Diffusion in the Desert: Adoption of Demand Response Technology by Rural Small Businesses

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ABSTRACT

Small businesses in California face a variety of economic challenges, which include the high costs of labor, insurance, and energy. Electricity costs can represent a significant portion of the operating overhead for small entrepreneurs, especially in rural hot climate areas that require air conditioning. However, despite their intuitive benefit, energy saving programs face sociological constraints that inhibit their effective adoption in this "hard to reach" market sector. As a result, extraordinary outreach efforts are often required by energy service providers to engage small businesses when implementing these programs.

This paper examines the development of non-traditional communication channels (formal and informal) and the customer adoption of an electric utility-based demand response program in a rural desert region. We include a case study of a bounded set of customers to whom Southern California Edison (SCE) marketed the SCE Energy$mart Thermostat[SM] Program during the spring of 2002 in the Coachella Valley (Palm Springs region) of Southern California. Of greatest interest will be the examination of the spontaneous, self-developed interpersonal communications that customers established informally, and the effectiveness of that mechanism to provide an alternate means of program promotion that reached beyond the standard media delivery channels.

Introduction

The blazing hot Coachella Valley in the lower desert of Southern California shimmers in the summer sun, driving residents and tourists indoors to seek the cool comfort of air-conditioned offices, shops, and restaurants. The price for this comfort finds its way to small business owners' operating costs through the high electricity bills they receive during the summer. Typically most small business owners on California are too busy, inadequately trained, and poorly financed to do much about effectively reducing their energy consumption. Yet this group of customers is responsible for a significant portion of the energy usage in the state, and their behavior in exhibiting responsiveness to higher prices can affect overall energy costs for all state consumers.

When SCE launched its marketing effort to implement the SCE Energy$mart Thermostat[SM] (E$T) program (a demand response pilot study) and install 5,000 energy-saving thermostats for small businesses across its service territory, the program encountered an all-too-common phenomenon in the world of energy services marketing called "lack of interest." Despite creating a seemingly rational offer that was a low-risk, economically logical slam dunk (free equipment, save money, get $300) and pretested on small business owner focus groups, the program elicited few participants in the first few months of deployment.

SCE went back to the marketing drawing board and made some changes—not in the offer of the technology (still state-of-the-art and capable of saving energy and reducing peak demand)

or the financial benefit (still the same economic slam dunk), but in the design and nature of the marketing communications. The revised strategy added several new and primarily interpersonal communication channels, and in the Coachella Valley, which was a targeted area for the program due to a high saturation of air conditioning, this enhanced strategy included the additional use of more community-based and informal communication channels.

The purpose of this case study was to discover and describe the communication channels that served to diffuse the awareness and adoption of the new SCE thermostats among the small business owners specifically in six cities in the Coachella Valley in 2002. The communication channels for this study are defined as those formal and informal, non-personal and interpersonal means of communication through which informative and persuasive messages were delivered over time to the eventual adopters of the technology in the diffusion of innovations process. By so doing, the case study demonstrates the principles of diffusion of innovations and communications theory that should be folded into the traditional energy-related program communication strategies for maximum effectiveness.

Diffusion and the Innovation-Decision Process

Previous communication theories, particularly those of the early 20th century, viewed communication as a one-way, linear act in which one individual transfers a message to another in order to achieve certain effects. Taken to the extreme, the "magic bullet" theories of the early 20th century held that media stimuli could penetrate people's defenses with powerful messages and transform their thoughts and actions, almost without their ability to resist manipulation (Baran and Davis 1995, 66).

By contrast, communication in the diffusion framework is a two-way process of convergence. The newness of the idea in the message context gives diffusion its special character, and involves some degree of uncertainty. This means that when making a decision about an innovation, an individual seeks and processes information to reduce this uncertainty about the advantages and disadvantages of the innovation in his or her own situation.

"Getting a new idea adopted, even when it has obvious advantages, is often very difficult," stated Everett Rogers on the first page of his groundbreaking work on diffusion of innovations theory (Rogers 2003, 1). We encounter this phenomenon continually in our work as we promote and deliver innovative energy efficiency and demand response programs to a skeptical and somewhat disinterested small business market sector. It is this theory that we adopt in our efforts to market these programs to the rural small business community.

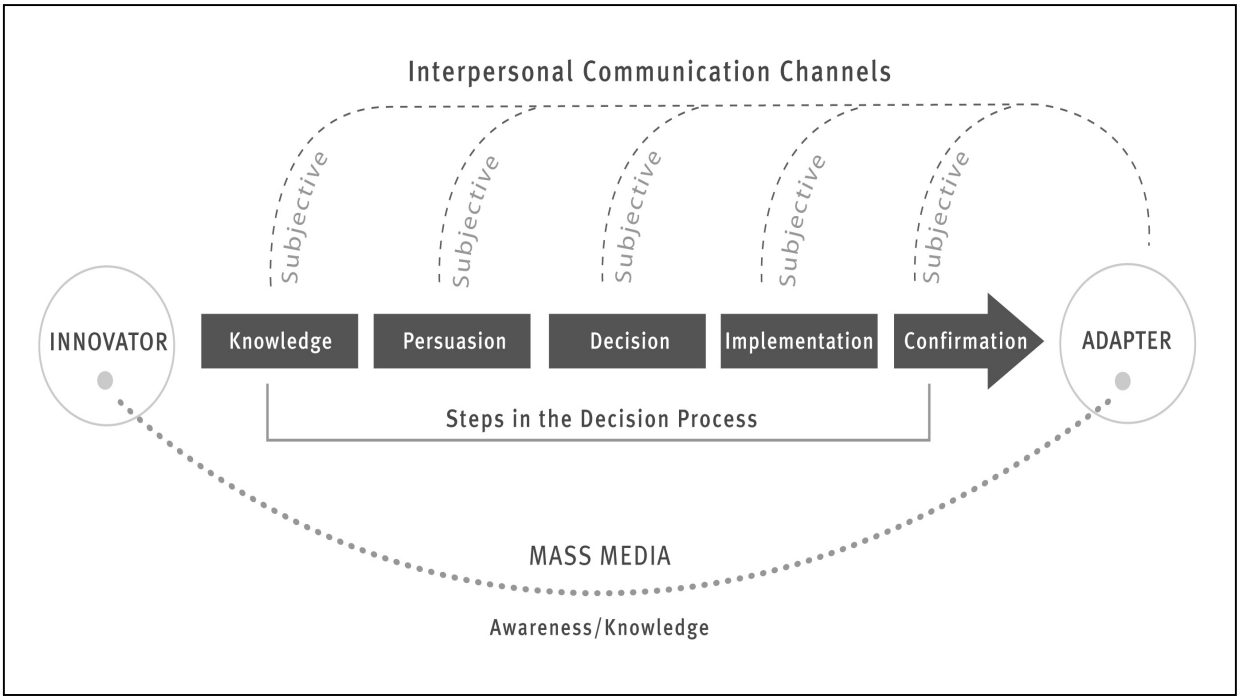
According to Rogers, "Diffusion investigations show that most individuals do not evaluate an innovation on the basis of scientific studies of its consequences, although such objective evaluations are not entirely irrelevant, especially to the very first individuals who adopt. Instead, most people depend mainly upon a subjective evaluation of an innovation that is conveyed to them from other individuals like themselves who have previously adopted the innovation. This dependence on the experience of near peers suggests that the heart of the diffusion process consists of the modeling and imitation by potential adopters of their network partners who have adopted previously. So diffusion is a very social process." (Rogers 2003, 18)

Technology Adoption is a Social Process

The conceptual framework for delivering these programs in the past has centered on the challenges of overcoming market barriers and enhancing market effect, with an emphasis closer to that of the neo-classical economic tradition. According to energy consultant Bruce Mast, that tradition "conceptualizes each decision-maker as an isolated, perfectly rational, self-interested decision-maker who engages in economic transaction with other isolated, perfectly rational, self-interested decision-makers" (Mast 1999, 8). By contrast, the diffusion of innovations framework views decision-makers as social beings who rely on their social and business interactions for clues on whether to adopt or avoid innovations. What is rational is relative, and small businesses often rely on their pragmatic approach to operations and profitability to define their decisions about technology.

When adopters make decisions ultimately regarding new technology, the new ideas usually are communicated first through certain channels over time among the members of a social system. The final decision maker can pass through all five stages in the decision process (knowledge, persuasion, decision, implementation, and confirmation) and is influenced by a variety of communication channels at each stage in the process. (See Figure 1 below.)

Figure 1. Communication Channels in the Diffusion of Innovations Process



The Role of Mass Media vs. Interpersonal Communication Channels in Decision-Making

At the primary knowledge stage in the decision process, the individual should be made aware of what the innovation is and how and why it works. Mass media channels (i.e., radio, television, newspaper, and for the purposes of this study, mass direct mailing) are often the most rapid and efficient means of informing an audience of potential adopters about the existence of an innovation and creating awareness knowledge.

Moving through the next stages in the decision-making process in Figure 1, the individual evaluates the innovation. Interpersonal networks with near-peers are particularly likely to convey this kind of information, and are more effective than mass media in persuading an individual to accept a new idea, especially if the interpersonal channel links two or more individuals who are similar in socioeconomic status (such as being a small business owner), education, or other important ways. Ultimately, it is the power of "word of mouth" that both converts and confirms the innovation decision, and these messages are carried and delivered by interpersonal channels.

Change Agents and Opinion Leaders

In the diffusion framework, a change agent is an individual who influences clients' innovation-decisions in a direction deemed desirable by a change agency (Rogers 2003, 33). Change agencies seek to persuade markets to adopt the technology through direct representatives, or agents, who are deployed as extensions of the agency. They may come from outside the social structure of the market but operate within the cultural boundaries to seek to influence the innovation-decisions.

Opinion leadership is the degree to which an individual is able to influence other individuals' attitudes or overt behavior informally in a desired way with relative frequency. Opinion leaders have a unique and influential position in their system's communication structure: They are at the center of interpersonal communication networks. Opinion leaders such as political figures or successful business managers can help influence potential adopters through their interpersonal communications networks.

Change agents use opinion leaders in a social system as their lieutenants in diffusion campaigns, and this dynamic can successfully support a rural outreach effort.

The Coachella Valley E$T Program Outreach and Case Study

Program Description

All of California was ill-equipped to deal with the sudden and dramatic shortages in California's energy resources that arose during the energy crisis of 2001. As a result of Assembly Bill 970 enacted after that far-reaching event, the California Public Utilities Commission (CPUC) ordered the state's investor-owned utilities to run a suite of pilot programs aimed at various residential and small business customer segments (those hardest hit by the crisis) that would help determine new programs to reduce the demand on the state's energy reserves during times of peak usage.

The CPUC asked SCE to target its small business customers with a technology-based approach directed at reducing air conditioning (AC) load, and SCE then devised the E$T program. It offered small businesses a free, state-of-the-art, "smart" thermostat that would take over the chore of monitoring their indoor temperature and operate their AC equipment more efficiently. SCE would install the thermostat at no cost to the customer, and sweeten the deal by letting them keep the thermostat and giving them $300 a year as an appreciation payment for participating in the program.

On its own, the "smart" thermostat could save on energy usage through its functionality as a means to suit the business owner's AC operating hours and temperature needs. The thermostat's two-way pager capability also allowed SCE to remotely curtail air conditioning load

when overall electricity demand was at its highest and resources on the state electricity grid ran short. When the curtailment was active, the thermostat raised the cooling setpoint by a specific number of degrees (called the temperature offset), thereby reducing the amount of electricity needed for cooling, without eliminating the AC altogether. This was immensely preferable to the alternative of a "rolling blackout" in the occurrence of an electrical system emergency.

The marketing portion of the program was in effect from October 2001 through July 2002 and had a goal of full program subscription of 5,000 thermostats. SCE's marketing strategy was to target small commercial/industrial customers on high energy usage climate zones and in small cities or rural areas. These sectors are somewhat resistant to the traditional marketing communication activities of direct mail and bill inserts, and have been the most difficult to reach effectively and the slowest to adopt new technologies and behaviors. Geltz Communications (GC) assisted SCE in both designing the communication plan specifically for the Coachella Valley, and providing direct outreach activities in support of the E$T program, in order to overcome these barriers. When the program was fully operational in 2002, SCE achieved full program demand response of 10 MW, more than twice the original program projections.

Case Study

To investigate the effectiveness of the non-traditional marketing approaches and to discover the influences of all of the communication channels that reached customers with the E$T message, we conducted a qualitative research project. This case study examines a bounded system of 194 small business adopters of the E$T program in six cities of the Coachella Valley (Cathedral City, Desert Hot Springs, Indian Wells, Palm Desert, Palm Springs, and Rancho Mirage) in 2002.

The ideal process evaluation should track participants and communication channels before, during, and after a communication campaign. In the case of the E$T program in the Coachella Valley, we were faced with the disadvantage of interviewing customers about their experiences some two years after the initial marketing efforts. However, we shall see that the results of this analysis still provide useful information for assessing the rural marketing efforts for the E$T, and deliver some interesting insight into the effectiveness of marketing energy-related programs to small businesses.

Investigative Methodology

From SCE program tracking files and GC records, we compiled a chronology of all the marketing outreach activities during 2001-02. We then matched the individual program applicant names to all the SCE and GC mailing lists and compiled a case study database. Next, we interviewed a sample of the original applicants to ask them about their decision-making process and the communication channels they used and created. Finally, we plotted the applicant locations on city street maps.

Review of All Communication Efforts and Channels

Table 1 below presents a compilation of all the communication channels that could have impacted customers in these six cities.

Table 1: E$T Communications Channels Utilized in 2001-02 Campaign

Description	Type	Date
SCE Mailing – First brochure to first sample of businesses	Mass mailing	October 2001
SCE Mailing – Second brochure to first list (re-mailing)	Mass mailing	February 2002
SCE Mailing – Second brochure to a different sampling	Mass mailing	February 2002
SCE Mailing – Second brochure to a third sampling	Mass mailing	Late March/early April 2002
SCE Business Solutions	Interpersonal	January – July 2002
SCE Public Affairs	Interpersonal	January – July 2002
SCE Direct Marketing	Mass mailing	January – July 2002
GC city mailings to business license lists – no endorsement	Mass mailing	Cathedral City 6/13/02
GC city mailing to business license lists – with endorsement cover letter on city letterhead	Mailing with letter endorsement of trusted third party opinion leader (city)	Desert Hot Springs 6/11/02 Palm Desert 5/22/02 Palm Springs 6/15/02
GC presentations at community events - Rotary Clubs, Chambers of Commerce, Business Networking Breakfasts, Palm Springs Business Expo	Interpersonal	March – June 2002
GC presentations to property managers	Interpersonal to opinion leaders	March – June, 2002
Informal, spontaneous customer communication with other business owners	Interpersonal	Exact dates uncertain but likely Jan – June 2002

Customer Population and Marketing Effect Database

Roughly 194 small business customers in the six Coachella Valley cities submitted applications to SCE for participation in the E$T program. Some of these customers requested multiple thermostats for their buildings, but SCE treated each customer as a discrete respondent, regardless of the number of thermostats customers requested or had installed. Overall, the average E$T program participant had 1.9 thermostats per building.

Subsequent to the application process, SCE thermostat installers found upon site inspection that nearly 70 of these customers were not eligible for the program due to technical problems at their customer sites (i.e., lack of pager coverage, incompatible wiring, and incompatible A/C systems). However, since we were interested in the communication channels leading up to the application submission, this subsequent drop out did not affect our overall analysis, but it did limit our sample for telephone interviews.

To this database of active and rejected customers we added a record of each time their name appeared on a list for any of the mailings that went out, along with possible influences of community meetings in their city. Because the applications were encoded by marketing influence, we could track the nature of the influence to which the customers responded ultimately in making their decision to apply for the program.

Telephone Interviews

We conducted telephone surveys with 47 customers who were original submitters of the E$T applications in 2002, still participate in the E$T program, and responded to our invitation to take part in the survey. We tape recorded and transcribed the surveys, and compiled the responses by question to determine emerging trends in customer responses. In addition, we interviewed nine participants in person on their business premises and subsequently transcribed the interview notes. Finally, we interviewed five program non-participants. Survey respondents received a cash financial incentive for their completion of the surveys.

The survey instrument for this qualitative study consisted of seven open-ended questions. The questions generally followed the sequence of steps in the innovation-decision process and helped us learn more about related aspects of diffusion communication channels.

Plotting of Applicants on City Maps

In addition to the marketing effects database and the telephone surveys, we plotted the locations of successful installations as well as applicants who were later disqualified on the basis of on-site technical problems. We wanted to determine if we could identify geographic clusters of applicants who might have influenced each other by means of spontaneous interpersonal communication channels. We would then overlay the knowledge we had from the telephone surveys to confirm, if possible, the impact of these endorsements.

Study Findings

Marketing Influences and Communication Channels

Our analysis of the customer tracking database revealed that the majority of customers responded to the marketing influence of a city-endorsed mailing (cover letter on city letterhead enclosed with E$T brochure). Customers who joined in response to the mass mailings were in the minority and applied earlier in the program than other customers. Other marketing influences had significant effect, such as the direct interpersonal change agent interactions from SCE, GC, and other groups. These influenced combined rank third in the level of influence. Figure 2 on the next page illustrates the impact of these general types of marketing influences and their communication channels, as a separate and when combined with the mass mailings.

Self-Reported Customer Experiences from the Telephone Survey

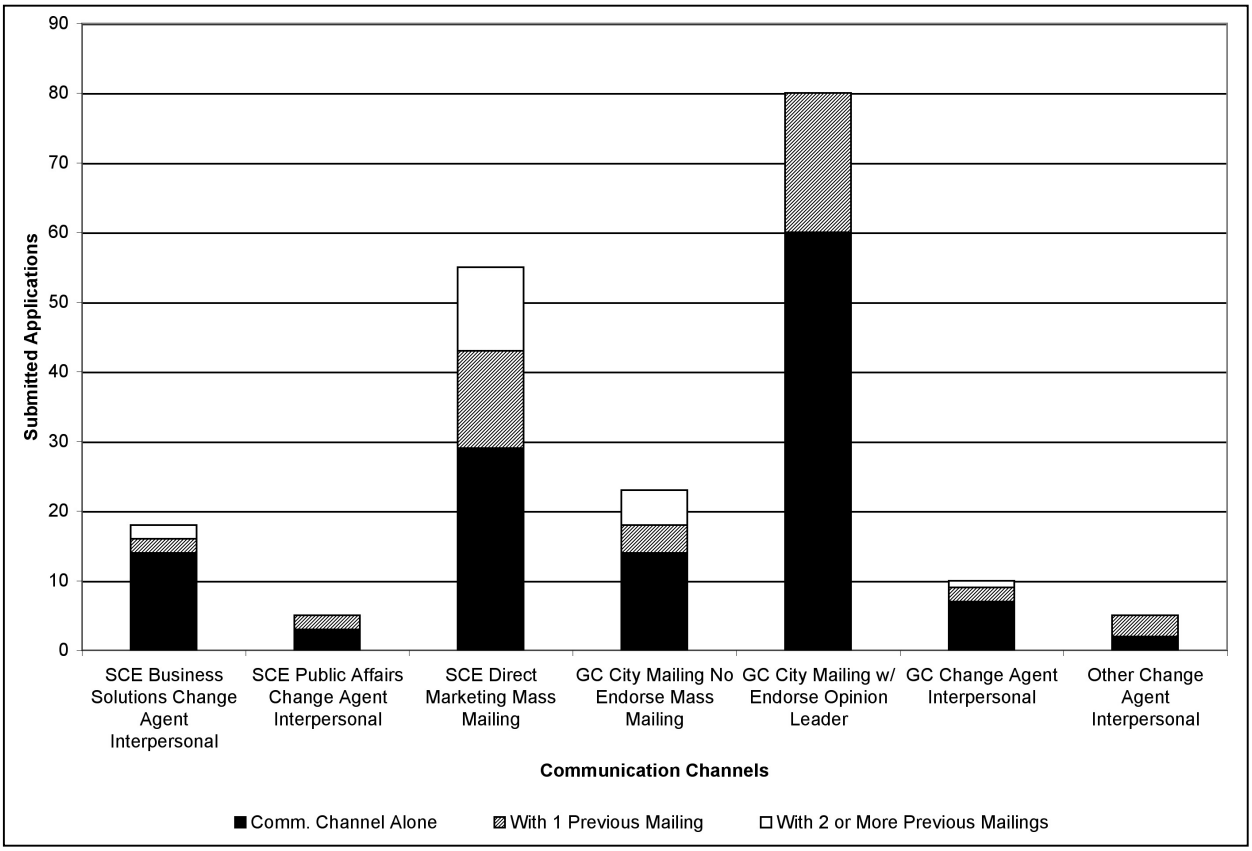
Knowledge/awareness influences. When asked how they first heard about the program, nearly three quarters of the respondents indicated that they had received something in the mail. About 1 in 10 said that they had spoken with a representative, and another 1 in 10 said they heard about the program at a community meeting like Rotary Club or a business network group.

Persuasive features. When asked what about the program caught their eye or made them want to sign up, one third mentioned saving money as their first priority, and then opinion was divided evenly after that among saving energy, the rebate, and the free thermostat. In third place were high electricity rates and the opportunity to have better control of their air conditioning system.

Among those who mentioned two priorities, more than half mentioned the rebates as their highest second priority, with better control of the air conditioning system in next place.

In discussing how they thought the program would affect their business, many expressed uncertainty about whether they would be able to live with the raised temperatures setpoints during curtailment, but with assurance from SCE and with the rebates, free thermostats, and the opportunity to save on their electricity bills, they were willing to give it a try.

Figure 2. E$T Applications Received through Contact from Various Communication Channels



Persuasive influences. Nearly three quarters of our respondents apparently decided for themselves. The remainder mentioned that they had spoken to someone else first (such as a co-worker, an SCE representative, a friend, or people within a community organization). Only a few reported that they could not remember if they had sought someone else's opinion during this process.

Decision/implementation stage. When it came to filling out the application and submitting it, eight out of 10 respondents said that they had no problems—they just filled out the application and sent it in. The rest of the respondents said they did get more information first (reducing uncertainty) before they submitted the application. Nearly all respondents said they had no second thoughts after they submitted the application. Among the non-participants, about half did not apply because of AC system incompatibility (they had evaporative coolers or wall AC units

that cannot be used with the E$T thermostats), and the other half cited the potential hassle and disruption of installation as the reason for their decision not to apply for the program.

Spontaneous, self-generated communication channels. Nearly three quarters of the telephone survey respondents reported that they had recommended the program to someone else, typically to more than one other business owner in the Coachella Valley. In many cases, they were able to name the other businesses and we could identify those customers as other telephone survey candidates.

Paradoxically, when we asked the people to whom the program was referred where they heard about the program, they did not mention the influence of another business owner's recommendation.

Preferred communication channels for future SCE communication. When asked how they would like to hear about future SCE programs designed to help them save energy and lower their electric bill, nearly three quarters of the respondents said they would like to get something in the mail, with the rest nearly evenly split between a phone call and hearing about it at a community event.

Conclusions

A Variety of Communication Channels Contribute to Successful Diffusion

Traditional, objective mass media fulfill a vital purpose. As we mentioned previously, mass media channels are relatively more important at the knowledge stage and interpersonal channels are relatively more important at the persuasion stage. Information that creates awareness-knowledge of an innovation seldom comes to individuals from a source or channel of communication that they actively seek. Information about a new idea can only be actively sought by individuals after they are aware that the new idea exists, and when they know which sources or channels can provide information about innovation. (Rogers 2003, 192)

For SCE trying to market the E$T program to small business owners in the Coachella Valley, the mass mailings of brochures served to create awareness of the E$T program. When they received the mailings, some of the customers did mention calling SCE (their source for more information) and asking about the program. In addition, a review of the marketing effects results (Figure 2) reveals that SCE Direct Marketing was still the second most successful marketing channel in generating adopter applications.

Non-traditional, subjective, interpersonal communications are effective. Interpersonal channels provide a two-way exchange of information, and an individual can secure clarification or additional information about an innovation from another individual. This characteristic of interpersonal networks often allows them to overcome socio-psychological barriers to adoption. We saw this dynamic at work in the E$T program, with many of the applicants responding to some kind of interpersonal influence from an opinion leader or near-peer, or to an endorsement from an opinion leader.

Change agents and opinion leaders are important. During the course of the E$T outreach, change agents proved to be most effective when they were able to influence opinion leaders as

their lieutenants, thereby tapping into the opinion leaders' interpersonal networks. The ratio of individual adopters influenced by the change agents was relatively low, and we believe that their time is better spent recruiting those who are better-positioned to influence greater numbers of potential adopters within their communities. In addition, we observed that opinion leaders' messages can be effective even when delivered through a non-interpersonal communication channel such as a letter.

Self-generated communication channels may promote geographic adoption clusters. When looking at the city maps plotted with the locations of E$T applicants, the clusters appear very obviously. In some cases, three, four and five businesses within the same building are installed sites or at least were originally applicants. However, we cannot assume a causal relationship among the businesses in all of these clusters. Other factors might apply, such as the fact that some of the areas are small towns in which the businesses all occupy a relatively condensed commercial zone. We think that further research before, during, and after a diffusion study testing for these influences would reveal more clearly the role that near-peer recommendations played in the establishment of these clusters.

Incentives help to conquer uncertainties. Although this study investigated primarily the communication channels that were most effective in persuading individuals to adopt the technology, we believe that in most cases the E$T incentives also persuaded potential adopters to take a chance on the complexity of the innovative E$T technology. In the innovation-diffusion process, adopter incentives increase relative advantage of an innovation and can act as a cues-to-action (events occurring at a point in time that crystallize an individual's favorable attitude into overt behavior change) in triggering the adoption of an innovation. This can lead to adoption of an innovation by individuals different from those who would otherwise adopt. Paying an adopter an incentive can change the audience segment that pioneers in adopting an innovation.

Implications for Future Programs

Our study of the 2001-02 E$T Coachella Valley outreach provided several strategic insights that change agencies can use to deliver successful, cost-effective energy efficiency and demand response program in the future.

Engage the support of local opinion leaders. This study demonstrated that the influence of a neutral, third-party opinion leader in marketing an energy program in a rural area can be powerful, even when communicated through a non-interpersonal channel such as a letter.

Design communication programs to discover and utilize diffusion influences throughout the campaign. GC change agents continually uncovered networks of opinion leaders throughout the 2002 campaign and we did our best to make nimble course corrections that took advantage of these networks. We also saw that self-generated communication channels were at work, serving as a powerful and extremely cost-effective marketing influence on behalf of SCE, without any suggestion from the utility. And we saw geographic clusters of applications and only guessed at their nature.

Combine the traditional econometric approach with the diffusion approach. SCE expected the program benefits of a traditional econometric approach to serve the marketing efforts well when we launched the program in our service territory. However, we discovered that simply informing customers about the well-designed program through mass media did not serve to diffuse the technology as we had hoped. It took the effective one-two punch of a well-researched program design delivered through a variety of diffusion communication channels to achieve successful adoption of the program.

Monitor and assess the campaign during deployment and adjust as necessary. SCE and GC both learned that a dynamic and flexible approach to rural campaign deployment is essential to ensuring success in the long run. By confirming that both the deployment plan and the measurement tools are in the place at the outset, most marketing activities can be tracked, measured for effectiveness, and adjusted to ensure maximum campaign effectiveness. This can be achieved by:

- Targeting local opinion leaders as a top priority and tracking their influence
- Tasking change agents with seeking out and supporting opinion leaders
- Encouraging "word of mouth" referrals among applicants to other business owners
- Tracking marketing influences in a section of the program brochure/application
- Tracking applications as they occur and determining the causes behind geographic clusters of applicant sites
- Conducting telephone interviews during the campaign as customers apply for the program to learn about the influences on their decision-making process and make course corrections if necessary

Investigate how adopters use informal communication channels when the technology doesn't work. If the program design has no mechanisms in place with which to listen or react to problems in the field, the informal networks might promote something quite different from that which is counted by or promoted by formal networks.

The lessons learned from the diffusion of innovations process, whether in the farmlands of rural Iowa or the deserts of Southern California, can provide meaningful tools for modern energy-related program outreach approaches. We examined the innovation-decision processes of rural customers through qualitative discussions, review of key program messages, and identification of traditional and non-traditional communication channels. We found that by using the existing interpersonal communication networks and the intermittent association of small business owners within a relatively small remote area, we could effectively engage a relatively conversation market base to adopt a challenging technical innovation.

References

Baran, S. and Davis, D. 1995. *Mass Communication Theory: Foundations, Ferment, and Future.* Belmont, Calif.: Wadsworth Publishing Company.

Mast, B. 1999. "Why Can't We All Just Get Along? A Reconciliation of Economic and Innovation Diffusion Perspectives of Market Transformation." In *Proceedings of the 1999 International Energy Evaluation Conference.* Denver, Colo.

Rogers, E. 2003. *Diffusion of Innovations.* 5th Ed. New York: The Free Press.