An Applied Investigation of Rogers and Shoemaker's Perceived Innovation Attribute Typology When Marketing to Elderly Consumers

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Abstract

Rogers and Shoemaker's typology of innovation, which has long represented the bench mark for research on the relationship of perceived innovation characteristics to the diffusion process, may not be appropriate for most marketing innovations according to the theoretical and empirical evidence developed in this research. The appropriateness of the innovation typology was investigated across innovations classified on a continuous-discontinuous continuum. The results suggest their model is appropriate for discontinuous innovations, but that respondents evaluated the continuous innovation along dissimilar dimensions, which were also smaller in number. The results argued for marketing appeals based on the determinant perceptual dimensions of innovations. For discontinuous innovations, marketing efforts should primarily focus on addressing the relative advantage and observability of the innovation. Organizations marketing continuous innovations should focus on the economic and performance advantages and ease of use associated with the product.

Introduction

The bulk of research conducted on the diffusion of innovations in the consumer domain has been concerned with identification of differences between adopter groups with relatively little being conducted with respect to differences in characteristics between innovations (Gatignon and Robertson 1985; Mahajan, Muller and Bass 1990; Aaltman and Stoff 1973). Barnett (1953, p. 313) was one of the first to propose that "the character of the new idea itself is an important determinant of the nature of the reception to the idea." Rogers and Shoemaker (1971) developed a typology of those characteristics used in evaluation of an innovation. It has since been suggested that the characteristics of an innovation affect the speed and likelihood of its diffusion through a social system and, consequently, represent an important area of study (Arnould 1989; Gatignon and Robertson 1985; Rogers 1983). However, only limited research has empirically considered the role of innovation characteristics within the marketing literature (Dickerson and Gentry 1983; Goslar 1987; LaBay and Kinnear 1983; Ostlund 1972; 1974). This research will investigate the appropriateness of Rogers and Shoemaker's typology of innovation characteristics across innovations differing on the extent that they are "new" (Robertson 1967) and then investigate the predictive strength of those characteristics in the adoption decision.

Literature Review

Innovation Classifications

The initial classification of innovations was made by Robertson (1971) who delineated three classes of innovations based on their effects on established consumption patterns. A continuous innovation causes little disruption in behavior and involves the introduction of a modified product. A dynamically continuous product causes some disruption in behavior patterns, but does not change them substantially: it may involve creation of a new product or modification of an existing one. A discontinuous innovation is a new product whose consumption requires the establishment of new behavior

patterns. No research has concurrently investigated, across the range of innovation classifications, the influence of innovation characteristics on the diffusion processes (Gatignon and Robertson 1985).

Perceived Characteristics of Innovations

The first effort investigating the relationship between characteristics of innovations and the diffusion process was conducted by Wilkening (1952), who identified characteristics affecting diffusion by mapping the differential rates and patterns of acceptance of agricultural innovations. Barnett (1953) suggested material innovations would have a higher rate of adoption than would more abstract innovations as they are more easily communicated, their utility is more easily demonstrated and they are perceived to have fewer effects on personal or social life. Menzel (1960) ranked medical innovations on the basis of their communicability, risk and persuasiveness, with the findings supporting a hypothesis that innovations possessing those characteristics would be among the earliest adopted. The issue was next broadened to include educational innovations in a study addressing economic characteristics (Mort and Cornell 1961). Most subsequent research on innovation characteristics was conducted in rural sociology (Feder and O'Mara 1982; Fliegal and Kivlin 1966) or organizational behavior (Zaltman 1973).

Summarizing previous research, Rogers and Shoemaker (1971) constructed a typology depicting the characteristics by which a potential adopter evaluates an innovation:

Relative advantage - The degree to which the innovation is perceived to be superior to that which it replaces.

Compatibility - The degree to which the innovation is perceived to be consistent with the innovator's existing values, past experiences and needs.

Complexity - The degree to which the innovation appears difficult to understand and use.

Divisibility (trialibility) - The degree to which one can experiment on a limited basis with the innovation.

Communicability (observability) - The degree to which the results of using the innovation are visible to others.

It has since been asserted that most perceptual attributes of innovations can be subsumed under these five characteristics and that these perceptions determine the likelihood the innovation will be accepted (Rogers 1983). Each characteristic is described as being "somewhat empirically interrelated with the other four, while remaining conceptually distinct" (Rogers 1983). This collection of innovation attributes has since achieved widespread acceptance in research on the characteristics of innovations (Gatignon and Robertson 1985).

Rogers and Shoemaker's typology was developed with respect to discontinuous innovations and most research on the role of innovation characteristics subsequently conducted by Rogers and his colleagues investigated the diffusion of discontinuous innovations. However, the majority of innovations fall into one of the other two categories (Dickerson and Gentry 1983). That fact, coupled with the generally inconsistent results of consumer researcher's attempts to relate the characteristics of innovations to their diffusion patterns (Lancaster and Taylor 1986; Zaltman and Lin 1971), suggests Rogers and Shoemaker's typology may not be equally appropriate across innovations of a less radical nature.

Innovations and Involvement

The adoption of an innovation represents a process rather than an instantaneous event (Gilly and Zeithaml 1985). The "hierarchy of effects" model (Lavidge and Steiner 1961) may provide the appropriate representation of this adoption decision process under conditions eliciting high cognitive processing. Diffusion researchers have been generally content to rely on the learning-oriented hierarchy of effects model, ignoring low involvement adoption models such as those posited by Krugman (1965), Ray (1973), Robertson (1976), and Gatignon and Robertson (1985). Accordingly, research investigating relationships between the Rogers and Shoemaker set of innovation characteristics and the diffusion process has tacitly assumed a high involvement decision process.

Just as innovations are amenable to classification along a continuous-discontinuous continuum, they may also be arrayed relative to consumer involvement (Clark and Belk 1979; Bloch 1982). In the decision process involved with adopting or not adopting an innovation, the following circumstances are believed to induce high (versus low) involvement cognitive processing: (1) high consumer learning requirements, (2) high innovation or switching costs, (3) high social relevance, and (4) a multiperson adoption process within the decision making unit (Krugman 1965; Ray 1973; Robertson 1976).

Discontinuous innovations, whose adoption involves the establishment of new patterns of consumptive behavior, should typically invoke higher consumer learning requirements and innovation (switching) costs as well as a higher likelihood of a multiperson adoption unit. Therefore, as compared to continuous innovations, they should engender higher levels of involvement. By definition, the adoption of continuous innovations does not involve development of new patterns of consumption. Therefore their associated learning requirements and switching costs are lower or non-existent. It follows

that the adoption decision for continuous innovations should initiate lower levels of involvement.

While Rogers and Shoemaker's conceptualization is a useful schematic, it appears grounded in an assumption of high involvement processing. Its suitability may vary with the level of cognitive processing for the particular adoption decision. It is possible that some other typology of innovation characteristics may be appropriate under adoption conditions eliciting lower levels of involvement. For example, Krugman (1965) suggested that, dependent on their level of involvement, consumers differ in the extensiveness of their purchase decision processes as indicated by the number of characteristics they use to compare and evaluate brands.

Involvement has a number of consequences on the consumer's communication and adoption behavior. The level of information search is a function of involvement (Bloch, Sherrell and Ridgway 1986) with high involvement adoption decisions engendering more extensive information search and processing than low involvement decisions (Laurent and Kapferer 1985; Petty, Cacloppo and Schuman 1983; Zaichkowski 1986).

Dependent on their level of involvement, individuals may differ in the configuration of their adoption decision process as well as the passive or active nature of their search for information. More highly involved consumers should be motivated to seek greater comprehension of innovation related information. Rogers' (1983) model suggests highly involved consumers arrive at a "trial" decision later in the adoption process while low involvement models suggest consumers arrive at a "trial" decision earlier in the adoption process (Robertson 1976). Under the latter adoption circumstance, individuals should evaluate fewer characteristics.

Research Objectives

It is proposed that Rogers and Shoemaker's conceptualization represents the appropriate set of characteristics on which consumers evaluate *discontinuous* innovations. However, it is further proposed that their conceptualization is inappropriate for innovations which evoke low involvement processing (*continuous* innovations). Under such diffusion circumstances, consumers should evaluate innovations on a set of characteristics fewer in number and compositionally divergent from Rogers and Shoemaker's typology.

Research is needed which relates innovation characteristics to innovation types classified on the basis of the radical nature of the innovation (Arnould 1989; Gatignon and Robertson 1985). This procedure would involve delineation of a set of innovation characteristics and the types of innovations for which they are appropriate. This categorization should prove useful since diffusion research is frequently looked to for guidance on the dissemination of new technologies, products, services and regulatory initiatives. In addition, the specific research outcomes may prove useful in the design and promotion of certain categories of innovations. Further, the research would provide an initial basis for the development of a standard classification scheme for innovations and a stronger basis upon which to compare and generalize the results of particular studies.

The first objective of this research is to verify empirically, across innovations classified on the basis of their radical nature as continuous or discontinuous, the appropriateness of Rogers and Shoemaker's typology of innovation characteristics. This objective involves testing, across discontinuous and continuous innovations, the factor structures derived from Rogers and Shoemaker's set of hypothetical dimensions. That analysis will facilitate the determination of the relative predictive strengths of innovation characteristics for the adoption of innovations categorized as continuous and discontinuous, as suggested by Zaltman and Lin (1971) and Lancaster and Taylor (1986). This represents the second objective of the research.

Methodology

Sample Characteristics

The data was gathered via a self-administered questionnaire mailed to a disproportionate stratified random sample of 1000 elderly and nearelderly persons distributed over the entire nation. The sample frame encompassed a range of age groups in the following proportions: 50-54 (8%), 55-59 (8%), 60-64 (8%), 65-69 (20%), 70-75 (26%) and over 75 (30%). The sample was also specified with respect to household income ($15,000 and above) and residence status (living independently). The sample was selected from Market Facts, Inc. Consumer Mail Panel.

Elderly have seldom been investigated in diffusion research. However, use of this sample frame is appropriate when the innovations under study are primarily targeted toward and consumed by the elderly, while still applicable for consumption by nonelderly. The growing magnitude and importance of the elderly segment within the U.S. marketplace, particularly those over the age of 70, is well documented (Robertson 1967).

Of those contacted, 831 or 83.1% responded. After editing incomplete instruments, 794 questionnaires were suitable for analysis. Among other behaviors, respondents were asked whether they had adopted each of the innovations studied and, if they had not adopted, about their relative level of knowledge (familiarity) of each innovation. Those with no knowledge of an innovation would not have made the decision to *not* adopt. This

requirement eliminates those who have "not adopted" simply because they have no knowledge of the innovation. In addition, when confronted with inquiry about the attributes of innovations, uninformed individuals can not be expected to reliably answer questions (Wilton and Pessemier 1981). But the ability to discriminate attributes grows as knowledge grows (Pessemier 1978). Based on adoption and knowledge of the innovations, two following groups were defined with respect to each innovation: those who have adopted the innovation; or those who have not adopted the innovation, but who nevertheless possess knowledge about the innovation with the concomitant opportunity to adopt.

The demographic characteristics of those responding are not directly comparable with national data taken from the 1991 *Statistical Abstracts of the United States* because of the sample specifications. Correspondingly, when compared to the national racial composition of those 65 and over, those responding were more predominately white (96.9%). The educational (74.9% completed at least 4 years of high school) and income levels, as specified, were substantially higher for this sample than the national average of those 65 and over.

Classification of Innovations

The first step in selecting the innovations studied involved the identification, through examining the geriatric and health care literature, of a set of innovations primarily targeted toward the elderly. Eighteen innovations were compiled in this fashion. Five experts in the marketing and health care domains were then asked to place each innovation into what they deemed as the proper cell of a continuous - discontinuous classification matrix. One innovation was selected for each cell, subject to two constraints: consensus among the experts, while being an innovation that each member of the sample would realistically have had the need/opportunity to adopt.

The experts selected generic drugs and self-diagnosis devices, both from the health care area, to represent the continuous and discontinuous innovations, respectively. Generic drugs were described as: "Non-branded medications bought in a pharmacy." They were classified as continuous because they represent simple alterations of a previously existing product, while their adoption is not disruptive on established medication consumption patterns. Self-diagnosis devices were specified as: "Blood pressure and sugar monitors, calipers, cholesterol monitors and glucometers, whose use is initiated by the individual." They were classified as discontinuous because they are a new product, not directly superseding anything previously available to the consumer, while their adoption involves the development of new patterns of consumption, (i.e., no longer using health care practitioners).

A verification check was employed to determine whether respondent evaluations of the continuous-discontinuous nature of these innovations were congruent with the expert's designation. Two dimensions -- the innovation's actual or perceived affect on one's daily routine *and* on the use of related products -- were employed to address the level of disruption associated with each innovation. A t-test analysis revealed the presence of a significant difference ($p=.000$) between the innovations regarding the level of disruption thought to be associated with their adoption. Self-diagnosis devices were perceived as the more disruptive innovation, supporting the validity of the classification procedure.

Construct Measurements

Eleven items, which measured each dimension that comprised Rogers and Shoemaker's set of innovation characteristics, were included in the research instrument. The items have also been used for similar purposes in other research of a related nature (LaBay and Kinnear 1983; Ostlund 1974; Rugers 1983). These items, with their attendant dimensions, are given in Table 1.

Respondents were asked to evaluate their perception of the degree to which each dimension was associated with that innovation. A four-point scale ranging from (1) "Not at all" to (4) "Very much so" was used. Respondents were asked to provide their perceptions of generic drugs, in general, and self-diagnosis devices, in general. The broad definitions of generic drugs and self-diagnosis devices, respectively, that are described in detail during the "classification of innovations" discussion, was again provided for the respondent's consideration. No single generic drug, or self-diagnosis device product was evaluated by the elderly consumers.

Adoption of the innovations was measured by asking the respondents whether they "now used the product." Respondent knowledge of each innovation was measured on a five-point scale ranging from (1) "A lot less than others" to (5) "A lot more than others." Only the respondents who had adopted, or, if not adopted, possessed greater than average knowledge of the innovations were used in the subsequent analysis. This scale, and the method of classifying the respondents, reflect the approaches used in prior diffusion studies (LaBay and Kinnear 1983). The procedure resulted in a final sample size of 647 for the analysis associated with generic drugs (399 adopters and 258 knowledgeable nonadopters) and 485 consumers (160 adopters and 325 knowledgeable nonadopters) for self-diagnosis devices.

Analysis Techniques

The development of confirmatory factor analyses (CFA) for covariance structures (Joreskog 1969; 1970)

Table 1
Rogers and Shoemaker's Typology of Innovation Characteristics

CHARACTERISTIC - Dimension - **Item**
RELATIVE ADVANTAGE
Degree to which an innovation is perceived superior to that which it supersedes (economic considerations)
This product saves money over products it replaces
Degree to which an innovation is perceived superior to that which it supersedes (noneconomic considerations)
This product is generally superior to products which came before it
COMPATIBILITY
Degree to which innovation is perceived as consistent with existing values of the potential adopter
Would not affect how I feel about the world to use this product
Degree to which innovation is perceived as consistent with existing habits of the potential adopter
Using this product does not require changes in my behavior
Degree to which innovation is perceived as consistent with past experiences of the potential adopter
Using this product does not differ from what I used in the past
COMPLEXITY
Degree to which innovation is perceived as difficult to understand
It is difficult to understand how this product works
Degree to which innovation is perceived as hard to use
It is difficult to use this product
TRIALIBILITY
Degree to which innovation is perceived as available for trial on a limited basis, without large commitment
It is easy to try out this product without a big commitment
Ease with which adopter can return to preadoption state
It would be hard to return to how things were once I use this product
OBSERVABILITY
Degree to which results of use will be apparent
The advantages/disadvantages would be readily apparent if I used this product
Degree to which the results of using innovation will be possible to communicate to others
It is easy to communicate the results of using this product

has provided an appropriate method for assessing and revising theories. CFA allows introduction of specific hypotheses about the factor structure under question. The likelihood that such hypotheses will be supported is quite small if some factorial causation is not present (Long 1983).

To test the first objective, CFA was used to evaluate the appropriateness of Rogers and Shoemaker's five characteristic conceptualization of the dimensionality of innovations. Separate analyses were carried out for each innovation permitting appraisal of the generalizability of Rogers and Shoemaker's theory across discontinuous *and* continuous innovations.

LISREL VI (Joreskog and Sorbom 1986) was used to obtain maximum likelihood estimates for the hypothesized models. This procedure also provides a chi-square statistic and other goodness of fit measures of the overall adequacy of the models. The same model was specified for each innovation. In each instance, the 11 items were specified so as to correspond to the set of 5 innovation dimensions embodied in Rogers and Shoemaker's typology.

Where the Rogers and Shoemaker's set of innovation dimensions was not found to adequately fit the data for either or both of the innovations, an exploratory factor analysis procedure was conducted to reveal actual relationships among the variables. Through principal components analysis the latent structure is identified. The purpose of this incremental analysis was to summarize the patterns of intercorrelations existing among the variables where the CFA procedure suggested the true specification is contrary to that posited by Rogers and Shoemaker. The results of the principal components analysis, representing a modification of Rogers and Shoemaker's *a priori* theory, were then reintroduced to the CFA procedure. It is appropriate to use exploratory factor analysis to suggest viable structures and then to test these structures with CFA (Marsh and Richards 1987).

Multivariate Analysis Of Covariance (MANCOVA) and discriminant analysis were used to investigate the predictive strength of the derived innovation characteristic sets in the adoptive process. Darden and Perreault (1975) demonstrated the facility of using discriminant analysis in conjunction with MANCOVA to ascertain the direction and intensity of the relationships. While MANCOVA tests for significant departure from the null hypothesis of no group differences, discriminant analysis determines the weights of the combination of criterion variables that optimize the departure from the null. Examining the contribution of each criterion variable to the discriminant function facilitates evaluation of the differences between groups. The covariates were introduced into the model in order to remove any influence that demographic differences (sex, age and income) among the sample members themselves may have on the results and increase the precision of the test of the null hypothesis. The procedure provides greater assurance that variation among the consumers does not influence the results.

Summated scales based on the sets of innovation attribute items identified in the confirmatory factor analysis were used as the criterion variables in this portion of the analysis.

Results

Innovation Characteristics Typology: Discontinuous and Continuous Innovations

The first research objective involved empirically investigating the appropriateness of Rogers and Shoemaker's conceptualization of the dimensionality of the attributes of innovations across discontinuous and continuous innovations.

Discontinuous Innovation (Self-Diagnosis Devices). A reduced correlation matrix, using squared multiple correlations as communality estimates, was obtained for the 11 items associated with the dimensions of the five characteristics. This matrix was then submitted to a five factor confirmatory analysis to test the null hypothesis that "the five factor model fits the data." LISREL VI provides a number of goodness-of-fit measures, among them a chi-square test. However, the chi-square statistic, partially a function of N, is quite sensitive to sample size. In samples equivalent to or larger than this, residuals of no practical significance can lead to statistical rejection of the model, whereas in very small samples less appropriate models can be judged as providing "acceptable fit" (Anderson and Gerbing 1984). In this analysis, the chi-square was 537.01 and was sufficiently large to reject the null (Anderson and Gerbing 1984; Bentler and Barett 1980; Joreskog 1978). As a counter measure, Joreskog and Sorbom (1981) proposed the use of the goodness-of-fit index (GFI) and the adjusted (for degrees of freedom) goodness-of-fit index (AGFI). They represent measures of the relative amount of variance and covariance which are jointly accounted for by the model. For the discontinuous innovation, the GFI and AGFI indexes were .85 and .81, respectively. Each measure falls within the range which generally supports the appropriateness of Rogers and Shoemaker's model (Anderson and Gerbing 1984; Kulik, Oldham and Langner 1988). The five *a priori* dimensions were observed to exist in the manner specified. It was concluded that Rogers and Shoemaker's theoretical conceptualization of the innovation's attribute dimensionality was appropriate. The five factor maximum likelihood solution for the items, along with the goodness-of-fit measures and coefficient alpha (Cronbach

Table 2
Maximum Likelihood Solution for the Original Rogers and Shoemaker Innovation Characteristics Typology for the Discontinuous Innovation (Self-Diagnosis Devices)

CHARACTERISTIC -Item	Parameter Estimates (Standard Errors)	Coefficient Alpha
RELATIVE ADVANTAGE		.823
Product saves money over products it replaces	.84(.06)	
This product is generally superior to products which came before it	.69(.07)	
COMPATIBILITY		.873
Would not affect how I feel about the world to use this product	.52(.09)	
Using this product does not require changes in my behavior	.98(.05)	
Using this product does not differ from what I used in the past	.64(.07)	
COMPLEXITY		.899
It is difficult to understand how this product works	.94(.06)	
It is difficult to use this product	.49(.17)	
TRIALIBILITY		.698
It is easy to try out this product without a big commitment	.77(.07)	
It would be hard to return to how things were once I use this product	.61(.08)	
OBSERVABILITY		.751
The advantages/disadvantages would be readily apparent if I used this product	.88(.07)	
It is easy to communicate the results of using this product	.62(.08)	

RESULTS OF LISREL ANALYSIS

Chi-Square	Goodness-of-fit index	Adjusted goodness-of-fit index
537.01 (p<.000)	.85	.81

1951), are shown in Table 2.

Continuous Innovation (Generic Drugs). The confirmatory factor analysis procedure was repeated for generic drugs, the continuous innovation. The outcome suggested Rogers and Shoemaker's innovation characteristics typology was not appropriate. The CFA solution failed to converge (within 150 iterations). The primary cause of nonconvergence is a pattern of observed correlations that is fundamentally incongruent with the specified model (Joreskog 1966; 1967; 1969). However, a decision to respecify a measurement model should not be based on statistical results alone but rather in combination with theoretical considerations. It was previously proposed that when confronted with an adoption decision involving a continuous innovation, which initiates lower levels of product involvement, an individual should evaluate an innovation on fewer dimensions than are present in Rogers and Shoemaker's model. Therefore, theoretical justification also exists to support the contention that the original model is not correct.

It was therefore appropriate to subject the data to an exploratory analysis procedure to expose the underlying patterns. The outcome of this analysis then serves to guide respecification of the model for subsequent confirmatory analysis (Marsh and Richards 1987). This procedure also lessens the number of alternative models which are necessary to investigate (Young 1977) while reducing the possibility of taking advantage of sampling error to attain goodness-of-fit (Anderson and Gerbing 1988).

The results of the principal components analysis with varimax rotation are shown in Table 3. Based on the scree plot and eigen-root criterion, a three factor solution emerged with all loadings above .49. Based on their factor loadings, the factors might be labeled as the "manifested advantages," "affective consequences" and "complications," associated with adoption of the innovation. To address the internal consistency of these factors, Cronbach's alpha coefficient was calculated for each factor (Cronbach 1951). Each alpha coefficient was above .60.

Table 3
Principal Components Analysis of Innovation Characteristics for the Continuous Innovation(Generic Drugs)

SCALE NAME - Item[a]	Rotated Factor Loading	Coefficient Alpha
MANIFESTED ADVANTAGES		.772
This product is generally superior to products which came before it	.80	
It is easy to communicate the results of using this product	.76	
The advantages/disadvantages would be readily apparent if I used this product	.71	
It is easy to try out this product without a big commitment	.71	
This product saves money over products it replaces	.57	
AFFECTIVE CONSEQUENCES		.619
It would not affect how I feel about the world to use this product	.78	
Using this product does not require changes in my behavior	.64	
It would be hard to return to how things were once I use this product	.59	
COMPLICATIONS		.603
It is difficult to use this product	.74	
It is difficult to understand how this product works	.63	
Using this product does not differ from what I used in the past	.49	

[a] The number of factors was determined through joint use of the scree plot (Cattell and Vogelman, 1977) and the eigen root criterion (Guttman, 1954).

This three factor solution was then subjected to the confirmatory procedure as the respecified model associated with the continuous innovation. The goodness-of-fit measures (GFI = .89; AGFI = .84) indicated the respecified model, comprised of fewer dimensions, now "fit the data." These results suggest Rogers and Shoemaker's original model is not appropriate for continuous innovations. The three factor maximum likelihood solution for the characteristics associated with generic drugs, along with various of goodness-of-fit measures, is shown in Table 4. The *manifested advantages* factor represents the respondents' notions of the degree of explicitness of the innovation's economic and performance preeminence, along with its' availability for trial. The dimensions common to the *affective consequences* factor included the emotional and behavioral effects thought to be associated with adopting the innovation. The *complications* factor featured the difficulties in-

Table 4
Maximum Likelihood Solution for the Respecified Innovation Characteristics Typology for the Continuous Innovation (Generic Drugs)

CHARACTERISTIC -Item	Parameter Estimates (Standard Errors)	Coefficient Alpha
MANIFESTED ADVANTAGES		.772
This product is generally superior to products which came before it	.42(.10)	
It is easy to communicate the results of using this product	.54(.08)	
The advantages/disadvantages would be readily apparent if I used this product	.64(.08)	
It is easy to try out this product, without a big commitment	.72(.07)	
This product saves money over products it replaces	.55(.09)	
AFFECTIVE CONSEQUENCES		.619
It would not affect how I feel about the world to use this product	.51(.09)	
Using this product does not require changes in my behavior	.55(.08)	
It would be hard to return to how things were once I use this product	.67(.07)	
COMPLICATIONS		.603
It is difficult to use this product	.40(.11)	
It is difficult to understand how this product works	.72(.07)	
Using this product does not differ from what I used in the past	.48(.10)	

RESULTS OF LISREL ANALYSIS

Chi-Square	Goodness-of-fit index	Adjusted goodness-of-fit index
345.47 (p<.0001)	.89	.84

volved in using and comprehending the innovation. The characteristic typology associated with generic drugs was composed of fewer factors than were present for the discontinuous innovation, reflecting the influence on consumer perceptions of the comparatively less radical nature of continuous innovations.

Predicting Adopters and Nonadopters Using Innovation Characteristics

The second objective was to investigate the predictive strength of the innovation characteristics for the adoption of the discontinuous and continuous innovations.

Discontinuous Innovation (Self-Diagnosis Devices). Multivariate Analysis Of Covariance (MANCOVA) was used to test differences in innovation characteristic perceptions between adopters and (knowledgeable) nonadopters, while adjusting for the possible influence of demographic differences among those sampled. This analysis indicated that adopters and nonadopters differed significantly in their perceptions of innovation characteristics ($p=.000$). Discriminant analysis was conducted to determine the direction and intensity of the differences. The canonical loadings along with the group means and significance levels resulting from this analysis are shown in Table 5.

Respondent evaluations of the degree to which the innovation possessed the various characteristics were significantly different between adopters and knowledgeable nonadopters on four of the five dimensions: relative advantage, observability, complexity and trialibility were each significant discriminators between the groups. The observed relationships were in the direction posited by Rogers (1983): relative advantage, observability and trialibility were positively related to adoption, while perceived complexity was negatively associated. However, perceptions of the compatibility of the innovation with the existing values and past experiences of the respondents failed to discriminate between the groups. This result may be due to nature of the product category chosen to test the model.

The relative magnitude of the canonical loadings indicates the importance of each criterion variable in discriminating between the groups. The loadings demonstrated that perceptions of the innovation's relative advantage, or the degree to which the innovation is perceived to be economically and functionally superior to that which it replaces, and its observability had the most influence. Perceptions of the trialibility and compatibility of the innovation had the least influence.

Table 5
Differences in Perceptions of Innovation Characteristics Between Adopters and Nonadopters for the Discontinuous Innovation (Self-Diagnosis Devices)

Innovation Characteristic	Canonical Loadings	Group Means[a]		F-Test Significance Level
		Adopters	Nonadopters	
Relative Advantage	.776	2.54	1.92	.000
Observability	.546	2.59	2.13	.000
Complexity	-.291	1.09	1.59	.020
Trialibility	.207	2.27	1.99	.013
Compatibility	.125	1.72	1.68	.602
Multivariate F-test Significance Level				.000

[a] Based on a 4-point scale with (1) indicating Not At All (Innovation does not possess this characteristic) to (4) indicating Very Much So (Innovation always possesses this characteristic).

Continuous Innovation (Generic Drugs). The analysis was repeated for the continuous innovation. The multivariate analysis again indicated that the groups differed significantly regarding their perceptions of the innovation attributes. The canonical loadings along with the group means and univariate significance levels resulting from the discriminant analysis are shown in Table 6.

Table 6
Differences in Perceptions of Innovation Characteristics Between Adopters and Nonadopters for the Continuous Innovation (Generic Drugs)

Innovation Characteristic	Canonical Loadings	Group Means[a]		F-Test Significance Level
		Adopters	Nonadopters	
Manifested Advantages	.916	2.82	2.30	.000
Affective Consequences	-.120	1.42	1.43	.899
Complications	.089	1.63	1.66	.465
Multivariate F-test Significance Level				.000

[a] Based on a 4-point scale with (1) indicating Not At All (Innovation does not possess this characteristic) to (4) indicating Very Much So (Innovation always possesses this characteristic).

Univariate analysis revealed that only one of the three innovation characteristics was significantly different between the groups. When compared to knowledgeable nonadopters, adopters perceived that the innovation possessed greater levels of "manifestly apparent advantages associated with adoption of the innovation." The groups failed to differ regarding their "complications associated with adoption of the innovation" and "affective consequences associated with adoption of the innovation." These results were congruent with the expectation that individuals would evaluate the adoption of continuous innovations on the basis of a smaller set of characteristics. The failure to detect differences between adopters and knowledgeable nonadopters regarding their perceptions of the "complications" and "affective consequences" associated with the product may, indeed, be due to the lower levels of involvement associated with the adoption decision for the continuous innovation.

Discussion

Rogers and Shoemaker's innovation characteristics typology has enjoyed wide acceptance within marketing (Dickerson and Gentry 1983; Goslar 1987; LaBay and Kinnear 1983; Ostland 1972; 1974). However, this research suggests their conceptualization of perceived innovation characteristics may not be equally appropriate across classes of innovations which differ in terms of their discontinuity from previous offerings. On the basis of the factor analyses, consumers were observed to differ, across the innovation classes, regarding the number and composition of the characteristics associated with the innovations. For the continuous innovation, posited as more likely to elicit low involvement information processing, consumers were observed to evaluate innovations on a set of characteristics that were smaller in number and divergent in the thrust of their interpretation from those provided by Rogers and Shoemaker. Concurrently, the evidence associated with the discontinuous innovation, posited as more likely to elicit high involvement processing, demonstrated the appropriateness of Rogers and Shoemaker's original framework (see Table 7). Rogers and Shoemaker presumably realized that they were studying discontinuous innovations ("true" innovations), and not merely product modifications promoted as "new and improved" by advertisers. Marketers have apparently erred in adopting the factors explaining rate of adoption and implicitly assuming that they applied to any offering labeled as new. These results provide preliminary evidence suggesting researchers may wish to reevaluate the suitability of Rogers and Shoemaker's framework when investigating less radical innovations. There, consumers may make less fine

discrimination among product attributes than has been previously supposed. The findings associated with differences between adopters and nonadopters suggested a greater number of innovation characteristics influence the adoption decision associated with discontinuous innovation. By contrast, only one innovation dimension was observed to influence the decision to adopt the continuous innovation.

should primarily focus on addressing the relative advantage and observability of the innovation. This implies promotional efforts associated with discontinuous innovations, which by definition do not directly supersede anything, should emphasize the economic and noneconomic utility associated with use of the innovation. Marketing efforts associated with discontinuous innovations should also emphasize how apparent the

Table 7
Summary of Results For Discontinuous and Continuous Innovations

Innovation Characteristic Typology	Significantly Different Across Adopters and Nonadopters?
Discontinuous Innovation	
Relative Advantage	Yes[a]
Compatibility	No
Complexity	Yes[b]
Trialibility	Yes[a]
Observability	Yes[a]
Continuous Innovation	
Manifested Advantages	Yes[a]
Affective Consequences	No
Complications	No

[a] A positive relationship existed between this dimension and adoption.

[b] A negative relationship existed between complexity and adoption.

From a managerial perspective, the identification of different patterns of perceptual evaluation of attributes across innovation types offers several implications. First, the results call attention to the fact that consumers may employ discrepant sets of characteristics to evaluate the acceptability of discontinuous and continuous innovations. It is possible these collections of characteristics may be partially anticipated on the basis of knowledge of the innovation's disruptive influence on established consumption patterns. This understanding, combined with an understanding of the influence of the attributes on the adoption decision, could provide those organizations introducing innovative products an opportunity to more effectively focus their marketing efforts.

The results also argue for marketing appeals based upon the determinant perceptual dimensions. For discontinuous health care innovations, marketing efforts

results of use will be to the adopters and those in the adopter's social circle, as well as the ease of communicating the results of use to others (with the later perhaps representing an informal and *a priori* dissonance reducing technique).

By contrast, when faced with a continuous innovation, elderly consumers are more parsimonious regarding the number of innovation characteristics they contemplate in their adoption decision. Organizations marketing continuous innovations should focus on the economic and performance advantages and ease of use of the product. Appeals relating to the emotional considerations or problematic aspects associated with the product should not be emphasized, as evaluations of these characteristics failed to discriminate between adopters and nonadopters.

Suggestions For Future Research

The generalizability of these results are naturally bound by the products and populations studied. The need exists for confirmatory research addressing other product domains and consumer frames since no single study can ever hope to achieve external validity. Sustained programmatic research using different samples and measures/analysis procedures offers the only sure path to external validity (Calder, Phillipps and Tybout 1981). In addition, the post hoc analysis of the perceptual influences on adoption could be subject to criticism. The tentative conclusions offered in this paper could be addressed in a future experimental context.

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