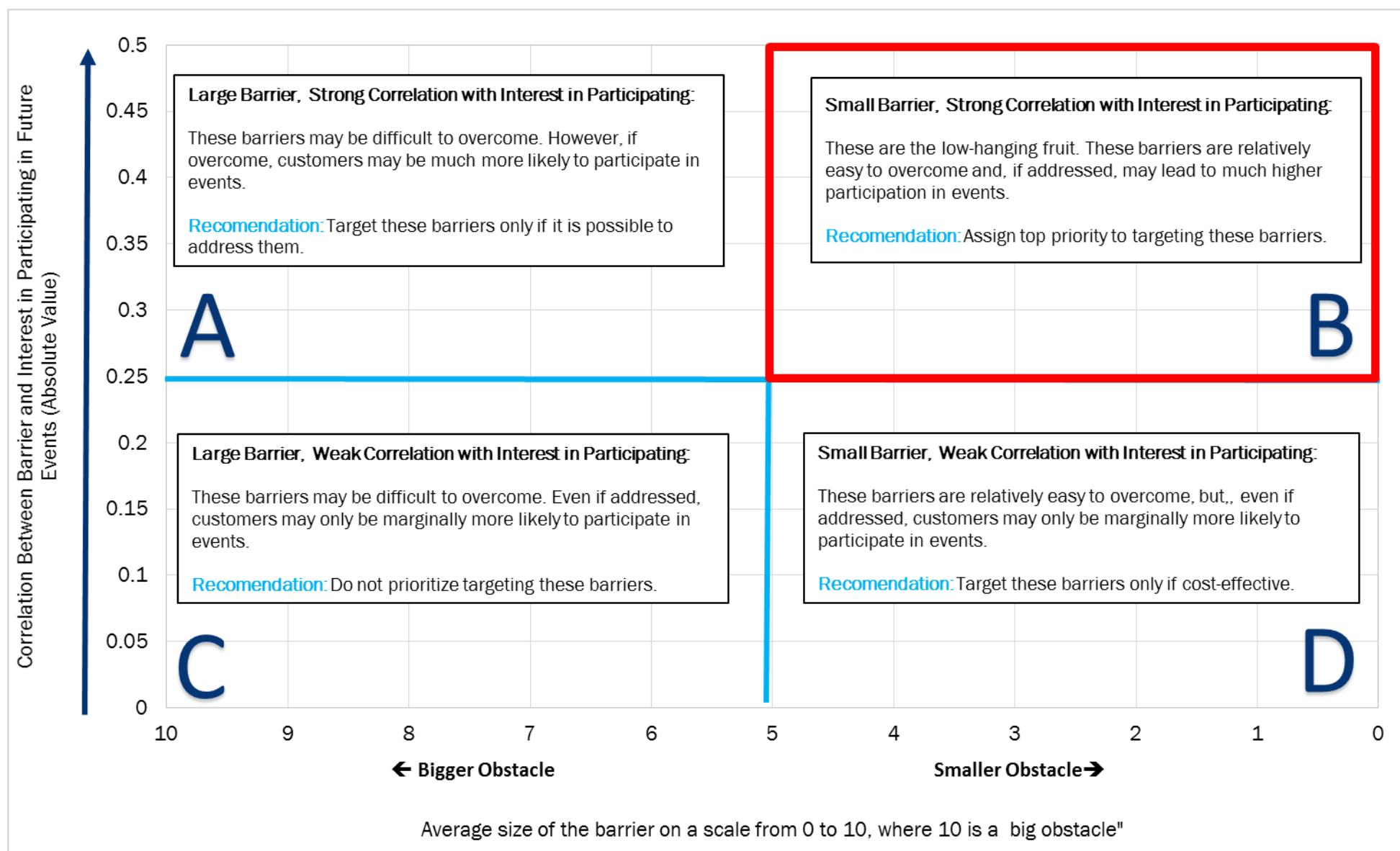
Figure 3. Interpretation Key for Quadrant Analysis

Results. As shown in Figure 4 below, all barriers identified in quadrant B (the "top priority" barriers) are experienced by active participants, suggesting that no low-hanging fruit exists for supporting dormant customers. Throughout the figure, most barriers faced by dormant participants are structural in nature, such as facility operating hours and ability to adjust service schedules. Ultimately, interventions through program design changes are unlikely to have much success in reducing them.

While dormant customers do face some barriers that can be reduced by program design changes, such as lack of program process understanding and lack of support from CRMs, reducing these barriers may only slightly increase likelihood to participate in future events. Based on the results below, the barriers for dormant customers identified in quadrant C should only be addressed if it is cost-effective to do so. Table 2 below summarized the key barriers to target that we identified through this approach.

Table 2: Barriers to Target by Active and Dormant Participants

Type	Barrier Correlated with Likelihood to Participate	Active	Dormant
Top Priority	The time required to participate in events	√	
	The amount of manual effort required to participate in events	√	
	My company is often unaware of DBP events	√	
	We don't receive notification of DBP events	√	
Lower Priority (if Cost-Effective)	The amount of load reduction needed to meet bid is difficult to understand		√
	Lack of support from utility staff/customer relationship managers	√	√
	Concern about employee and/or customer satisfaction	√	

Further, while we were unable to conduct the same analysis for Utility B's customers (using instead an open-ended question on barriers), feedback from respondents aligned with the barriers we identified for Utility A (see Table 3 below).

Table 3: Feedback from Utility B Respondents on Barriers to Event Participation

| Verbatim Examples from Respondents |
|---|
| *"Production is first priority...can't shut down."* |
| *"If it's a high traffic day [participating] would be hard."* |
| *"There are certain times that we are unable to reduce."* |
| *"Influenced by the ability to rearrange the schedule of our operations."* |
| *"Because we are a school and have to have things available for our teachers and staff, we can't just shut down and we can't change our schedules."* |
| *"Lack of understanding."* |
| *"If the cost is greater for participating then not."* |
| *"No usage in the past seven business days…"* |
| *"Too short of a notice."* |
| *"Lack of cooperation from our organization."* |
| *"Lack of control."* |
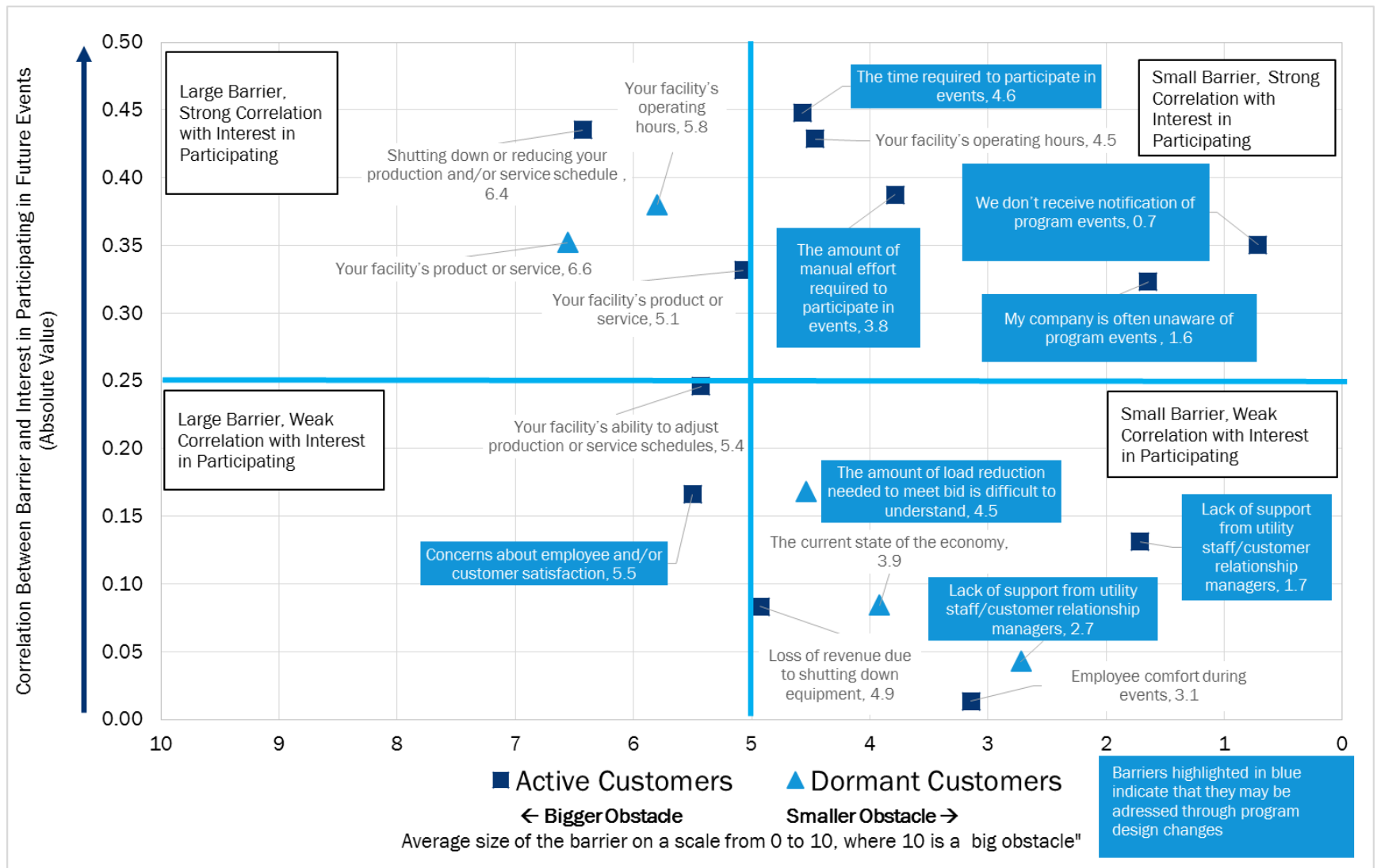
Figure 4: Key Barriers to Event Participation Faced by Utility A's Customers (Active vs. Dormant Customers; n=40)

Conclusion

In this paper, the authors presented two methods that give program administrators a structured way to analyze their current or prospective participant population. Ultimately, these methods have the potential to lead to program design changes that will enhance event participation as well as ensure that customers are placed in programs that make the most sense for them.

The first priority for program administrators should be to identify potential new customers that are the "low-hanging fruit". By leveraging existing data, for example through surveys and tracking databases, administrators can "profile" customers that participate (or do not participate) in events. They can then use this data to identify new participants within their customer population with higher likelihood for event participation.

Once program administrators have identified the low-hanging fruit, the next step is to identify how existing participants who are not likely to participate can be encouraged to become more active. To accomplish this, administrators can use a quadrant analysis to compare survey data on the size of barriers and the impact of those barriers on likelihood to participate. Further, administrators should keep in mind which barriers are possible to address through program design changes, and which are not. Using this framework, administrators can prioritize which barriers to address. Alternatively, they can consider ways to migrate these customers to programs that better suit them (i.e., with higher incentives for participating).