

Rethinking the Role of Process Evaluation in Demand Side Management (DSM) Resource Acquisition: An Assessment of Current Practice and Strategies for the Future

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Many important issues engaging demand side management (DSM) professionals can be illuminated by the thoughtful application of process evaluation methodologies. A bibliographic analysis of recent DSM evaluations and interviews with several practitioners of process evaluation are used to examine current issues in the practice and use of process evaluation. The first section suggests several of the most important DSM program design issues upon which process evaluation can shed light. Section two discusses the current status of process evaluation within regulatory and utility environments, and examines the typical emphasis placed on process evaluation relative to other evaluation types. This section includes an assessment of evaluation budgets from sources including the proceedings of the International Conference on Energy Program Evaluation, and a discussion of current definitions and generalizations that surround process evaluation practice. Section three offers examples of process evaluations used to address broad program design issues. Section four summarizes our findings and identifies strategies for optimizing the usefulness of process evaluation in answering important DSM program-related questions.

Introduction

The good news is that process evaluation of energy efficiency programs has been attracting attention recently. The first comprehensive guide for DSM Process Evaluation is being released by EPRI (Spinney and O'Rourke 1991). In a few states, notably New York and Wisconsin, the regulatory community is placing increased emphasis on process evaluation to gain insight into why DSM programs perform as they do (Freeman 1991). Process evaluation can comprise rigorous empirical techniques, in addition to more qualitative methods, and can illuminate many important issues currently facing demand side management.

The bad news is that the potential for process evaluation to provide answers that will help to optimize DSM programs has not yet been fulfilled in practice. Traditionally, process evaluation has operated in the shadow of impact evaluation. Impact evaluation appears to attract more resources, to generate more discussion, and to possess a greater air of legitimacy. The intense focus in recent years on DSM program outcomes measurement and verification has diverted attention from addressing critical issues surrounding DSM program design and delivery.

Within the current climate of high stakes evaluations that refine the bottom line with progressively more sophisticated statistics, some big questions are not receiving sufficient attention. Despite the glare created by ambitious impact evaluations, many program design and delivery issues facing DSM practice have not been addressed, and

are more complex than ever. Programs will be unable to optimize the DSM resource until many of these questions are answered:

- Are rebates or incentives more effective? What cash levels are most cost-effective under various conditions?
- Which strategies are most effective in fostering the development and marketing of efficient technologies? Which promotional strategies achieve the highest penetration? Which measures and programs are best for various market segments?
- Should programs focus resources on quality or volume? What are the trade-offs between comprehensive and incremental installation of measures over long-term relationships with clients?
- Which communication mechanisms work best in a DSM program? How can coordination between parties delivering programs be optimized? What are the optimal levels of staff training?
- What are the optimal levels of client contact and education? What are the short- and long-term effects of education in non low-income, non-residential applications? How can programs influence the chain

of decisions in multi-stage efforts, such as code or design assistance programs?

- What happens to measures over time? Are they still installed, working, and acceptable? Which measures have the highest persistence? What are the most effective strategies for maintaining measure performance over time? Is commissioning the best approach to persistence in large facilities?
- What are the trade-offs among and effects of alternate verification strategies? How can program managers and utility commissions optimize evaluation resources?

Process evaluation is the best approach to answering these questions because it seeks to explain how to design and deliver energy efficiency programs that work most effectively and efficiently. However, the practice of process evaluation has some barriers to overcome.

Barriers to More Effective Use of Process Evaluation in the DSM Evaluation Community

Several factors limit the application of process evaluation to these broader program delivery issues. These include the current scope of requests for process evaluation services by utilities and regulators, preoccupation with impact results in the DSM community, a tendency by users to discount the qualitative aspects of process evaluation, and lack of reference to the bigger context for process evaluation results in definitions and descriptions of what process evaluation does.

The Narrow Focus of Process Evaluation Applications

Most current process evaluations are the products of requests made by regulatory commissions and utilities. Utilities and regulators often do not seek to answer the "big picture" questions surrounding DSM programs, and rather focus more narrowly on those issues pertinent to near-term negotiations. One of the primary uses of process evaluation in the regulatory community has been to provide short-term prudence review of utility operations. Utilities also want to know how programs are succeeding. This desire is manifested in the general use of process evaluation as a tool for rapid assessment of short term developments. As Brandis (1987) points out, process evaluation can be very useful for making mid-course program corrections.

Demand for this type of information often means that DSM process evaluation is not pursued as a holistic exercise, but rather is approached in a piece-meal fashion. Process evaluations often focus only on one program, or only on one or more aspects of a single program, such as marketing penetration. However, program design and delivery issues span the lifetime of programs. Comprehensive process evaluations often involve work during design, early implementation, and program maturity.

Evaluators are commonly constrained by the narrow focus applied by their clients, and often do not, or cannot, structure their research to encompass broader program delivery issues. On the bright side, momentum does appear to be building in more progressive utilities and regulatory bodies for more integrated and holistic process evaluations.

Preoccupation with Impact Results

The utility, regulatory, and evaluation communities have placed most emphasis on answering the question, "How did we do?" This emphasis on outcomes in evaluation stems from regulatory pressure to provide a solid measured basis for determining incentive awards and resolving other DSM regulatory issues. As a result, process evaluation does not seem to have the standing of impact evaluation. This systematic emphasis on impact evaluation over process evaluation appears in both evaluation budgets and in how evaluation results and methods are discussed in the literature.

In Evaluation Budgets. Process evaluation receives a much smaller share of the typical utility evaluation budget than does impact evaluation. Wirtshafter and Baxter (1991) reported that process evaluation accounted for a weighted average of 30 percent of total evaluation budgets for a sample of Northeast Utilities. (See Table 1.)

This finding was consistent with the experience of the three process evaluation specialists we interviewed. They suggested that as a general rule of thumb, evaluation budgets typically show a one-third process, two-thirds impact split. The argument for this allocation has largely been made on the grounds that impact evaluation is more complicated and simply costs more. However, as the sophistication of process evaluation techniques increase, as some of our key informants suggested was the case, the cost and complexity argument becomes less legitimate.

The argument being made here is not to spend less on impact evaluation, since rate payer dollars fund evaluation efforts and accurate impact results are needed, but rather to invest more heavily in comprehensive process

Table 1. Utility DSM Evaluation Expenses

	Process (\$000)	Impact (\$000)	Total (\$000)	Process to Total (%)
Central Hudson (90-92)	295	1,182	1,477	20
Consolidated Ed (90-92)	289	3,593	3,882	7
Long Island Light (90-92)	3,401	4,250	7,651	44
New York E+G (90-92)	638	1,689	2,326	27
Niagara Mohawk (90-92)	1,900	3,908	5,808	33
Orange+Rockland (90-92)	211	1,281	1,492	14
Northeast Utilities (Connecticut 91)	1,100	2,600	3,700	27
Totals	7,834	18,503	26,337	30

Source: Wirtshafter and Baxter 1991.

evaluation because of the long-term benefits of more effective program design.

Evaluation Literature and Reporting. A second measure of the status of process evaluation is the degree to which process evaluation issues are discussed and results reported in the DSM evaluation community. To assess this, we conducted a bibliographic analysis of the proceedings from the last three Chicago International Energy Program Evaluation Conferences. We chose the Chicago conference because it is the only conference devoted solely to energy program evaluation, enabling the clearest and cleanest comparison. Papers were tabulated in six categories based on an overall assessment of content. As the boundaries between process and impact are not explicit, a great deal of judgment was required in classifying each paper. Thus, the results presented below are indicative of trends, rather than being definitive. The following definitions were used to classify papers.

- *Process evaluation results:* A broad definition of process evaluation was used. Included are traditional process evaluations, as well results of quantitative experiments to assess the effectiveness of program delivery strategies.
- *Process evaluation methods:* Papers focusing on the development of techniques that could be applied to process evaluation. Also included are accounts of practical problems of data collection and communicating results.

- *Impact evaluation results:* Papers reporting the outcomes, costs and benefits of DSM programs. Also included are monitoring and metering research results.
- *Impact evaluation methods:* This category includes reporting on advances in measurement techniques (e.g., PRISM, Conditional Demand Analysis) or the applications of measurement techniques to new areas.
- *Integrated evaluations methods and results:* Includes papers where both impact and process evaluation results are presented.
- *Marketing:* Market segmentation studies and customer service related papers.
- *Other:* Includes all papers that are not classified above.

Three striking patterns can be seen in Table 2. The first is that impact results were reported at nearly twice the rate of process results. This does not necessarily mean that there is twice as much impact evaluation going on. Much process evaluation is done in a more informal manner less conducive to publication. A second factor, which may contribute to these differences in reporting, is that process evaluations may raise sensitive communications and organizational issues. Utilities are, in a sense, more vulnerable to process evaluation results since they report situations over which the utility typically has direct control. Impact results are further removed and there are

Table 2. Bibliographic Analysis of International Energy Program Evaluation Conference Proceedings: Percentage Distribution of Conference Papers by Content Area

	Year of Proceedings		
	1987	1989	1991
Total Articles (n)	70	65	87
Process Evaluation			
Results	10%	14%	9%
Methods	4%	2%	3%
Impact Evaluation			
Results	24%	18%	22%
Methods	20%	22%	25%
Combined Evaluations			
Results	11%	8%	8%
Methods	1%	3%	3%
Marketing Evaluation	9%	15%	6%
Other	20%	18%	22%

often mitigating circumstances that can be identified to account for results.

Although many have noted a trend toward integrating process and impact evaluation, this has not yet shown up in reporting. Separate treatment of impact and process results was far more common.

The most striking pattern is the lack of papers discussing process evaluation methods. In any of the last three Chicago conferences fewer than five percent of papers discussed process evaluation methods in any detail. In contrast, more than 20 percent of the papers in any of the three years were focused on impact methods. One reason suggested, from our interviews with practitioners, was that basic methods of process evaluation haven't changed. While that may be true, the sophistication and rigor with which process methods are applied has changed as a result of personal and professional maturation in the field. This lack of discussion of process evaluation methods and applications in the literature contributes to the impression that process evaluation does not have a great deal to offer evaluation users.

Lack of Communication of the Broader Uses Process Evaluation to Users

Process evaluation's limited application is due, in part, and, in part, causes a lack of reference to the role of process evaluation in addressing broad program design

issues in definitions and descriptions of what process evaluation does. To illustrate this, we collected several definitions referencing process evaluation. A sampling follows.

"A process evaluation is a study of program implementation, [a] qualitative reporting of program operations (Brandis 1987)."

"Process evaluation seeks ways to optimize program delivery and therefore addresses program design and operation....Process evaluations are usually qualitative assessments, often based on surveys of consumers or other relevant groups" (Puget Power 1991).

"Process evaluations focus on a company's decision making needs in process of designing and implementing a program. Specifically, process evaluations cover the qualitative aspects: (1) Program design and operation; (2) marketing issues/customer satisfaction; (3) delivery system/contractor-customer issues" (Purkayastha and Fautleroy 1991).

"Process evaluations examine program operations to identify how well the program is implemented and to suggest ways to improve program delivery. Such evaluations focus on program goals, history and activities, and often are based on interviews with utility program staff, program managers, participants and trade allies" (Hirst and Reed 1991).

"The systematic assessment of a utility DSM program for the purposes of improving its design, delivery and the usefulness and quality of the services delivered to consumers" (Spinney and O'Rourke).

The definitions focus--to greater or lesser degrees--on three areas: the goals or purpose of the evaluation, the issues or questions generally studied with process evaluation, and the methods used to answer the questions. Most writers agree that the purpose of process evaluation is to optimize program implementation, which includes design, marketing, delivery, and operations.

The methods used vary by practitioner. Some maintain that process evaluation uses primarily qualitative methods, such as key informant interviews; some embrace marketing, customer, or non-participant surveys, which are quantitative methodologically, but deal with qualitative subject matter; some specifically mention the systematic assessment of program elements, which include tracking systems, cost-effectiveness, etc.; and some writers skirt methods altogether in their definitions, perhaps not wanting to be too specific.

The issues committed to process evaluation are often left somewhat vague in initial definitions, although subsequent elaboration may follow. These issues focus primarily on marketing, program delivery (quality and efficiency), and customer satisfaction.

In the definitions cited here and in others we examined, there is no reference to broader application of results regionally or nationally; none include quantitative analysis based on experimental manipulation of program conditions; none explicitly discuss the role process evaluation can play in addressing some of the larger issues haunting DSM impact evaluators today: penetration of measures in multi-measure, multi-stage programs; persistence of savings in all sectors; or impact of behavioral measures, among others.

Alternatively, there is a growing tendency to develop more specialized nomenclature. Both Freeman (1991) and Spinney and O'Rourke (1991) argue for distinguishing process evaluation from market evaluation. Market evaluations assess the effectiveness of programs and program strategies in transforming markets. Others have argued for distinguishing between process evaluation (broader more structured investigations) and progress evaluation (interim assessments of activity). While these distinctions may be useful to the specialist, they tend to contribute to the balkanization of the evaluation field.

Incomplete or overly narrow definitions contribute to attitudes that limit the focus of process evaluation and inhibit the development of more integrated evaluation approaches. Expanding definitions and descriptions of process evaluation alone will not change the current situation, however definitional changes may help expand conventional wisdom about what process evaluation can accomplish.

Discounting the Value of Process Evaluation Methods

The practice of process evaluation is also fettered by generalizations held by evaluation end users, and sometimes the practitioners themselves. The most limiting generalization--one which has achieved mythic stature--follows an elitist logic: process evaluation is qualitative, and qualitative methods are inherently soft; therefore, process evaluation is soft. Examples of definitions given above depict process evaluation as a purely qualitative exercise in contrast to the more "quantitative" approaches of impact evaluation. This qualitative label carries not-so-hidden connotations. Among them are that process evaluation methods are less

rigorous and less challenging and therefore results are somehow less reliable and definitive than impact results.

Qualitative analysis is a central tool for process evaluation. However, qualitative does not mean non-empirical, and as Peters and Bronfman (1991) and Freeman (1991) note, the general trend in the field is towards more rigorous application of these methods. Process evaluation can encompass empirical techniques and experimental designs. Process methods can even be useful for examining the effects of alternative experimental designs in impact evaluation.

Transcending the Barriers-- Examples From the Literature

One of the goals of this paper is to educate regulatory bodies and utilities about the bigger questions that process evaluation can answer about what does and doesn't work in DSM program design. This type of application of process evaluation is the exception, not the rule. As the four examples below indicate, this type of work has and is being done. These reports exemplify holistic research that attempts to answer major questions with process techniques. While all would not fit under the traditional definitions of process evaluation, anytime an evaluation systematically tests different delivery mechanisms, it is a process evaluation.

A Comparison of Commercial Retrofit Programs

Peters et al. (1988) did a comparative analysis of three retrofit programs targeted to the commercial sector in the Northwest. Two were operated by the Bonneville Power Administration (BPA) (Purchase of Energy Savings Pilot Program and the Commercial Incentives Pilot Program) and one by Puget Sound Power and Light (the Puget Incentive Program). Each program offered different delivery strategies and incentive structures. The study was a post-hoc review of delivery strategies, penetration, program delivery costs, and estimated savings. Because comparison of three programs was not planned for and common reporting approaches not developed, incomplete and inconsistent data hampered the evaluator's efforts.

While the study covered both process and impact results, a primary goal was assessing which incentive structures were most effective and assessing a BPA requirement that all cost effective measures be installed. By comparing results of these different programs, the trade-offs between requirements for comprehensive installations (which resulted in more measures being installed per building)

and overall program cost effectiveness (which was higher for programs with less restrictive installation requirements) were illuminated. The study also highlighted that ease of participation and easily understandable incentive structures is often a more important concern than incentive amounts.

New York State Electric and Gas (NYSEG) Commercial Audit Penetration Experiment

A 1989 Xenergy study of NYSEG Commercial Audit Programs examined audit penetration rates as function audit cost (free, fee with a rebate, and fee) and method of contact (phone or mail versus direct contact). The type of contact (personal) was more important than the audit cost. But no-cost audits combined with one-to-one solicitation had the highest penetration levels. One-to-one solicitation has a much higher first cost than mail or phone approaches. However, the dramatically higher penetration rates suggested that cost per audit and, ultimately, per installed ECM may be lower. The study also provides clear empirical evidence that supports the value of fostering client relationships.

Although this two factor quasi-experimental design used impact techniques, the focus was on understanding which delivery strategies were more effective. This study shows that the boundaries between impact and process evaluation are diffuse, and that conceptualizing evaluation in broad terms garners synergy leading to much greater understanding of the issues at hand.

Heat Pump and Solar Water Heater Marketing Experiment

In a similar experiment in the mid-80s, BPA examined the relative effectiveness of promotion versus incentives for obtaining market acceptance of residential heat pump and solar water heaters (BPA 1989). Unlike the commercial retrofit study, BPA was able to plan this study in advance. The program was offered to utilities that BPA wholesales power to. Participating utilities were assigned randomly to high and low levels of incentives and promotional activities. The evaluation tracked both market penetration data and program costs. While higher incentive and promotional levels had positive effects separately, the utility with both high incentive and promotion levels had dramatically higher penetration rates than utilities whose programs had either high promotion levels or high incentive levels.

The Effects of Occupant Education in Low Income Weatherization

There is a growing body of evaluation literature summarized by Quaid (1990) on the effects of combining occupant education with low-income weatherization programs. There have been at least four empirical studies in different states comparing energy savings in no weatherization, weatherization only, and weatherization plus education homes. Each program used somewhat differing education strategies (with different costs), yet all have demonstrated that occupant education significantly increased weatherization savings, by as much as 50 percent, at a fraction of the measure costs. One consequence in Washington State is that occupant education is more regularly included as part of low-income weatherization programs. From a larger perspective, these findings reinforce the importance of including provisions for education and training for those who will use or operate DSM measures. It is our expectation that these results would transfer beyond low-income weatherization.

Each program provided different levels of education, ranging from one site visit to as many as twelve. When cost and savings were compared across programs, it was evident that the optimum number of education visits is 2-3. The ability to make these comparisons was a matter of fortune and not design as these evaluations were developed independently.

In the strictest sense, this research is impact evaluation, however, the basic question the study addresses, "does education make a difference in low income energy efficiency programs?" is a process question. More importantly, the impact results were coupled with process evaluation methods to establish the strengths and weaknesses of the alternative delivery mechanisms.

All four studies emphasize the ability of process evaluation techniques when with coupled with impact evaluation data to provide clear and powerful information on what DSM program strategies are most effective, and why they get the results they do.

Strategies for Strengthening Process Evaluation

This paper has revealed the need for a systematic effort to integrate process, impact, and any other types of DSM program evaluation. This can be achieved through a variety of strategies.

Seek to Answer the Big Questions

The best way to achieve the best uses of process evaluation is to explicitly plan for it. Resources for annual evaluations, which function as report cards, may be better allocated to less frequent, but more meaningful research that can answer not only "How did we do?," but also "How can we do better?" For example, utilities and commissions may be better served by identifying key program design and delivery questions to resolve and then establishing an appropriate time frame in which to answer them. It may take two or three years to find out with some certainty which incentives achieve the greatest participation, or whether client education is cost effective. This longer-term strategy may help to decouple process evaluations from immediate punitive effects, thus increasing the likelihood that process evaluation results will be shared.

Process evaluation can help to answer large, and perhaps hard-to-quantify, questions within DSM. Practitioners may want to see their work situated in broader contexts than those currently used. The purpose of process evaluation can be expanded to include study of programs across sectors, utilities, and regions. This leverages other researchers' efforts by approaching the same basic issue from different, yet compatible, perspectives. For example, The Wisconsin Center for Demand Side Management has coordinated the efforts of five utilities in order to analyze direct load control for air conditioners. Key issues that may be addressed include an analysis of cycle frequency and successful targeting and marketing strategies. The cooperation of utilities creates an automatic quasi-experimental design, in which each utility is testing a somewhat different model. A similar strategy is in the works to test alternative strategies for distributing energy efficient residential lighting.

Communicate and Educate

If process evaluation is to fulfill its potential, it is imperative that practitioners communicate with and educate utilities and commissions about potential uses of process evaluation results. Existing channels are at best incomplete. One channel is professional organizations, such as the Association for Demand Side Management Professionals (ADSMP), which could play a useful role in identifying what the critical questions about DSM program design are, and educating the stake holders in program evaluation. Other channels for exchanging results and identifying the critical DSM development questions are needed, particularly among process evaluation professionals.

Develop Holistic Evaluations

In the broadest, most inclusive, sense process evaluation can include any evaluation that examines DSM program design and delivery. This goal-based orientation focuses on the end product or use of process evaluation. It emphasizes program optimization over program measurement. To use alternative wording, process evaluation is a formative exercise rather a summative one (Herman et al. 1987).

If we adopt a holistic approach to evaluation, then market and progress evaluation become subtypes of process evaluation. This makes it easier to distinguish between process and impact evaluation, and ultimately, to integrate them. For example, there is confusion about whether measure life and persistence are process or impact issues. They are both. However, with the broader applications proposed here, the distinction becomes clearer--impact evaluation focuses on estimating measure life; process evaluation measures which program design strategies most effectively and efficiently preserve program measures.

The profile of process evaluation is increasing on its own merits due to regulatory and other pressures. Theories and methods from other, well-developed branches of social science (organizational and communication theories) are being introduced into more traditional energy program evaluation. This trend will become standard practice in the future. It will/should lead to cross-program investigations of the issues raised here.

Conclusion

This paper was conceived out of a frustration which appears to be a growing preoccupation in the DSM evaluation field with measurement, monitoring, and verification. In the rush to develop impact evaluation tools to assess DSM program performance to meet regulatory needs, we seem to have stopped asking enough of the larger questions about how to design and deliver the most effective energy efficiency programs. If we are to optimize the DSM resource in the long run, it is essential that these questions get asked and answered. Process evaluations can and have been used to address these larger questions. This use of process evaluation by utilities and regulators appears to be the exception. By adopting a more holistic approach to evaluation, encouraging more collaborative comparative studies, and educating utilities and regulators about the need to keep an eye on the big questions, better process evaluations and ultimately better energy efficiency programs will result.

Acknowledgements

The authors thank Jane Peters, Louisa Freeman, Linda Dethman, Liz Hicks, and Marjorie McRae, who participated in interviews and draft critiques, and who offered many insights on process evaluation.

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