An Assessment of the Decision-Making Process Within the Industrial Sector

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A process evaluation of a Northwestern utility's industrial conservation program resulted in an unusual body of information about how and why customers did or did not choose to participate in the utility's program. Rather than use a quantitative survey or a case-study approach, the project used a large-scale, in-person, and telephone survey approach to capture experiential data. The magnitude of this effort differed from other process evaluations of industrial programs, generating more robust results than were possible from focus groups and limited interviews. More than 80 industrial customers participated, and four categories of personnel were surveyed: upper management respondents were asked about investment and financial benefits; middle management respondents were asked about productivity issues; engineering staff were asked about technical selling points; and maintenance and facilities personnel were asked about the effectiveness of the program description. The result may be the largest current set of qualitative data describing customer decision making derived from an evaluation focusing on the industrial sector.

A causal model was developed to describe the events and relationships involved in industrial decision making. The model identified critical points in the decision-making path as well as intervening factors (such as budgeting cycles, market barriers, and potential indirect benefits) that influenced the structural flow of the decision-making process.

Introduction

Although the industrial sector typically contains some of the largest single consumers of energy, utilities and evaluators have struggled to understand how industrial customers judge the merits of implementing or rejecting proposed electrical efficiency improvements. One of the earliest papers to examine the industrial decision-making process was prepared by Sassone and Martucci (1984). They found that factors influencing industrial decision makers to proceed with energy conservation investments did not follow conventional investment analysis. Instead, Sassone and Martucci (1984) concluded that energy conservation investments are neglected by top management due to low priority and low visibility, and, in many firms, this is not due to good or bad decision making, but due to no decision making at all.

Over the past 10 years, various evaluations have been conducted for a variety of utility DSM programs targeted specifically to the industrial sector. While these evaluations provided valuable information concerning the implementation of utility programs, the evaluations did not provide an in-depth analysis of the industrial decision-making process as it relates to energy efficiency improvements.

Recently, Barakat & Chamberlain concluded a two-year evaluation of an industrial energy conservation program. The evaluation was conducted in two phases. Phase I concentrated on obtaining utility staff and program participants' perspectives; Phase II focused solely on nonparticipants. This approach afforded us a unique opportunity to examine the issues surrounding decisions not to participate in the program. These issues include: nonparticipants' roles within their firm, perceived barriers to participation, responses to non-energy benefits, and intervening factors such as budgetary cycles and indirect benefits.

The causal model presented in this paper is a first attempt to describe the events and relationships involved in industrial decision making, and to identify the critical points in the decision-making path between a utility program and an industrial customer.

Research Approach

The evaluation collected data through structured interviews with program staff, and through a combination of in-person interviews and telephone surveys with participants and nonparticipants. The research approach also included a thorough review of program records and documents. Table 1 displays the survey type applied to the various categories. In total, 83 industrial customers were contacted.

Table 1.

Participants	In-person	22
	Telephone	14
Nonparticipants		
Category 1 Customers receiving no contact from utility	Telephone	28
Category 2 Customers receiving contact from utility, but elected not to participate	In-person	19
TOTAL		83

Our approach was divided into two Phases. Phase I focused on collecting participant data, while Phase II centered on collecting nonparticipant data. For the purposes of the evaluation, nonparticipants were divided into two categories: Category 1, where customers did not receive utility contact; and Category 2, where customers received utility contact but elected not to participate.

Studies of self-selection describing how program participants actively select themselves “into” a DSM program can result in assuming that participants, due to a combination of potential behavioral and demographic characteristics, are systematically different than the rest of the population. Thus, participants’ responses can be subject to bias. In addition, Category 2 nonparticipants can be assumed to be subject to a similar kind of bias because they have actively selected themselves “out” of the program. We proceeded with this evaluation cognizant that differences could exist between participants, Category 2 nonparticipants, and the remaining population of industrial customers, while simultaneously taking into account the affect of this potential bias on customer responses.

The term nonparticipant could not be strictly applied for Category 1 nonparticipants as they were more closely a “control” group, drawn randomly from the population of industrial customers and, by definition, were never afforded the opportunity to choose between participation and nonparticipation. Thus, the potential for self-selection bias for Category 1 nonparticipants was greatly diminished. However, we did not conclude that Category 1 customers were more or less representative of the population than were other interviewed customers.

This approach results in an analysis that recognizes that differences between customers are both possible and likely to exist, and the development of the industrial decision-making model embraced these differences as key components. We adapted for these differences by determining and addressing these distinguishing characteristics between industrial customers.

The Sample and Methodology

A large part of the telephone survey data was collected in a quantitative format, and responses were entered into a database management and statistical analysis software package. This permitted us to conduct a quantitative analysis of customer responses, including univariate distributions, cross-tabulations, and informal cluster analysis.

In-person interviews yielded a substantial accumulation of qualitative data. In order to manage, classify, and analyze the qualitative data, we developed a series of metarnatrices. Metamatrices are master charts assembling descriptive data from several sites into a standard format (Miles and Huberman 1984). The development of a metarnatrix enhanced our ability to classify and analyze interview data in a structured and efficient manner. Similar matrices were developed for qualitative data describing the decision-making processes of participants and nonparticipants, and we used this in the development of the customer decision-making model presented later in this paper.

Customer Profile

The industrial contacts interviewed for this evaluation can be divided into four classes: upper management, middle management, engineering, and maintenance and facilities. There are distinct differences between these classes, especially concerning descriptions of roles and responsibilities within each class. The key characteristics of the various roles and responsibilities are as follows:

- Upper Management: generally make decisions based on subordinates’ advice;
- Middle Management: though occupying positions of executive authority, their particular areas of responsibility are specialized into specific aspects of the firm’s business;

- Engineering: their primary role is to attend to the physical details of plant equipment, but they are often responsible for decision making;

- Maintenance and Facilities: often immersed in the technical details of maintaining the working operations of a plant or organization, they generally require approval from upper management for major equipment purchases.

Our evaluation found that nonparticipant contacts more frequently held jobs in engineering or maintenance and facilities than in upper or middle management. The distribution of participant contacts on the company ladder is more evenly distributed. The distributions of roles and titles held by participant and nonparticipant contacts are displayed in Table 2.

These distributions between participants and nonparticipants can most likely be attributed to the internal decision-making policies of firms considering capital investments. As stated above, maintenance, facilities, and engineering staff are less likely to have final approval for these types of decisions. It is likely that participant firms have routed project responsibilities from individuals in engineering, maintenance, and facilities to individuals with more decision-making authority.

Using these same four classes, contacts were asked to identify their company's hurdle rate[2] for authorizing small and large[1] capital improvements, and to describe the decision-making process. Although most contacts felt the preassigned categories for defining large and small capital purchases did not accurately reflect their criterion for distinguishing between these types of capital purchases, the reported decision-making process remained fairly consistent among classes. The results are displayed in Table 3.

The common themes began to emerge as follows:

- Upper management are more actively involved in large capital purchases. Small capital purchases require only their approval. Financial considerations are expressed in terms of payback ranges.

- Middle management have the authority to make decisions on small capital purchases and to provide input on large capital purchases. However, the decisions are based more from a production-level rather than financial basis.

- There is less active involvement in the decision-making process at the engineering level. Instead, engineers assemble information and documentation needed by upper management to make decisions. Engineering contacts report the lowest level of knowledge concerning internal hurdle rates.

- Maintenance and facilities contacts represent a wide range and variety of involvements and responsibilities. They viewed the decision-making process as informal and largely executed at the middle or upper management levels.

Table 2. Roles of Participant and Nonparticipant Contacts

Role	Examples	Cat. 1[(a)]	Cat. 2	Part.	Total
Upper Management	President, General Mgr.	5 (19%)	3 (16%)	10 (28%)	18 (22%)
Middle Management	Technical Director, Public Works Director	6 (22%)	4 (21%)	11 (30%)	21 (26%)
Engineering	Process Engineer, Plant Engineer,	6 (22%)	5 (26%)	9 (25%)	20 (24%)
Maintenance/ Facilities	Maintenance Mgr., Facilities Mgr., Master Mechanic	10 (37%)	7 (37%)	6 (17%)	23 (28%)
Total		27	19	36	82

(a) One of the Category 1 nonparticipants did not state their title.

Table 3. Category 1: Decision-Making Process

Role	Hurdle Rate	Large Purchase Process	Small Purchase Process
Upper Management	Ranged from less than a one-year payback to a 5- year payback.	Actively involved in decision-making process, along with lower management staff.	Provide approval, but most decisions made at the firm's operational level.
Frequency=4	All identified payback in terms of years.	Longer payback ranges acceptable.	Shorter payback required.
Middle Management	Commonly expressed as a rate of return (ROR) in comparison to productivity.	Generally made by upper management.	No approval needed from upper mgmt. Can make decision on their own.
	Payback (year(s)), case-by-case basis, and nondisclosure (terms were confidential) were other responses.	Characterized as needing more signatures and Corporate approval.	The production aspect is primary consideration.
Frequency=8		The financial aspect is a primary consideration.	
Engineering	Generally didn't know. Responded that the Accounting or Financial Department would know the details.	Not involved; handled by Corporate.	Role is to identify need, justify and present to mgmt. for a decision. Not actively involved in process.
Frequency=5		Characterized as needing more documentation and approval signatures.	Some were authorized to make decision if purchase met a certain payback range (less than one year).
Maintenance/ Facilities	Responses varied. ROR, payback ranges, made on a case-by-case basis, and don't know were the common responses.	Most said upper management made the decision.	Decision made at a local or regional level based on need or operational requirements.
Frequency=10		Only two mentioned that the decision was made at the Corporate level.	Middle management makes the decision. The process is informal.

Based on these viewpoints, it appears that upper management is concerned about financial aspects of decision making, while lower levels are most concerned about production and operational aspects. Our study found that firms meld these objectives by creating teams or committees that review purchase decisions. The teams or committees are comprised of staff from all levels of management. This allows for multiple viewpoints to be considered and supports our contention that industrial decision making is a group process, rather than the responsibility of a single individual or class of management making an decision.

Yet, the question remained on how to reach decision makers when promoting an energy efficiency improvement project. Our evaluation found that participating contacts played the role of project liaison; that is, they were responsible for exercising authority as well as managing the technical details of the project. Many of these liaisons also had a personal or corporate interest in energy efficiency. We categorized these individuals as "project champions." We also found that nonparticipant contacts did not describe themselves in terms that would categorize them as project champions. We concluded that project champions provided both the catalyst to initiate new projects and remained the driving force to keep projects rolling. This finding had substantial bearing and, in essence, was the missing link in the chain between company contacts and decision makers.

Decision Evaluation

In constructing this model, we identified when critical phases occurred in the flow of events, likely times that iterative cycles occurred as decisions were passed through the organization, and when the presence and identification of a project champion needed to occur for the project to reach fruition. (See Figure 1.)

This causal model uses a network of variables and draws causal connections between them. It moves beyond lists of effects and associations to create a structural framework for explaining connections and causation. After development, we tested the model by placing data from customer interviews within it, then judged if our set of relationships was accurate. Model refinement followed this testing and a review of customer interviews.

This model specifically describes the relationship between two parties-the utility and the industrial customer. Each party is responsible for making a series of decisions about the merit of the program and potential projects. We call these series of decisions and events the structural "flow." These decisions are affected by a number of intervening influences, which we call "factors." These factors include the perceived benefits and costs to making equipment purchase decisions with regards to energy efficiency improvements.

Perceived benefits from participating in the program for energy-efficiency projects were wider ranging than direct savings in energy costs. The most popular nonenergy benefits cited were: reduced maintenance, increased productivity and operational flexibility, and increased lifetime and equipment reliability.

The perceived costs of participating in the program were operationalized in the evaluation as "barriers to participation." These barriers fell into three broad categories: time, money, and expertise. Participating customers typically felt the participation barriers were mitigated

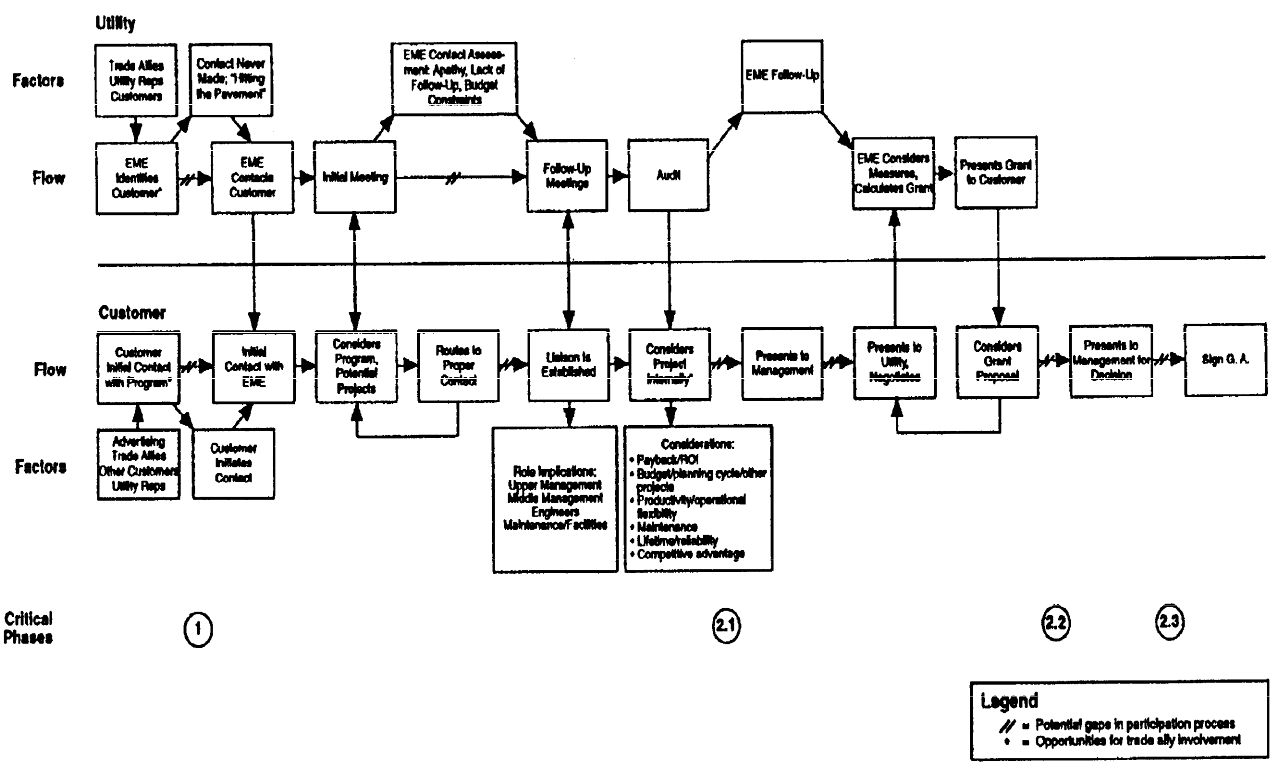

Figure 1. Industrial Customer Decision Model Structure

sufficiently by the educational and financial incentives offered by the program. Nonparticipants found these barriers to be more imposing. Category 1 nonparticipants felt they did not have enough information about the program to pursue participation. We categorized this barrier as insufficient expertise. Category 2 nonparticipants stated that time and money constrained them from participation.

Time barriers included both absolute time (i.e., not enough staff time to start new projects) and relative time (i.e., too far into the current capital budget planning period). Money barriers also fell into absolute (i.e., insufficient capital reserves or constrained cash flow) and relative categories (i.e., other projects already under way that were obligatory to maintain production). However, Category 2 nonparticipants did not state expertise as a factor; in fact, they often indicated they were confident of their staff's ability to implement such projects, with or without the assistance of utility representatives.

Given the rigor of testing the model against our qualitative evidence, we feel this model does a fine job of describing the structural flow of events and communication between the parties to a potential project.

Summary

While we agree with Sassone and Martucci (1984) that industrial decision making does not always follow the conventional wisdom of financial investment analysis, we disagree that upper management ignores or doesn't make any decisions. Rather, our evaluation reveals that, within the four classes of contact roles, different decisions are made for very different reasons at the various levels. Additionally, instead of only one class (e.g., upper management) making an arbitrary decision, we contend that there exists a group of decision makers with various intervening factors influencing the decision-making path, Finally, we conclude that a critical factor in influencing the path of the decision-making process is finding a project champion within the firm to sell the project "up the line."

Understanding the various factors affecting the decision-making process, and knowing the roles and responsibilities of different management levels within industrial firms will better enable utilities to market and obtain participation from their industrial customers.

Endnotes

1. For the purpose of the evaluation, large capital expenditures were characterized as purchases exceeding $5,000, while small capital expenditures were considered purchases of $5,000 or less.

2. Hurdle rate: A generic term used by industrial firms to describe an internally set rate that capital improvement projects must meet in order to be considered for funding. Hurdle rates are commonly expressed by industrial firms in terms of payback, rate of return, or return on investment.

References

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