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Exploring Audience Segmentation: Investigating Adopter Categories to Diffuse an Innovation to Prevent Famine in Rural Mozambique

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Abstract

Audience segmentation is a useful tool for designing effective campaigns. Further, the efficiency promised in diffusion science rests to some degree on the existence of adopter categories that can be identified and used to strategically disseminate prevention innovations. This study investigates the potential to identify adopter categories in potential recipients ($n = 127$) of an innovation to prevent food shortages in Mozambique. A five-class model was found using latent class analysis, but it showed important differences from existing descriptions of adopter categories. Implications for theory and practice are discussed.

Keywords

Audience segmentation; Adopter categories; Mozambique; Prevention

Rogers (2003), in his theory of the diffusion of innovations (DOI), explains that people fall into categories of adoption that vary from early to late (if ever) adoption of a new innovation. These categories promoted in his theory are called innovators, early adopters, early majority, late majority, and laggards. People in these different adoption categories vary in other attributes, such as their social networks and education (Rogers, 2003). Thus, it is theoretically possible to classify members of a community into these adoption categories and to target an intervention aimed at diffusing a new prevention practice to them. Targeting may be particularly important for the diffusion of prevention innovations, because they are so difficult to diffuse (Rogers, 2002).

The promise of diffusion science is efficiency: “Communicating an innovation to a special small subset of potential adopters so that they, in turn, will influence the vast majority of other potential adopters to attend to, consider, adopt, implement, and maintain the use of worthy innovations” (Dearing, 2008, p. 101). Thus, a critical determinant of the success of strategic dissemination is the ability of change agents (often the role of the prevention scientist; Dearing, 2008) to correctly classify intervention participants into the adopter categories. Audience segmentation, in general, has been argued to be a critical prerequisite to designing effective campaigns (Slater, 1996), but segmentation strategies have often been more useful for theory development than campaign design (Slater, 1996).

Although adopter categories provide a potentially powerful means by which to segment audiences (Valente, 1996), the categories have generally been created after the innovation has been adopted. Laggards, for example, have been identified as those who adopted the innovation later than one standard deviation from the mean (Rogers, 2003). Although characterization after implementation may be useful for investigating differences in those who adopted at different times (Valente, 1996), the ability to identify adopter categories beforehand remains elusive. This type of investigation could be conducted with latent class

analysis (LCA, Collins & Lanza, 2009). LCA is used to fit models in which a population is divided into “mutually exclusive and exhaustive subgroups” (Lanza, Collins, Lemmon, & Schafer, 2007, p. 671). To this end, this study investigates categories of potential adopters of new stress-tolerant, soil-enhancing legumes to prevent food shortages in Mozambique.

Adopter Categories and Diffusion

According to Rogers (2003), diffusion is a “process by which (1) an *innovation* (2) is *communicated* through certain channels (3) *over time* (4) among the members of a *social system*” (p.11, italics in original). Innovations are ideas, practices or objects that are new to the adopter (Rogers, 2003). The newness can be “expressed in terms of knowledge, persuasion, or a decision to adopt” (p. 11). Diffusion occurs as the innovations spread through messages from one person to another in formal and informal networks through mass media or interpersonal channels. Qualities of the innovation can speed its adoption (Rogers, 2003): Those with more relative advantage over others, compatibility with one's lifestyle, less complexity, more trialability, and greater observability are more likely to diffuse. People adopt innovations at different rates as well (Rogers, 2003). For the purposes of effectively communicating completed innovations to target audiences, this paper focuses on segmentation by adopter categories.

Rogers argues that adopters can be categorized into five groups (percent membership in parentheses): innovators (2.5%), early adopters (13.5%), early majority (34%), late majority (34%), and laggards (16%). The five categories are listed in order of adoption: Innovators adopt first and laggards adopt last, if ever. The adopter categories, then, are a latent group that may be proxied by a person's observed adoption behavior. If other indicators could be used to identify these latent, adopter categories, then these profiles could be used to analyze an audience and develop targeted interventions based on their likelihood of adoption. The existing literature suggests that, in addition to timing of adoption, people within these adopter categories are thought to vary in their social networks, education, and risk-taking behaviors.

Innovators are described as educated persons (Ainamo, 2009) who actively seek out innovations and maintain high exposure to mass media and large interpersonal networks that reach outside of the local system (Rogers, 2002, 2003). When compared to innovators, early adopters maintain a more local social system, and they are more integrated in it (Rogers, 2002, 2003). In other words, innovators and early adopters may both have large networks, but innovators may span or bridge different groups while early adopters maintain a more central position within one group.

Opinion leaders are most likely to appear in category of early adopters (Rogers, 2002, 2003). As stated earlier, opinion leaders, or those with social influence within the social system, are critical to encourage diffusion (Dearing, 2008; Rogers, 2002, 2003; Valente & Davis, 1999; Valente & Fosados, 2006). Field studies (Farquahar et al., 1990; Puska et al., 1986) and clinical trials (Lomas et al., 1991) show that if opinion leaders encourage an innovation, then it is more likely to diffuse. According to DOI, these opinion leaders are not likely to be the ones who adopt the innovation first. Instead, the first adopters (i.e., innovators) may serve as sources of information for opinion leaders (Dearing, 2008). Although opinion leaders may be early adopters, the two issues – adoption and influence – should not be confused. As rightly pointed out by an anonymous reviewer, those who adopt early may have no influence on others' behavior.

Persons categorized in the early and late majority have many informal social contacts, and adopt innovations once they feel secure that the local network supports the innovation (Ainamo, 2009; Rogers, 2003). Late majority persons tend to be conservative and skeptical

about making changes as well as lower in socioeconomic status than early majority, early adopters, or innovators (Ainamo, 2009).

Laggards accept an innovation only if they are surrounded by peers who have already adopted it and like it (Rogers, 2003). Essentially, laggards adopt once the innovation is no longer innovative (Ainamo, 2009). Due to their lack of interest in and resistance to change, laggards and late majority persons know less about the effects of the innovations than those in the other categories (Ainamo, 2009). The descriptive profile of laggards can be seen a negative; this may be due to a general tendency toward a pro-innovation bias (Rogers, 2003).

Thus, the existing literature suggests that the following characteristics could be used to identify groups that should discriminate between adopter categories: education, social network size and diversity, mass media exposure, opinion leadership, social needs and concern about adopting new innovations. This claim is tested as a part of formative research focused on the potential diffusion of an innovation aimed at preventing food shortages in Mozambique. This scenario is challenging for several reason: prevention innovations are difficult to diffuse (Rogers, 2002), and prevention requires action at one point in time to avoid something else later (Rogers, 2003). Rewards for adopting a prevention innovation, then, are delayed in time, relatively intangible, and the unwanted consequence may not have occurred anyway (Rogers, 2002). In addition, the target audience has few resources available for adoption and the innovation distributors have limited means by which to diffuse the innovation. The next section describes this scenario in greater detail.

The Legume Innovation

This study focuses on female farmers in rural Mozambique and new stress-tolerant, soil-enhancing legumes that address food security and nutrition challenges. Rural farmers in Mozambique attempt to grow many crops, primarily for home consumption (Bandiera & Rasul, 2006; Donovan & Massingue, 2007). Agricultural efforts are challenged, however, by the poor soil and difficult climate in Mozambique (Mazuze, 1999; St. Clair & Lynch, in press). Rural farmers, on average, report nine months a year in which they have food security (Bandiera & Rasul, 2006). Current droughts in Mozambique have exacerbated the conditions challenging food security in the area (USAID, 2010). Estimates suggest that 460,000 people need food assistance in 2010, up from 281,000 people in 2009 (USAID, 2010). These new legumes have been bred to address these challenges, and grow well in such challenging conditions (Lynch, 2007).

In the short term, the legumes can address current issues of food security and nutrition in the area by providing calories. Further, the legumes provide protein, which is in low supply in the farmers' current diet (Donovan & Massingue, 2007). Further, in the long term, legumes help to fix nutrients into the soil, so that other crops may be introduced (Shiferaw, Kebede, & You, 2008). One measure to prevent famine and nutrition deficits, then, is the distribution of drought-resistant seed (USAID, 2010). Unfortunately, in many sub-Saharan countries, access to improved seed is limited (Sperling & Loevinsohn, 1993), which limits widespread adoption (e.g., Tripp, 2000). An intentional diffusion intervention may be needed to diffuse the new legumes. Thus, investigating the potential to classify respondents into adopter categories is an important first step in designing such an intervention. Latent class analysis (LCA, Collins & Lanza, 2010) is a statistical model that may prove useful to this end, because it is used to identify underlying latent classes, or subgroups of individuals with shared characteristics.

Latent Class Analysis

LCA can be used to empirically test whether people fall into “mutually exclusive and exhaustive subgroups” (Lanza, Collins, Lemmon, & Schafer, 2007, p. 671) of adopters, and whether those subgroups correspond to those outlined in the DOI framework (Rogers, 2002). LCA, conceptually, is similar to other latent variable models, such as factor models in that it attempts to capture latent constructs from measurable variables. LCA is used when the latent construct is categorical (Collins & Lanza, 2010), such as the adopter categories. The procedure provides two kinds of parameters: (a) the likelihood of membership in a latent class (often presented as frequencies), and (b) the likelihood of a providing a particular answer or response to a measured variable conditional on the set of classes. For example, based on DOI, fewer people are expected to be members of the innovator category, and those in this category should be very likely to maintain a high exposure to mass media sources. LCA also provides goodness-of-fit indicators for models; these estimates are used to select the best number of classes (e.g., a four-class or five-class model). This leads us to our first research question:

Research Question 1: Is there a latent class structure that adequately represents the heterogeneity in adopter categories among rural women in Mozambique?

LCA also allows one to test whether particular beliefs, actions, or demographics predict the odds of membership in one class relative to another (i.e. reference class). One way, then, to test the validity of the adopter categories produced by the latent class analysis is to determine if current adoption and avoidance of legumes predicts membership in the adopter categories. If previous adoption and avoidance does not predict membership in the groups constructed by the analysis, then further study of the characteristics that predict adoption behavior is needed. Previous studies show that people who accessed new and different seeds before, through interpersonal means and retained it from the previous season, are more likely to adopt improved seeds (Shiferaw et al., 2008). Conversely, if a laggards-class exists, then people categorized into this class should be growing fewer legumes currently and actively avoiding their adoption. This leads us to our second research question:

Research Question 2: Does their previous adoption behavior - reported adoption and avoidance of legumes - predict membership in adopter classes?

Methods

Participants and Procedures

Participants were recruited from households ($N = 127$) in five rural villages in Mozambique (Lione, $n = 29$, Lucucho, $n = 18$, Nhamane, $n = 24$, Ntapo, $n = 35$, and Somba, $n = 21$). Households were randomly selected from geographic maps of each village (2 km^2), using individual dwellings as the indicators of households; 50% or more of the available households were sampled. Costenbader & Valente (2003) showed network centrality estimates created from samples at this rate (50% or more sampled, randomly) and higher provide very close approximations (90% or higher for degree centrality) to the full dataset. Interviewers were fluent in Portuguese and local languages to help respondents with the survey (91% of respondents had limited use of Portuguese). All interviewers received training before and during the data collection. The data were checked by a supervisor each night. Legumes, and particularly beans, were a major focus of the interviews.

Interviewers (one male and one female) approached each household and asked to talk to the male and female head of the household. Each interviewer took the interviewee of the same gender to a private place and obtained consent from the respondents before starting the

survey. In a number of households (16%), only women were available for the interview, thus only the responses from the female members are included in this study in order to avoid over-representing households with two members. Interviewers talked respondents through the survey, to gain information from those with low reading abilities. The female respondents were 39 years of age ($M = 39.85$, $minimum = 18$, $maximum = 76$). On average, they had lived in the area for 25 years ($M = 25.41$, $minimum = 1$ year, $maximum = 76$).

Instrumentation

Local sharing-network centralit—Respondents were asked to identify each household with whom they shared or traded seeds on the map of their village. On the map, each individual dwelling was numbered; respondents identified the number representing the location(s) of their sharing families. Respondents could identify an unlimited number of households. Degree centrality was used, which defines centrality in terms of the number of direct connections to others in the network (Wasserman & Faust, 1994). Respondents with zero (24%) connections were coded as low-degree centrality, and those with one (53%), two (16%), three (6%), or four (1%) to four connections were coded as high-degree centrality.

Group memberships—Respondents were asked to name all of the groups in which they participate. Respondents who did participate in social groups were coded separately from those who did not. (1 = *no*, 2 = *yes*, *one or more social groups*).

Sources for improved seed—Respondents were asked if they ever received improved seed varieties from friends outside of the village or extension workers (1 = *no*, 2 = *yes*). Answers were treated as separate items.

Radio announcements—Respondents were asked if they ever heard radio announcements on how to get new seeds (1 = *no*, 2 = *yes*).

Participation in seed trials—Respondents were asked if they ever participated in a seed trial, seed demonstration, field day, or other such event to help farmers (1 = *no*, 2 = *yes*).

Social security—Respondents were asked if they would need to see others growing the new seed before they would try it (1 = *no*, 2 = *yes*).

Market security—Respondents were asked if they would consider growing beans if they were guaranteed a buyer (1 = *no*, 2 = *yes*).

Identified opinion leader—Respondents were asked to show on the map the location of the person who would make the biggest impact on them, if this person were to start using a new variety of beans. The households identified in this manner were coded as opinion leaders.

Education—Respondents reported their ability to read and write (1 = *no*, 2 = *yes*).

Growing and avoiding beans—Respondents were asked if they grew beans. If they did, they were asked what kinds of beans they grew in the past few years; they could name up to four beans. They were also asked if there were any beans that they did not grow. If yes, they were asked to list up to three beans. The two answers were not correlated, $r(127) = .07$, *ns*, and were analyzed separately. The two answers to growing beans (ranging from 0 to 4) and avoiding beans (ranging from 0 to 3) were standardized as suggested by Lanza et al. (2007). Transforming these continuous covariates into z scores allows the LCA procedure to generate standardized logistic regression coefficients, which facilitate their interpretation.

Results

Adopter Classes

To address Research Question 1, the indicators of the latent classes using PROC LCA (see Lanza et al., 2007) appear in Table 1. Two to seven model classes were tested using 100 sets of random starting values for each test. The fit indices for these models appear in Table 2. Lanza and Collins (2010) suggest that a general rule of thumb is that ‘good’ models should have a goodness-of-fit statistic (G^2 value) less than the degrees of freedom. All the models fit these criteria, suggesting that there are underlying classes of adopter categories. To select the best model, AIC and BIC estimates are used such that lower scores are better (Lanza & Collins, 2010). The five-class model best fits the data, $G^2 = 195.18$, $df = 969$, $AIC = 303.18$, $BIC = 426.76$, Entropy $R^2 = 0.85$.

Before interpreting the five-class model, we tested whether the measurement was invariant across villages. The model was run with all item responses estimated freely and again with item responses constrained across villages. The G^2 statistic for the freely-estimated model was 179.64 ($df = 4849$) and 381.69 ($df = 5049$) for the constrained one. The likelihood-ratio difference statistic is 202.05 ($df = 200$), which is not statistically significant. The finding suggests that the measurement model holds across villages.

Five-class model

To further explore Research Question 1, we looked at the probabilities for response category 2 in five-class model. Table 3 presents the two parameters generated by LCA: the likelihood of membership into a class, and the likelihood of reporting a given answer within the class. As seen in previous DOI research, there are two large classes that are likely to classify 77% of the population, similar to early and late majority in DOI, and the other three classes are much smaller (15%, 6%, and 2%), similar to innovators, early adopters, and laggards. The second step is to compare the probably answer for likely members of a given class. Although the five classes show distinguishing characteristics, they differed from those described in the literature. New labels were created, as necessary, for the different classes.

Respondents in the largest group (50%) were likely to be central within the local network of those who share seeds with each other, thus they were labeled as *local majority*. They also needed a guaranteed buyer in order to consider growing beans. The second largest group (27%), labeled as *social majority*, reported memberships in multiple local social groups. Respondents in the *early adopters* class (15%) were likely to be central to the local seed-sharing network, had multiple memberships in the local social groups, to have heard radio announcements on how to get new seeds, and to be identified by other respondents as opinion leaders who would influence their decision to use new seeds. Respondents in the *laggards* class (6%) reported memberships in local social groups. In addition, they needed to see others grow new seed successfully before they would try it. The fifth smallest class, labeled as *externally connected* (2%), held central positions in the local seed-sharing network. They reported getting improved seeds from friends outside the village and extension workers. They also reported hearing radio announcements on how to get new seeds. Members of the *externally connected* class also wanted a guaranteed buyer in order to consider growing beans and they needed to see others growing better seed successfully before they would grow it.

Covariate Analysis

To answer Research Question 2, two covariates were investigated: current adoption and avoidance of different beans. The local majority was specified as the reference class. Both current bean use ($p < .01$) and avoidance ($p < .02$) predicted latent class membership.

Relative to the *local majority*, respondents who reported growing a greater variety of beans currently were less likely to be *early adopters* ($OR = 0.50$) or *laggards* ($OR = 0.27$), but more likely to be *externally connected* ($OR = 3.31$) or in the *social majority* ($OR = 1.61$). Relative to the local majority, respondents who reported avoiding a greater variety of beans were less likely to be in the *social majority* ($OR = 0.50$), *early adopters* ($OR = 0.96$), or *externally connected* ($OR = 0.97$), but more likely to be *laggards* ($OR = 1.66$).

Discussion

Adopter categories may provide a powerful means by which to segment audiences for interventions aimed at diffusing innovations. This study investigated the existence of classes of adopters, and how well these classes represented the adopter categories described in the existing DOI literature. In addition, it tested whether current adoption or avoidance of legumes correlated with membership in particular adopter classes.

The results showed that a five-class model described the data best. This finding supports the growing consensus that health audiences often are not homogenous, but they can be refined into segments that are (Rodgers, Chen, Duffy, & Fleming, 2007). This five-class model, however, did not clearly represent the descriptions of innovators, early adopters, early majority, late majority, and laggards. First, respondents in all of the classes had some probability of wanting security – social and market – before adopting the innovation. Respondents needed to see others growing the new seed successfully and wanted a guaranteed buyer before they would grow it. These findings suggest that persons fitting the existing description of innovators (Ainamo, 2009; Rogers, 2003) may be difficult to find in rural, economically challenged areas in developing countries. It would be interesting to see if these results replicate across different countries depending on their various stages of development: social and market. It is also possible that observability and trialability may be even more preferred qualities in innovations. Innovations whose actions can be easily seen and discussed with others, as well as tried before adoption, may be attractive to those with heightened attention to risk and uncertainty.

Second, the adopter classes all had social connections, but they differed in their portfolio of internal and external social connections. In terms of the internal connections, *participants*, the *well-connected*, and to some degree the *local majority* held central positions in the local seed-sharing network. In contrast, the *social majority*, *laggards*, and to some degree *participants* were members of local groups in the community. In terms of external connections, the *well-connected* received seed from friends outside the village and extension workers. In contrast, *participants* reported taking part in seed trials, demonstrations, or field days to help farmers. Both *participants* and the *well-connected* heard about seed opportunities via the radio. These findings suggest that adopter classes may vary in their type of internal or external network, and different communication channels are needed to reach them.

In addition, these findings may explain why it is difficult to identify opinion leaders from single measurements of sociometric centrality or nominations from the community (Valente & Davis, 1999). Both methods have been used to identify opinion leaders and to generate groups for interventions (Valente & Fosados, 2006). Valente (2010) points out that using leader nominations and structural centrality in the social networks can generate different intervention designs. It may also affect intervention decisions (Valente & Davis, 1999), and yet few studies have investigated “how the social or communication structure affects the diffusion and adoption of innovations” (Rogers, 2003, p. 25). The findings in this study suggest that both methodologies together may best identify opinion leaders who may facilitate the diffusion of prevention innovations.

The laggard class showed the most similarity to the existing description in the DOI literature. Laggards were involved in the local community as members of local groups, and they needed to be secure about the innovation before they would try it. In addition, the covariate analysis also supported this finding. Relative to the *local majority*, respondents who reported growing fewer and avoiding more bean varieties currently were more likely to be *laggards*. This class showed the most similarities to its DOI description.

Implications for Diffusing Prevention Innovations

These findings provide insight into why diffusion may be so challenging. Rogers (2002) suggested that one strategy to diffuse prevention innovations is to have champions, people who devote their interpersonal influence to encourage adoption, to promote it. Existing opinion leaders, because of their influence, are sought as champions, which may be why identifying the opinion leaders is arguably the most critical factor in successful diffusion (Dearing, 2008). (As pointed out by an anonymous reviewer, targeting opinion leaders or early adopters may not be cost-effective, because they may be prone toward adoption. Efforts may be better aimed at more resistant individuals.) Although identification is no doubt challenging, in the Mozambican communities studied here, the larger challenge may be to persuade the opinion leaders to promote the innovation. *Participants* were the class most associated with opinion leaders. They were also the most likely to report taking part in a seed demonstration, trial, or field day. Thus, these opinion leaders had opportunities to learn and try out new beans; yet, they, like laggards, were not as likely as the local majority to be currently growing a large variety of beans. In contrast, the well-connected, who received beans from extension workers, reported growing a greater variety of beans.

The question is whether the new beans gathered via field days or extension workers are effectively diffusing into the greater seed system in the community. Sperling and Loevinsohn (1993) found that 55% of rural farmers in Rwanda growing a new seed variety for at least three seasons had not shared their seeds. Of those who did share their seeds, this sharing was limited to one or two other farmers. Investigating which types of seed, new varieties or existing ones, diffuse through seed-distribution options – trials, extension, or networks – is a worthwhile activity for future research.

Of note, one characteristic – education-- did not differ between classes. Innovators, in particular, are described in the literature as educated persons (Ainamo, 2009). However, innovators in our study were not educated. None of the classes had large, diverse networks, mass media exposure, education, *and* risk-taking tendencies. When an innovator class does not exist, it is possible that outside agents of change serve in this capacity. If opinion leaders look to innovators as sources of information, it may be beneficial for change agents, which may be extension workers or coordinators of seed trials, to identify and promote their innovations. However, this suggestion may exacerbate an existing problem. Innovations may widen socioeconomic gaps through benefits captured by local elites (Brosius, Tsing, & Zerner 1998; Ravnborg & Ashby, 1996).

A second strategy put forward by Rogers (2002) is to encourage the adoption by encouraging peer networks to discuss the prevention innovation. Based on the finding from this study, campaign designers may need to generate different messages to inspire discussions among economic associates, friends, and community group participants (Sperling & Loevinsohn, 1993). That said, it may be logistically challenging to reach these different segments of the rural population, which may make mass media outlets, such as radios, appealing. It is important, then, to include media usage in segmentation analyses (Rodgers et al., 2007). Radio shows have been used successfully to educate about innovations in entertaining formats (Rogers, 2002, Singhal & Rogers, 2002). Entertainment education is noted for spurring conversations in interpersonal networks (Singhal & Rogers,

2002). The findings in this study suggest, however, that only two classes—*participants* and *well-connected*—were likely to hear about opportunities via the radio. These two adopter classes reported internal and external mechanisms by which to receive new seeds, which may have already existed or been improved by their exposure to the radio programs. Radio, then, may not be the best mechanism to reach across adopter classes, but few other channels, such as posters, pamphlets, or television programs, are available in this and other rural communities in Mozambique (Bandiera & Rasul, 2006).

Others have tried to diffuse agricultural innovations into rural Mozambique. In fact, recent efforts to diffuse sunflower seeds into the Zambezia area attempted to use DOI ideas: They identified opinion leaders and provided them with seed, with the hope that the seeds would diffuse throughout the villages. The project had limited success, in part, because non-adopting farmers reported a lack of access to information about the project, even though the project was available to all farmers through the extension workers and demonstration plots (Bandiera & Rasul, 2006). The findings in this study suggest that relying on extension workers and demonstration plots to promote innovations to all adopter classes may not work in rural Mozambique.

Limitations

This information was gathered at the start of the rainy season. Prevention behaviors are salient at this time (e.g., Panter-Brick et al., 2006), and this salience could have biased respondents' reports. Second, although women may have their own inclinations to adopt innovations, women's decisions to adopt new crops ultimately may be influenced by their spouses. The consistency and interdependence of spousal decisions, and their effects on adoption, should be pursued in future research. Third, as with other segmentation strategies, the utility of designing health messages for audiences segmented into adopter categories should be tested (Silk, Weiner, & Parrott, 2005). Fourth, the measures in this study were modified to meet the literacy demands of this audience. Although sensitive to the audience, more complex measures may allow further insights into the latent, adopter categories.

Conclusion

The efficiency promised in diffusion science rests to some degree on the existence of adopter categories that can be identified and used to strategically disseminate prevention innovations. Latent class analysis provided a useful method by which to segment an audience of potential adopters, and to identify personal characteristics correlating with membership in the different classes. This study showed how these methods and DOI may be used to understand the challenges in diffusing prevention innovations in the communities that need them, such as rural Mozambique. By continuing to investigate theoretical adopter categories as a part of formative research, designers may anticipate potential opportunities and roadblocks to diffusion, and diffusion science can further evolve toward its promise of efficiency and efficacy.

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Table 1
Descriptive Statistics of Adopter Category Indicators (n = 127)

Indicators of latent class	Code	Label	Percentage
Local sharing-network	1	Low degree centrality	24
	2	High degree centrality	76
Group Memberships	1	Zero	47
	2	One or more	53
Seed Source: Outside Village	1	No	88
	2	Yes	12
Seed Source: Extension Workers	1	No	90
	2	Yes	10
Heard Radio Announcements	1	No	65
	2	Yes	35
Participation in seed trials	1	No	86
	2	Yes	14
Need Social Security	1	No	40
	2	Yes	60
Need Market Security	1	No	21
	2	Yes	79
Identified as a Bean Opinion Leader	1	No	71
	2	Yes	29
Education	1	Unable to read or write	76
	2	Able to read and write	24

Table 2

Comparison of Latent Class Models

Number of classes	G ²	df	AIC	BIC	Entropy R ²
2	264.07	1002	316.07	465.80	0.73
3	236.24	991	310.24	491.26	0.82
4	219.96	980	308.96	428.26	0.78
5	195.18	969	303.18	426.76	0.85
6	190.87	958	320.87	505.74	0.89
7	180.51	947	332.51	548.67	0.86

Note. Boldface type indicates the selected model. df = degrees of freedom; AIC = Akaike's Information Criterion; BIC = Bayesian Information Criterion.

Table 3
Item-Response Probabilities for Five-Class Model Given Latent Class Membership

	Local Majority (50%)	Social Majority (27%)	Participants (15%)	Laggards (6%)	Well-Connected (2%)
Local Sharing-network Centrality	0.84	0.62	1.00	0.16	1.00
Group Memberships	0.13	1.00	0.81	1.00	0.00
Seed from Outside Village	0.11	0.00	0.00	0.72	1.00
Seed from Extension Workers	0.00	0.00	0.47	0.24	1.00
Radio Announcements	0.15	0.46	0.91	0.00	1.00
Participate in Seed Trials	0.00	0.21	0.55	0.00	0.00
Need Social Security	0.62	0.42	0.64	1.00	1.00
Need Market Security	0.91	0.68	0.67	0.53	1.00
Education	0.16	0.23	0.61	0.00	0.00
Identified Opinion Leader	0.12	0.38	0.73	0.29	0.00
Prevalence	50%	27%	15%	6%	2%