To the Graduate Council:

I am submitting herewith a dissertation written by Ruth Marie King entitled "The Effect of Garment Attributes and Risk Factors on Adoption/Purchase Decisions for Pesticide Protective Apparel." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Home Economics.

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THE EFFECT OF GARMENT ATTRIBUTES AND RISK FACTORS ON ADOPTION/PURCHASE DECISIONS FOR PESTICIDE PROTECTIVE APPAREL

A Dissertation

Presented for the

Doctor of Philosophy

Degree

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Ruth Marie King

June 1984

DEDICATED to

my Family

Mary Ruth King
Granville King I
Granville King II
Mary C. King
Sandra L. King
Granville King III

... with LOVE

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ABSTRACT

The purpose of the study was to further the research efforts of functionally designed protective apparel. Four hundred twenty-one pesticide applicators in the state of Tennessee responded to a two-part questionnaire. Attributes of innovation provided the conceptual framework within a simulated adoption/purchase context. The relationship between product attributes, risk perception, risk-handling tactics and impact of information (cost, penetration and comfort) on adoption/purchase intent of respondents is investigated within a consumer decision-making model (systems concept).

Six garment choices were provided. Four groups were devised on the basis of withholding information on product attributes: cost, comfort and penetration. Characteristics of respondents were further delineated by fastclus procedure resulting in the formation of three clusters. A Duncan's Multiple Range Test was employed to measure the significance of information and consumer profiles on garment choice. Jeans and chambray shirt (least preferable among garment choices) were a first preference in spite of information given except in the absence of cost information when Gore-Tex garments were preferred. Applicability to the consumer decision-making model evidenced the following findings: Cluster 1 was likely to rely on risk perception and garment attributes, Cluster 2, all dimensions and Cluster 3, risk perception and risk-handling tactics in garment selection. Groups evidence little interest in innovativeness nor was there a definite pattern in their use of risk-handling tactics.

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CHAPTER I

INTRODUCTION

Diffusion is the process by which innovations are communicated to members of a social system (Rogers & Shoemaker, 1971). User's acceptance of such innovations is closely allied with perceived risk and/or product attributes. Regardless of the level of persuasion, promotional or otherwise, users must develop or feel a need for the product. The need for safety as perceived among researchers and pesticide users has generated increased interest in the development and diffusion of functionally designed protective apparel for agricultural workers (Doutt, 1979; Henry, 1980; Branson & Henry, 1981; Orlando et al., 1981). However, there remains a certain degree of reluctance among licensed pesticide users to utilize functionally designed protective clothing. Important is the question of whether this reluctance will be displaced with acceptance when improved features (attributes) are incorporated in such apparel.

Henry (1980) states of all the characteristics of clothing, two factors were shown to be dominate in the preference of pesticide users toward protective clothing. Protection was seen as of greatest importance by fruit farmers who use air blast spray equipment and are susceptible to large quantities of pesticide during the application process. Comfort was found to be the most important by all other types of farmers with protection as secondary for this group. Henry's study indicates that protection and/or comfort may be the deciding factors in agricultural workers' decision-making concerning protective apparel.

Murray (1982) in a study evaluating users' preferences of protective clothing by means of a wear test found that innovative protective clothing was preferred by the agricultural workers participating in the study. However, after preferences were recorded, when the subjects were asked if they would purchase the garment and told the cost of each garment, they were not willing to pay the cost of the more expensive protective clothing. Therefore, it is inferred that cost may be another critical garment attribute that may affect the consumer decisions regarding protective clothing.

People respond to hazards they perceive (Slovic et al., 1979). The lack of risk hazards assessment relative to pesticide exposure requires a large element of human judgment with uncertain implications for the future. Coupled with this potential risk is that of product risk and/or importance. Estimates are that 50% or more of all new products developed fail (Cravens et al., 1979). For example, a product's success or failure hinges on the inherent advantages of product A versus product B. Essential is the relationship between source and receiver.

Perceived risk factors associated with new product purchases are important in a consumer decision-making process. Schiffman (1972) found an inverse relationship between new product trial and perceived risk for elderly consumers. Dash et al. (1976) examined product choice decisions relative to store preferences within the context of three risk perception variables, self confidence, perceived product risk and product importance and found a positive relationship. These findings

suggest the advantage of examining the underlying dimensions of perceived risk rather than relying on overall risk scores. For example, the uncertainty component of perceived product risk revealed that specialty store shoppers were more concerned than department store shoppers that their product choice would prove satisfactory.

Marketers offer a variety of strategies or risk-handling tactics to reduce consumer loss in the market place. Roseluis (1971) in his study of eleven risk relievers indicates consumers have preferences for different methods of risk reduction associated with various types of loss. He also found that consumer attitude toward risk-handling tactics can vary between types of buyers.

The present investigation represents an effort to extend research on functional apparel related to perceived garment attributes undertaken in prior studies by researchers (Henry, 1981; Orlando et al., 1981; Murray, 1982). The issue of how to market innovations (new products) more efficiently and/or effectively is a challenge. Critical to this study is the relationship of risk perception and risk-handling tactics as this applies to adoption/purchase or trial of an innovation. In addition, one may question if there is a relationship between user's perception of functionally designed protective apparel and adoption decisions.

Statement of the Problem

This investigation proposes to assess perceived product attributes of functionally designed protective clothing with special attention on (1) product attributes, (2) risk perception, and (3) risk-handling

tactics. It further purports to explore the relationship between these variables and the influence the attributes of cost, comfort and protection have on the consumer decision-making process as related to purchase or adoption intent. Relevant questions from Henry's (1980) study to determine perceived attributes of functionally designed protective clothing will be refined and validated. Three risk perception variables, consumer confidence, product risk (uncertainty and consequence) and product importance, will be investigated to determine if any significant effect on adoption decisions exist. The extent to which consumers manipulate risk-handling tactics (product endorsements, brand loyalty, major brand image, money-back guarantee, and cost/benefits) in the decision process in adoption/purchase situations will be explored. Demographic data will be compared with independent variables to assess relationships between adoption/purchase decisions. Information relative to garments regarding cost, comfort and penetration will be withheld from subsets of the sample to investigate their influence in garment adoption decisions.

Conceptual Framework

The functional design process is a unique technique which utilizes a systems approach to analyze the total environment within which a structure (design) is to function. It has been used in the development of protective apparel for pesticide users (Orlando, 1979). Relevant components, such as movement, thermal and impact-protection needs, bodily functions, and psychosocial needs are considered in the total

evaluative framework. Data analysis information is organized into a composite construct which encompasses users' preferences, the structural properties of textiles, convention, and aesthetic design to develop prototypes to meet desired specifications.

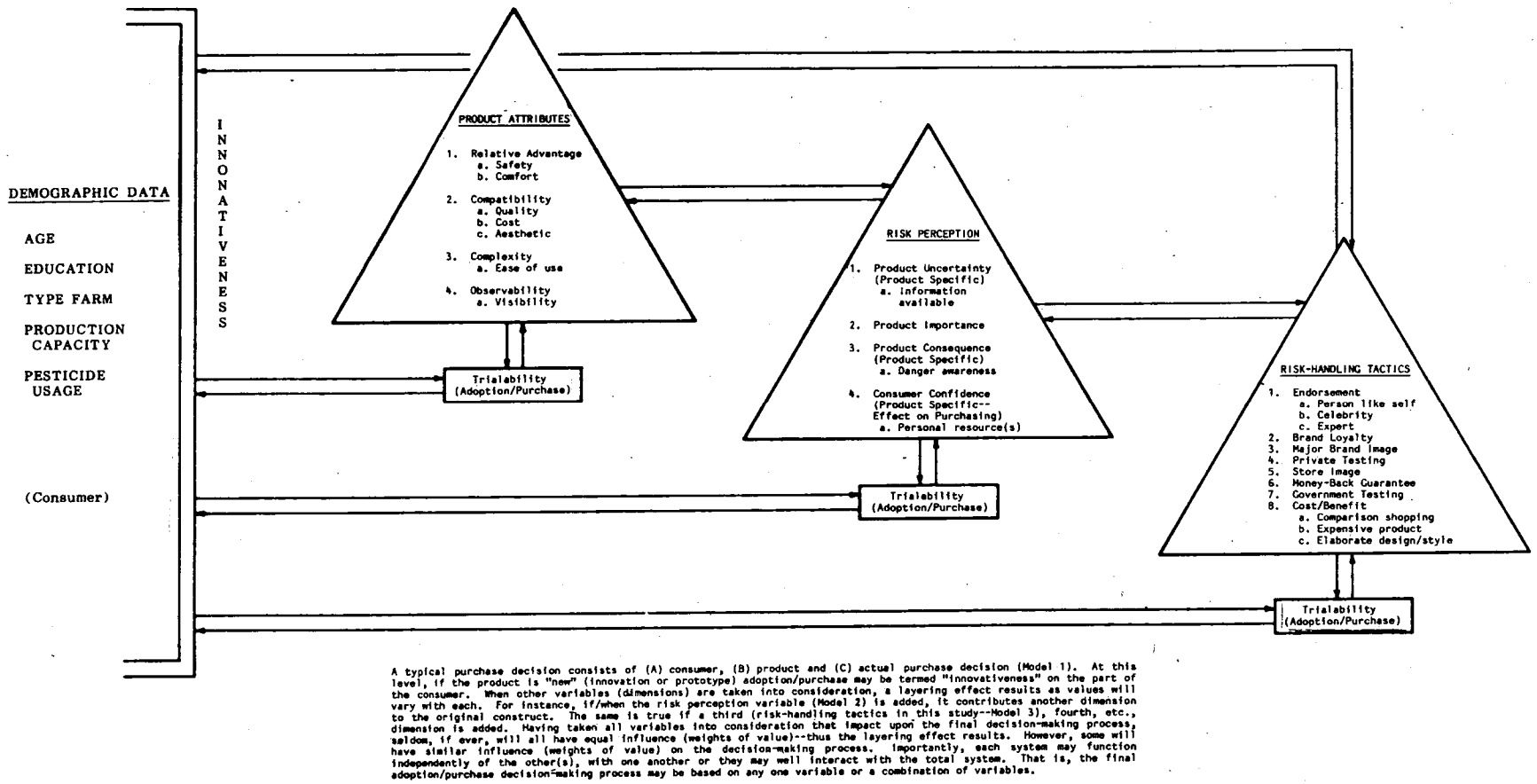
Once a product (garment) prototype is developed, it may be viewed as an innovation. The ultimate goal of all innovations is consumer acceptance. The inclusion of user's information during the developmental stage of a product may render easily a more acceptable product at the user or consumer stage. An important condition relevant to the rate of adoption of any product is the extent consumers view the "new" (innovation) as "better" than existing products. One such approach may be a comparative evaluation of product attributes. Consequently, the proposed conceptual framework of attributes of innovation seems to provide an appropriate format in addressing this problem.

Research has shown that users' perception of attributes of innovation affects their rate of adoption. These attributes of innovation as delineated by Rogers and Shoemaker (1971) are relative advantage, compatibility, complexity, trialability, and observability. As of this date, Henry (1980) is the only researcher to relate this concept to the area of functional apparel. She was able to conclude from among the attributes of innovation that the best predictors of the general favorability of functionally designed protective clothing for pesticide users were trialability, complexity, observability and compatibility. Combined these at best predicted only 20% of the variation in the general favorability

toward protective clothing. However, when Henry isolated the clothing characteristics from within the attributes' categories she found comfort and protection to be highly significant in consumers choice of protective apparel. This combined with the findings from Murray (1982), showing the influence cost has on the final decision of the consumer to purchase protective apparel, justifies the isolation of the characteristics cost, comfort, and penetration.

Product attributes however, may not be the sole criteria in a adoption/purchase situation. Related factors such as risk perception and/or risk-handling tactics may well enhance the decision-making process. Given that the level of risk is acceptable (risk perception), it too may serve as a motivational criteria under similar circumstances. Once a consumer enters the marketplace, other considerations tend to further motivate the final adoption/purchase decision. For example, a particular product endorsement, store image, brand name, money-back guarantee, etc., might provide further reinforcement (lessen the risk factor) in the ultimate decision-making process (risk handling tactics).

The conceptual decision-making model (Figure 1.1) describes the function of the factors capable of influencing the purchase decision. This study will examine the influence these factors have on protective apparel selection. The model will be applied to subsets of the population in order to isolate the influence of product specific information concerning cost, comfort, and safety.



A typical purchase decision consists of (A) consumer, (B) product and (C) actual purchase decision (Model 1). At this level, if the product is "new" (innovation or prototype) adoption/purchase may be termed "innovativeness" on the part of the consumer. When other variables (dimensions) are taken into consideration, a layering effect results as values will vary with each. For instance, if/when the risk perception variable (Model 2) is added, it contributes another dimension to the original construct. The same is true if a third (risk-handling tactics in this study--Model 3), fourth, etc., dimension is added. Having taken all variables into consideration that impact upon the final decision-making process, seldom, if ever, will all have equal influence (weights of value)--thus the layering effect results. However, some will have similar influence (weights of value) on the decision-making process. Importantly, each system may function independently of the other(s), with one another or they may well interact with the total system. That is, the final adoption/purchase decision-making process may be based on any one variable or a combination of variables.

Figure 1.1. Decision-Making Model--Systems Concept.

Theoretical Questions

The theoretical questions addressed in this study are:

First, what influence does information regarding cost, comfort and protection have on adoption/purchase decisions?

Secondly, what effect do grouped characteristics of the sample, as measured by their responses to the attributes risk perception, risk-handling tactics and demographic data, have on the adoption/purchase decision?

Hypotheses

In support of these theoretical questions, the following null hypotheses were developed:

H_1 No significant difference exists between garment selection when information is withheld relative to product attributes, cost, comfort and penetration.

H_2 No significant difference exists between subject characteristics/profiles and garment selection.

Limitations of Study

The present study's scope is limited to adoption/purchase behavior and the risk concept as related to functionally designed protective apparel. It does not deal with the nature of communication nor rate of adoption. The inference of risk perception is one of individual judgment (estimation). Also, the study is limited to one state, Tennessee. Thus, a more diverse sample may further validate extenuating findings.

Definitions of Terms

Adoption. Indicates the likelihood of product purchase or usage over a period of time. Synonymous to purchase in this study.

Attributes. Those characteristics which differentiate one product from another.

Consumer Confidence. Self evaluation of one's abilities or motives.

Functional Apparel. Clothing that is designed to meet the physical, social, psychological, and aesthetic needs of potential users.

Innovation. That which is new and/or different as opposed to an existing product.

Product Consequence. Anticipated outcome in terms of consumer satisfaction.

Product Importance. The value placed on the need for a particular product. In this study, the product is functionally designed protective clothing.

Product Risk/Uncertainty. Degree of confidence a user has in a product.

Risk. The degree of "certainty" or "uncertainty" individuals associate with a product, self, or other incident (danger/hazard).

Risk-Handling Tactic. Discriminate motive employed by an individual in the decision-making process. Synonymous to risk relievers in this study.

Users. Persons for whom the innovation is intended. Pesticide applicators are the users in this study.

Organization of Study

Chapter II provides an overview of research relevant to the conceptual framework. Methodology and/or procedure employed in the study are discussed in Chapter III; data analysis is discussed in Chapter IV. Summary, conclusions and recommendations are delineated in Chapter V.

CHAPTER II

REVIEW OF LITERATURE

Introduction

The innovation of functionally designed protective clothing for agricultural workers is a recent concept within the area of functional design. The growing concern of man relative to his health, safety, and other environmental factors impact upon the need for concern among researchers to meet the challenge of today's changing society. High failure rates of new products on today's market further impacts the need for adequate and efficient communications systems in maximizing the diffusion process among intended market groups (Cravens et al., 1979).

Diffusion of Theory

Diffusion is the process by which innovations are communicated to members of social systems (Rogers & Shoemaker, 1971). The focus on adoption and diffusion of new ideas or practices has been an ongoing concern of researchers across academic disciplines (Katz et al., 1963; King, 1966; Rogers & Shoemaker, 1971). Reportedly, the classic Ryan and Gross (1943) study of the diffusion of hybrid seed corn rendered the greatest contribution to the knowledge and interpretation of the processes which lead to overt behavior change among consumers. The irony may be that behavioral change is not necessarily the result of knowledge and persuasion. Some innovations are widely accepted within

the first few years. For others, the adoption process may be longer, if ever. The high failure rate of new products after commercial introduction is a major concern for marketers (King, 1966). Bell (1963) contends that the consumer who accepts newness is as much an innovator as the firm. A totally new concept to a firm may mean a totally new process as well as added investment or cost. For the consumer, it may be a complete shift from a traditional behavior pattern to a totally new and different one. For example, one may consider the adjustment incurred by the consumer when the traditional mode of drying clothes is displaced by an automatic dryer.

A successful product innovation implies the matching of technical possibility with latent and manifest market needs (Rosenbloom, 1966). Rogers and Shoemaker (1971, p. 18) proposed four crucial elements in the diffusion of new ideas: the (1) innovations (2) which is communication through certain channels (3) over time (4) among members of the social system. Diffusion of innovation is one of the major mechanisms of social and technical change (Katz et al., 1963). Obviously, the diffusion and adoption of all innovations is not desirable. Brandner and Straus (1959) found that in spite of the fact that various agricultural agencies did not recommend the adoption of hybrid sorghum, 28% of the sorghum acreage in northeastern Kansas was planted the first year it was available. The dimension of credibility between source and receiver in the diffusion process is pertinent.

An adoption decision is not an instantaneous act. The adoption process as conceptualized by Rogers and Shoemaker (1971, pp. 100-101) consists of five stages:

1. Awareness stage. The individual learns of the existence of the idea but lacks information about it.
2. Interest stage. The individual develops interest in the innovation and seeks additional information about it.
3. Evaluation stage. The individual makes mental application of the new idea of his present and anticipated future situation and decides whether or not to try it.
4. Trial stage. The individual actually applies the new idea on a small scale in order to determine its utility in his own situation.
5. Adoption stage. The individual uses the new idea continuously on a full scale.

Beal et al. (1957) in their investigation of feeding of antibiotics to swine among 148 Iowa farmers found support relative to the validity of the stages concept. Further supporting evidence was found in the analysis of similar data for three other practices studied in Iowa--the use of chemical weed spray, preserving food by freezing, and the use of new synthetic fabrics. Most researchers concur that the adoption process of innovation is a multistep facet, however, a similar accord is not evident in the literature (Ryan & Gross, 1943; Beal et al., 1957; Copp et al., 1958; Mason, 1963).

Attributes of Innovation

The relative time within which an innovation is diffused (adopted) may be related to perceived risk factors and product attributes. Rogers and Shoemaker (1971) synthesized several characteristics of innovation that contribute to differences in rate of adoption as follows:

Relative Advantage--degree to which an innovation is perceived as better than the idea it supercedes.

Compatibility--degree to which an innovation is perceived as consistent with existing values, past experience, and needs of the receiver.

Complexity--degree to which an innovation is perceived as relatively difficult to understand and use.

Trialability--degree to which an innovation may be experimented with on a limited basis.

Observability--degree to which the results of an innovation are visible to others.

Each is conceptually distinct, yet each of the five may be somewhat interrelated with the others. Four are positively related to rate of adoption, complexity is negatively related. An individual's (receiver's) perceptions rather than attributes affects one's rates of adoption.

Relative Advantage

Relative advantage may be expressed in reciprocative terms, the nature versus cost-benefit. An individual's circumstance may affect his subjective perception relative to objects and ideas. Subdimensions of relative advantage may be illustrated by degree of economic profitability, low initial cost, lower perceived risk, a decrease in discomfort, a saving of time and effort, and the immediacy of the reward. For instance, Henry (1980) found that the relative advantage "comfort" was more desirable in a proposed protective garment as opposed to what is presently available in similar protective apparel. For some preventive innovations, the degree of relative advantage may be difficult to

communicate due to future effects such as accumulation of pesticide in body organs. Rogers and Shoemaker (1971) concluded that "the relative advantage of a new idea, as perceived by members of a social system, is positively related to its rate of adoption." Ryan and Gross (1943) in their study of the diffusion of hybrid seed corn in Iowa found the relative advantage related to increased yield, 20% more. Such a conclusion may indicate the subdimension of economic profitability. However, Roger and Shoemaker state that Kivlin and Flieger (1967) discerned that among small scale farmers, economic profitability was not positively related to rate of adoption. Ostlund (1969) investigated the role of product perception in innovative behavior. Six new products, all relatively low-cost, were selected from test markets outside the Boston area. Utilizing the five product attributes proposed by Rogers and Shoemaker, he found that the product perception variable "relative advantage" ranked first for each product considered. Also, relative advantage was positively related to innovative willingness.

Compatibility

As generalized by Rogers and Shoemaker (1971, p. 152) "the compatibility of a new idea, as perceived by members of a social system is positively related to its adoption rate." Congruency of innovations with existent salient characteristics within a social system tend to speed adoption. Compatibility ensures security and less risk to the receiver thus making the idea more meaningful to him. An innovation may be compatible with sociocultural values and beliefs, previously introduced

concepts, or with client needs for innovation. Graham (1956, p. 398) hypothesized that:

> Social classes will accept innovations to the extent that the innovational features and the cultural characteristics of the class are compatible. Because they vary in many aspects of their culture, different classes will possibly adopt a given innovation in varying degree. But because they share some aspect of the common culture, they may accept in no significantly different degree. Finally, because each innovation requires that those who would use it should possess different physical, mental, and behavioral equipment, no class could be said to be conservative or liberal in reacting to all.

He found that compatibility of innovation with social class values partly determined its speed of adoption. Twenty-four percent of the upper class sample compared to 72% of the lower class sample adopted television. Seventy-two percent of the upper class compared to 12% of the lower class accepted canasta. Differences in adoption rate may be attributed to values related to recreation. Further indications are that each innovation is compatible in different degrees with the culture of a given group.

An example of negative compatibility was described by Santopolo (1961) in relation to difficulty encountered by Kentucky county extension agents in their effort to convince farmers to switch from tobacco farming to "pickle-raising" (cucumber farming). Although the relative advantage of profitability was apparent, the innovation was not adopted due to the feminine connotation associated with such a practice. Too, tobacco farming was considered a prestigious endeavor. Also, Brandner and Kearl (1964) reported a negative relationship relative to compatibility and rate of adoption of innovation among Kansas farmers. For

example, the areas slowest to adopt hybrid sorghum were the ones in which this crop was most important.

Ostlund's (1969) findings support the generalization made by Rogers and Shoemaker (1971). To a degree further support is provided by Henry (1980) in her study of protective apparel for licensed pesticide applicators in Michigan. Congruency of innovations was more compatible with one group than another. For instance, fruit farmers perceived the need to be protected from dangers of pesticide in a significantly more positive way than did the majority group, dairy and/or livestock farmers.

Complexity

Determinants of complexity are not consistent among researchers. However, any new idea may be classified on a complex-simplicity continuum. The relative degree of complexity may alter its rate of adoption. Rogers and Shoemaker (1971, p. 154) generalized "the complexity of an innovation, as perceived by members of a social system, is negatively related to its rate of adoption."

Fliegel and Kivlin (1966) investigated farmers' perception of fifteen attributes of innovation relative to rate of adoption. The relationship between perceived complexity of innovation and rate of adoption, as hypothesized, was in the negative direction, but dropped to nearly zero when other attributes were taken into account.

Similar results were reported by Ostlund (1969). Complexity with innovative willingness, as hypothesized, was in a negative direction, however for only one product--Product 2, a disposable female

undergarment. Also, Fliegel et al. (1968) found that innovations perceived as more complex were adopted less rapidly among three farm groups in a cross-national comparison.

Henry (1980) sought to determine which attribute of innovation is the best predictor of favorability of protective clothing for pesticide users. Rank responses indicated that complexity was the second best predictor. Complexity in her study was based on the understanding by respondents that clothing can be contaminated by toxic substances and that protective clothing can be comfortable.

Graham (1956) sought to determine why canasta and television diffused at different adoption rates in the upper and lower class. He concluded that one reason was the difference in the complexity of the two ideas. Television was a one-step operation compared to canasta which required the assistance of others to learn.

Trialability

Trialability tends to minimize the uncertainties underlying the adoption of a new innovation. Some innovations do not lend themselves to experimental use neither on an installment nor small-scale basis prior to adoption. However, a known fact is that later adopters are more likely to omit the trial stage. Further implications are that no innovation comes without some consequence. The inability of marketers to predict the relative advantage or disadvantage is evident. Rogers and Shoemaker (1971) generalized that the trialability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption.

Henry (1980) sought to determine whether pesticide users would try protective clothing if they were easily available to them. She found a significant difference exists between the attitudinal and behavioral response for all attributes except the trialability in which there was no difference. The mean for the trialability index was higher than the mean of any of the other attitudinal indices. A more positive feeling exists among fruit farmers than dairy and/or livestock farmers relative to their willingness to try the innovation. Other researchers have found similar or positive results (Ryan & Gross, 1943; Fliegel & Kivlin, 1966; Ostlund, 1969).

Poplielarz (1967) indicated that willingness to try a new product involves a propensity to assume different kinds of risks: willingness to try new products seems to be associated with a preference for errors of inclusion rather than errors of exclusion. Unwillingness to try a new product involves a preference for errors of exclusion. This relationship varies from products, as a function of the visibility in question, but is consistent in direction between sexes.

A positive association between past new product trial and perceived error tolerance was found by Schiffman (1972) in his investigation of new food product trial by elderly consumers. It was found that perceived error tolerance was capable of identifying elderly consumers who risk trying new food products on a consistent basis.

Observability

Consequence may be defined as change that occurs within a social system as a result of the adoption or rejection of an innovation. The

more visible a consequence the more readily its results can be observed and communicated. Veblen (1924) in his Theory of the Leisure Class termed this phenomenon "conspicuous consumption." Rogers and Shoemaker (1971) generalized that the observability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption.

Most researchers have found similar results (Ryan & Gross, 1943; Ostlund, 1969; Henry, 1980). For example, Ryan and Gross (1943) found that farmers who adopted hybrid seed corn more often cited the influence of neighbors in their decision to adopt the innovation.

Risk Concept

Definition

Conceptually, the term risk has both nontechnical and technical connotations. The former implies a chance of exposure to hazards, adversity, and affliction. Technically, its usage applied to the probability that a planned event will not be attained within specified constraints by following a predetermined course of action (Regulinski, 1975). Lowrance (1976) defines risk as a measure of the probability and severity of adverse effects. Both evidence the dimension of uncertainty. The underlying consideration as proposed by Rowe (1977) again is the dimension of uncertainty applied within a hierarchial construct--or acceptability. However, when the risk value is applied, this approach appears to work in reverse. Rowe describes an example of a wealthy, satisfied, egocentric person who is apt not to be

concerned about illness or death to the degree that such fears dominate his life. However, if threatened with premature death his values revert to the more primitive. The uncertainty dimension implies both descriptive and measured (measurement) uncertainty (Keeney, 1972; Woodruff, 1972; Taylor, 1974; Fischoff et al., 1977).

Nature of Risk

The scope of risk covers a variety of human experiences involving personal and societal, man-made, or natural conditions. Consequences range from financial involvement through death. The various levels include: (1) physical, biological risk to man and environment; (2) the perception of these risks by individuals; (3) the potential risk to the psychological well-being of individuals based upon these perceptions; and (4) the risk to social structures and cultural values as influenced by the collective psychological states of individuals (Otway & Pahner, 1976, p. 123). The most obvious and extensively researched is societal risk, or those that affect man's health and environment. The controversy surrounding nuclear energy is an example of these four levels of risks. Not only have there been attempts to estimate the physical and biological risks of a specific type of nuclear plant, but comparisons with other risks existing in society were made, on the basis of acceptability. However, controversy from interest groups whose perceptions do not concur with formal estimates could create potentials for social and cultural change. Other parallels or examples of these various levels have been cited by various researchers (Lave & Seskin, 1970; Lowrence, 1976).

The general structure of risk assessment in decision-making is characterized by two stages, risk estimation and risk evaluation. Risk estimation refers to the side effects of a decision, estimation of their probabilities, and magnitude of the associated consequences. The latter is a complex process of determining the meaning, or value, of the estimated risks to those affected (Otway & Pahner, 1976).

Risk evaluation may be thought of as ordering, or ranking, risks so their total effects, objective or subjective, may be compared--it essentially defines the "acceptability" of risk. Basically, there are two methods of risk evaluation, revealed preferences (Samuelson, 1938; Houthaker, 1950; Bruner & Tajfel, 1961; Starr, 1969) and controlled experiments (more analytical/technical). Revealed preferences measure past behavior, however, the difficulty lies in the ability to anticipate future behavior on the basis of observations of past behavior. Controlled experiments provide information on attitudes at the present moment. Difficulties relate to how to anticipate behavior from measurements of attitude. More recently, an alternative approach to revealed preferences proposed by Fischoff et al. (1978) is "expressed preferences." However, both methods have their proponents and critics.

The matter of gauging risk is one of probability (Lowrance, 1976). That is, a risk estimate can assess the overall likelihood that an unfavorable event will occur, but it is powerless to predict the specific event. One may predict that an automobile part will break and cause an accident. However, one cannot predict which individual car or when the part will fail. The advantage of probability thinking is that it tends to enable one to make broad comparisons among different hazards.

Related Research

Technological innovation has contributed much to the standards of living during this century. However, as technological systems become larger and more complex, benefits to the citizens occasionally have not outweighed the risks (costs). Every technological advance imposes some risk of adverse effects on society (Starr, 1969; Lowrance, 1976; Otway & Pahner, 1976; Rowe, 1977; Fischoff et al., 1978). Along with these technological advances have come increased anxieties on the part of the consumer relative to his safety, health, and environment. Simultaneously, rapid communication and dissemination of these anxieties by mass media tend to exacerbate the issues which further impact on the public's perception of risk. In many instances determining what is "acceptable" may become an issue to be arbitrated through the courts, in referenda, or other regulatory proceedings (Lowrance, 1976; Rowe, 1977). The Federal Pesticide Act, 1978 (Doutt, 1979), Consumer Product Safety Act, 1970 (McGuire, 1979), and Occupational Health and Safety Act, 1970, are but a few examples of regulatory procedures established by government.

Innovative usage of chemicals, especially toxic chemicals found in pesticides, have presented some unique problems for agricultural workers. Indications are that a majority of these workers do not adequately perceive the true nature and/or possible health risk that may result from exposure to such substances. Recently there has been increasing interest among researchers relative to ascertaining acceptable levels of risk. Properly posed, the question is "How safe is safe

enough?" It is believed that people respond to hazards they perceive. Many accept different levels of risk for different types of risk, voluntary or involuntary (Rowe, 1977).

Starr (1969) explored the relationship between risk and benefits among the public sector based upon the analysis of national accident statistics. He derived what might be termed "the laws of acceptable risk" (Otway & Pahner, 1976; Fischoff et al., 1978, p. 1237), namely:

1. the public is willing to accept "voluntary" risks roughly 1000 times greater than "involuntary" risks;
2. the statistical risk of death from disease appears to be a psychological yardstick for establishing the level of acceptability of other risks; and
3. the acceptability of risks appears to be roughly proportional to the third power of the benefits (real and imagined).

However, there is evidence that some researchers (Otway & Pahner, 1976; Fischhoff et al., 1978) do not concur with these conclusions. Otway and Pahner (1976) conclude that whereas Starr's hypothesis was probably philosophically correct, the result could not be justified on the basis of his analysis. They further concluded that the mathematical relationships indicating the relative importance of the determinants must be regarded as unlikely.

Fischhoff et al. (1978) proposed to measure public attitude toward risks and benefits from 30 activities utilizing an alternative approach referred to as "expressed preferences." Four significant observations were derived. First, for many activities and technologies, current risk levels were viewed as unacceptably high. Differences between perceived and acceptable risk indicated a lack of satisfaction with the way that market and other regulatory mechanisms balanced risks and

benefits which is unsupportive of Starr's (1969) findings. Secondly, little systematic relationship between perceived existing risks and benefits is apparent; nor are risks entered into voluntarily perceived as greater than involuntary risks at fixed levels of benefit. Thirdly, there is an overwhelming relationship between perceived benefits and acceptable level of risk. Fourthly, high intercorrelations existed between the nine characteristics hypothesized, however, they could easily have been reduced to two. One dimension discriminated between high- and low-technology activities often with delayed consequence, whereas the second dimension reflected primarily the certainty of death given that adversity occurs. Conclusive here is that such relationship may prove beneficial in predicting public acceptance of risk level associated with proposed technologies.

One may assume that the social acceptance of risk is directly influenced by public awareness of the benefits of an activity, and determined by advertising, usefulness, and the number of people participating (Starr, 1969). The minority position associated by society with agricultural workers in contrast to other occupational groups may contribute to the lackadaisical approach by this group in assuming certain occupational related risk. Therefore, a lack of information on the part of workers and society may lead to mediocre assessments where risk to life are greater than one would anticipate. Rowe (1977) states that any action taken to alleviate risk (risk aversion) may be motivated through direct reduction of uncertainty (uncovering new risk--reciprocative related), or by intuitive perceptions of risk takers.

Expertise in risk handling involves a large component of judgment. There is evidence that people are poorly informed or misinformed relative to important hazards. Therefore, they respond not just to numbers (quantitative) but to qualitative aspects of the hazards. When assessing risk, the lack of statistical data leads to heuristic judgment, inferences based on what is recalled or observed about a risk question (Tversky & Kahneman, 1974; Slovic et al., 1979). For instance, one may evaluate the probability that a given business venture will fail by imagining various difficulties it could encounter. Slovic et al. (1979, p. 38) reported several findings from their examination of risk perception relative to the fallibility of judgment:

1. Cognitive limitations, coupled with the anxieties generated by facing life as a gamble, cause uncertainty to be denied, risks to be distorted, and statements of fact to be believed with unwarranted confidence.
2. Perceived risk is influenced (and sometimes biased) by the imaginability and memorability of the hazard. Therefore, people may not have valid perceptions even for familiar risks.
3. Statistical frequencies of death correspond closely with experts' risk perceptions. Lay person's risk perceptions were based in part upon frequencies of death, but there were some striking discrepancies--the concept of risk involves qualitative aspects such as dread and the likelihood of a mishap being fatal. Also, lay people's risk perceptions were affected by catastrophic potential.
4. Disagreements about risk should not be expected to disintegrate in the presence of "evidence." Definitive evidence, particularly in the case of rare hazards, is difficult to obtain. Weaker information is likely to be interpreted in a way that reinforces existing beliefs.

Green (1980) investigated the acceptable or optimum level of risk in relation to the fire hazard of buildings. His findings indicate that no measure of safety can be arbitrarily assumed as appropriate. Also, what people mean by safety and what characteristics of a situation are

used to assess its safety must first be determined in order to derive an appropriate measure of safety. "Acceptable" levels of safety cannot be equally assumed to be an intrinsically meaningful term. There is evidence that the relationship between the level of safety and nature of the situation are reflected in expectations about the type of accidents that will occur in that situation. However, there is at present little knowledge as to whether it is merely the frequency of accidents that determines whether they are accepted, or whether they are assessed in light of more complex expectations. Green concluded that the application of an acceptable level of safety based on attitude criterion is insufficiently defined to be a reliable design criterion for fire safety.

It is possible that value placed on an existing situation by an individual will be positive, negative, or of no value. Rowe (1977, p. 81) hypothesized that "the propensity for taking risk is inversely related to the value of one's status quo; the higher the positive value of the status quo, the lower the propensity to take risk." For example, the propensity to gamble is directly related to the type and magnitude of the consequences, cost-benefit.

Roselius (1971) investigated consumer preferences for eleven different methods of reducing risk associated with various types of loss on the basis of risk relievers. Indications are that some relievers may receive a higher or lower rank if associated with certain methods of purchase or with certain types of products. However, this question was beyond the range or scope of his study. Also, buyers generally favor some risk relievers and are relatively unimpressed with others.

More significant was the fact that buyers prefer some relievers to others depending upon the kind of loss involved, and that the attitude toward relievers can differ between different types of buyers. There is evidence that buyers have preferences which extend over a wide variety of methods of relief, which is supportive with the statement that, generally, buyers have a choice open to them for reducing perceived risk. From the ranking of the risk relievers there is evidence that a danger exists of misdirecting research efforts if they are focused on relatively insignificant methods of risk relief--methods which have a neutral or unfavorable meaning to many potential buyers. Roselius suggested that future research on risk relief should include a variety of methods for risk reduction, rather than study individual risk relievers in isolation from others.

As an experiment, Starr (1969) applied a sample of his risk assessment criteria to atomic plant safety. Significant was the relationship between engineering design objectives and economic criteria. It appears that such a marriage of data would result in a design-target risk level much lower than the present socially accepted risk for electric power plants. Similarly, it may be assumed that such a marriage of relevant data as applied within the functional design process would have similar applications and/or results.

Summary

Diffusion of innovation is a necessary phenomenon for social change. Individual perception of an innovation relates to its relative

advantage, compatibility, complexity, trialability, and observability. Human predispositions and personal values are determinants of acceptance or rejection of any innovation. Resistance to change may impede the overall adoptive process. Inherent risk accompanies any innovation, whether conscious or unconscious and may lead to anxieties and feelings of insecurity about the idea or concept relative to its final trial and eventual adoption. Evaluation and assessment may be made on the basis of heuristic judgment rather than qualified and quantified measurements. There is a need for marketers to assess both attributes of the product (innovation) as well as internal factors (personal) and external factors (social) in the total diffusion process.

CHAPTER III

METHODOLOGY

Research Design

The heuristic nature of the conceptual framework including attributes of innovations, necessitates incorporating several alternate approaches in order to ascertain adoption/purchase intention on the part of the consumer in the decision-making process. Few researchers, with the exception of Henry (1980), have taken this approach. However, she examined attributes of innovation within the context of determining consumer perceptions. The dependent variable in this study is adoption/purchase intention. Independent variables may be delineated within two constructs, attributes of innovation and risk--risk perception and risk-handling tactics.

Six garments, complete with descriptions, illustrations and a fabric sample for each, were provided. With one exception, all garments are available on today's consumer market. This garment was developed by researchers at The University of Tennessee, Knoxville, for pesticide protection. The inclusion of garment descriptions including information on features and fabric performance was intended to broaden evaluative criteria essential to future trial or adoption intention. To isolate critical elements which may influence garment selection, four groups were devised. The first group, Group I, was provided complete (all) information for each product. Group II was given complete information for each garment with the exception of comfort information. Penetration/safety information was withheld from Group III. For Group IV,

cost information was withheld. In each instance all participants received the same questionnaire for responses.

Research Variables

Attributes of Innovation

Recognizing the fact that an adoption decision is not an instantaneous act, careful consideration was given to design features of functionally designed protective apparel developed by prior researchers (Henry, 1980; Orlando et al., 1981). Discriminate characteristics (variables) were then aligned as closely as possible with the attributes of innovation, relative advantage, compatibility, complexity, trialability and observability described by Rogers and Shoemaker (1971) as follows.

The variables "comfort" and "safety" were used to measure the "relative advantage" attribute or "the degree to which the innovation is perceived to be better than the idea it supercedes." Consumer adoption/purchase criteria is often made on a reciprocative or cost benefit continuum. Future ramifications often tend to be subjective perceptions or no more than "judgmental hunches" relative to objects or ideas. The premise is that, individual assumptions may not always be an actual factor where information is limited regarding a specific product.

The variable of "cost" was used to measure compatibility in the study. In spite of relative conceptual independence of each attribute, it has been noted that there tends to be some overlap or interrelatedness among the other four. For example, the "cost" variable tends to be related to "relative advantage" of the product. Compatibility may be

defined as the degree to which an innovation is perceived as consistent with existing values, past experiences, and needs of the receiver. The assumption being (1) that benefits derived will outweigh the investment, (2) the risk factor will influence adoption/purchase, and (3) individual needs tend to overshadow expenditures. If the need is great enough, expenditures often become secondary. Also, cost may not always be the determinant that makes one product "better" than another. However, more often buyers seemingly rely on such a motive as a determinant in a purchase decision. A buyer's past experience with a prior product may well indicate that an increased expenditure does not necessarily mean "better." A "quality" product could very easily mean one of lesser cost. Therefore, "quality" as a second variable in the measurement of "compatibility" will imply a top of the line product that is durable or long lasting.

A third dimension, "aesthetics" was considered also as a measurement of the compatibility attribute. Regardless of the type of work in which a person is actively engaged, it would seem that appearance is manifest. Rarely will a consumer purchase a product he dislikes to wear or for that matter use. The extent to which the buyer believes that garment features are no more or less conspicuous than other regular work clothes worn by agricultural workers may have an impact on adoption decisions.

The degree to which an innovation is perceived as relatively difficult to understand and use is described as "complexity." "Ease of use" is the variable designed to measure this attribute in this study.

Researchers have not always agreed on determinants of complexity (Fliegel & Kivlin, 1966; Ostlund, 1969; Rogers & Shoemaker, 1971). However, the adoption or rejection of a product may hinge on its degree of complexity. The diverse activities of agricultural workers suggest the need for safe uncomplicated products. A loss of time and effort could easily deter the usage or adoption process.

The variable used to determine "trialability" in this study is the intent to purchase. The propensity to assume risk in new product purchases is evident. This study has attempted to lessen the risk element through providing essential information for specific products and creating a simulated purchase decision.

"Visibility" is the variable used to measure the "observability" attribute or the degree to which the results of an innovation are visible to others. The absence of a visible residue on the user's skin or apparel might be interpreted as a lack of exposure to a pesticide. Also, no immediate ill effects after usage may not be indicative of continued good health. The time frame relative to degree of exposure and extent of exposure are factors with which to reckon. Research (Orlando et al., 1981) indicates the rate of absorption for pesticide residue through the skin varies with body area. The results of this study may lead to more reliable user assessments as well as more appropriate apparel selections in the future. (See Table 3.1 for a listing of attributes of innovation variables.)

Table 3.1. Delineation of Attributes of Innovation Questions--Section II.

Attributes	Variables	Statements
		When mixing or applying pesticides it is important/ unimportant that work clothes:
Relative Advantage	Safety	1. Allow little or no penetration of pesticides. 2. Will adequately coer areas of the body in danger from pesticide exposure.
	Comfort	1. Are comfortable. 2. Are not hot and bothersome. 3. Are roomy (fit appropriately).
Compatibility	Quality	1, Will last beyond one season. 2. Will withstand heavy work and strain.
	Cost	1. Are not any more expensive than regular work clothes. 2. Can be worn for other agricultural use as well as pesticide application.
	Aesthetics	1. Provide a good appearance for the wearer. 2. Have the same or similar style and design features of regular work clothes worn by other agricultural workers.
Complexity	Ease of Use	1. Launder easily. 2. Insure ease of dressing. 3. Provide convenient features such as pockets to accommodate personal items and small tools. 4. Provide convenient features such as zippers, Velcro, drawstrings, etc., as opposed to buttons.
Observability	Visibility	1. Prevent any visible signs of pesticide residue on the skin. 2. Insure the absence of any ill effects after pesticide usage. 3. Be like that of commercial applicators.

*The trialability variable is measured relative to likelihood to purchase, Section I.

Risk Perception

As indicated, a further measure employed to determine consumer adoption/purchase intention was risk perception. The risk component in this study is associated with the degree of certainty or uncertainty individuals associate with a product, self or other incident (danger/ hazard). The subjective nature of risk estimation and evaluation in a decision-making process is a difficult one to assess.

"Product uncertainty" is the variable employed to measure the degree of confidence a user has in a product. The pending assumption is that a potential user may not be confident that the product measures up to professed performance claims. In that workers have performed certain agricultural related tasks over a number of years with no apparent danger and without the necessity for special apparel, the underlying concept may tend to be somewhat overstated by a few in reference to the risk component. To further differentiate among variables within this category, a subgroup characterized as "information available" was devised. The premise being that availability of information may impact on future purchase or adoption decisions.

The variable of "product importance" was used to determine the value placed on the need for a particular product. It was assumed that buying decisions often rest on implied probabilities such as "the likelihood of" or "the results of" type factors when selecting protective apparel. More often it would appear the "acceptable" level of risk one would forego would impact on the degree of importance associated with product usage. In instances where risk was perceived to be relatively

low, it would tend to reduce the need for a product. The assumption was the reverse when the level of severity was considered. High levels of risk would seemingly lead to increased product demand.

The "product consequence" variable was used to examine the anticipated outcome in terms of consumer satisfaction. Actual product use may not be the sole criteria that determines consumer satisfaction. For example, a lack of product knowledge and the inconveniences posed from time expended through information search or comparative shopping may have a possible effect on the adoption or purchase decision. If risk related factors are relatively low, the cost may not outweigh the benefits derived as a result of such efforts. Discriminate variables included as a subgroup in this category were termed "danger awareness factors." In that all variables relate to product outcome, the latter group more specifically is product oriented as opposed to consumer behavioral outcomes.

The "consumer confidence" variable was included to determine the degree of confidence an individual had in his ability to discriminate between product choices. With each purchase, the consumer will assume some level of risk. The extent to which a consumer feels he is able to make a wise selection will more than likely have some influence on his adoption/purchase decision. (See Table 3.2 for a complete listing of risk perception variables.) Again, two levels of variables were used to measure the confidence levels within this category also. Whereas the former group refers to effects on purchasing, the sub-group focused on confidence levels attributed to friends, government or

Table 3.2. Question Format for Risk Perception Variable.

Variable	Statements
Product Risk:	
1--Product Undertainty (Product Specific)	Purchasing protective clothing is complicated by the many brands and conflicting performance claims of each manufacturer.
	Often protective clothing does not measure up to stated claim of the manufacturer.
Information Available	Pesticide workers would be better off if there were more public awareness concerning pesticide usage.
	There is a limited amount f information available to farmers regarding protective clothing.
	If more information were available on protective clothing the demand would be greater.
2--Product Importance	Compared to other things or subjects that interest me, the use of protective clothing is of considerable importance.
	The benefits derived from using protective clothing outweigh the money invested.
	The inconvenience of having to shop special stores for protective clothing is worth the time and effort.
	Farmers are taking unnecessary risk when using pesticides without protective clothing.
3--Product Consequence (Product Specific)	Protective clothing and equipment current available for pesticide users are hot and bothersome.
	I would consider it very serious if I purchased protective clothing and it proved to be unsatisfactory.
Danger Awareness Factors	The exposure that occurs when handling some pesticides could be harful to the body.
	Pesticide users should be more concerned about the dangers of pesticide to themselves.
	The popular press has overstated the risks of agricultural pesticides.
	Continued use of agricultural chemicals (pesticides) leads to increasing safety risk.
	The day to day risk of exposure from organic chemicals (pesticides) by farmers is small in comparison to usage by other applicators.
4--Consumer Confidence (Product Sepcific-- Effect on Purchasing)	I have considerable confidence inmy ability to make a good choice in my selection of protective clothing.
	I feel confident I have the ability to judge the quality of protective clothing (work clothes) that I use.
Personal Resource	Private companies are not as reliable as government agencies in testing the adequacy of protective apparel.
	Recommendations and experiences of friends or associates are often more reliable than manufacturers' claims regarding protective clothing.

manufacturers. Product nature may influence the number of sources a consumer will rely on in a decision-making process.

Risk-Handling Tactics

Marketers resort to a number of strategies to induce consumer buying. These strategies more often appear under such disguises as "buying incentives" and tend to play a major role in product selections. The actual number of purchase decisions determined on this basis is difficult to discern. A probable assumption is that such strategies may easily speed or reduce the uncertainty factor in the adoption process of protective apparel. For example, a money-back guarantee may well assure customer satisfaction or mean no investment loss on the part of the consumer. In this study, twelve risk-handling tactics were included to investigate relationships on the adoption-purchase decision in the selection of protective apparel. Determinant criteria were applicability to specific product and methods of purchase that may be utilized by the sample. The need to include a broad cross-section may be further supported by the diversified sample. High versus low farm/crop productivity regions might be indicative of diversified life styles. Today's media and retail approaches afford a wide variety of alternatives which tend to reduce the risk component relative to product purchase or product adoption. A complete listing of risk-handling tactics is provided in Table 3.3.

Innovativeness

The variable "innovativeness" was added to examine the degree individuals would be susceptible to change. The assumption being,

Table 3.3. Risk-Handling Tactics and Innovativeness Variables Question Format

Variables	Questions
Risk-Handling:	
Endorsement	Buy the product whose advertising had endorsement from a person like me, a celebrity or an expert on the product.
Brand loyalty	Buy the product I have used before and have been satisfied with in the past.
Major brand image	Buy a major, well-known product, and rely on the reputation of the manufacturer.
Private testing	Buy the product that has been tested and approved by a private testing company.
Store image	Buy the product from a reputable store.
Money-back guarantee	Buy the product that offers a money-back guarantee.
Government testing	Buy the product that has been tested and approved by an official branch of the government.
Cost/benefit	Shop around on my own and compare product features of similar products in several stores.
	Buy the most expensive product available in a product line.
	Buy the most elaborate design/style available in a product line.
Innovativeness:	
Innovation	Buy a new product just to see what it is like.
	Be the first of my friends to buy/try a new style or design.

regardless of efforts put forth in the diffusion process of protective apparel, traditional methods would prevail if individuals were inclined to resist change. However, this was not a major focus of this study.

The Sample

Sample selection was a cooperative effort undertaken with The University of Tennessee Extension Service Program. Participants were selected from the five Agricultural Extension Service Districts which include 95 counties in the state of Tennessee. The sample population consisted of 906 agricultural workers likely to be involved in the application of pesticides.

A perusal of agricultural data regarding farming patterns throughout the state of Tennessee resulted in dividing the state into two distinct regions. The western area (Districts 1 and 2) was recognized as being much higher in agricultural productivity. Districts 3, 4 and 5 (eastern region) (see Appendix A) indicated a somewhat lower level of farm productivity. Therefore, a higher number of respondents was selected from high agricultural productivity regions and a smaller number from low agricultural productivity regions.

The underlying research concept was introduced to extension service supervisors attending the Tennessee Extension Service Supervisors Meeting at the university (Appendix B). Supervisors were asked to contact the County Extension Leaders in their respective areas. Extension leaders in Districts 1 and 2 were requested to submit the name and addresses of 15 agricultural workers per assigned county.

Only five names and addresses of agricultural workers per assigned county were requested from leaders in Districts 3, 4, and 5.

Sample size and diversity of locales determined a mailed questionnaire as the appropriate data collection technique. Return of questionnaires was also by mail. Each participant was assured complete anonymity.

Garment Selection

Commercial catalogs were used in the final selection of the six garments used in this study. The intent was to provide as near as possible a complete cross-section of styles and/or designs of protective apparel available in today's consumer market for comparative purposes. Other considerations were fabric, safety, comfort, cost, color and convenience features. The six garments were randomly ordered for presentation in a final questionnaire. The garment choices in their order of presentation are:

Garment #1. Gore-Tex coveralls, Style A: prototype, not available on consumer market; highly recommended for safety and comfort; cost, $150.

Garment #2. Tyvek coveralls: minimum protection from pesticide penetration; uncomfortable in hot weather; cost, $8.50.

Garment #3. Neoprene overalls, jacket and hat: highly recommended for safety but not comfort; cost, $60.75.

Garment #4. Tyvek treated with Saranex coveralls: highly recommended for protection from pesticide penetration; uncomfortable in hot weather; cost, $26.50.

Garment #5. Denim jeans and chambray shirt: not recommended for safety; comfortable in hot weather; cost, $19.48.

Garment #6. Gore-Tex coveralls, Style B: highly recommended for safety and comfort; cost, $150.

Pretests

Two pretests were employed in the development of the final questionnaire used in this study. Participants in the pretest at the initial stage were University of Tennessee and University of Kentucky employees in extension service programs or related agricultural disciplines knowledgeable of the immediate area of study. On the basis of their constructive comments, the instrument was refined and a second questionnaire was developed.

A second pretest was then undertaken with farmers who were licensed certified applicators in Knox County, Tennessee; applicators in this area were excluded from the final sample selected for this study. Further refinement of the instrument was undertaken to develop a final questionnaire which consisted of two parts (see Appendix C).

Development of the Instrument

The two-part questionnaire was mailed as a data collection median in this research study. Part I focused exclusively on protective apparel products. Part II consisted of five sections: selection of protective apparel; selection factors for future protective apparel, risk perception; risk perception; opinions on protective clothing and

pesticide usage; risk-handling tactics; consumer-behavior--decision to purchase, and background information. The discussion in this section will follow the format of the questionnaire.

Selection of Protective Apparel

Section I of the questionnaire was directed toward Part I of the questionnaire which consisted of six different protective apparel garments. With one exception, Garment #1, each product is currently available on consumer market. No information was provided relative to product source.

The instructions in Section I were as follows:

> Instructions. Several protective apparel products with appropriate description and fabric sample for each have been included. Carefully read the information that is provided for GARMENT #1, #2, #3, #4, #5 and #6. For each of the garments listed, please check (√) the location on the scale that best describes your likelihood to purchase or not to purchase the garment.

Garment selections were measured on the basis of "likely not to purchase" or "likely to purchase" continuum using a five point scale as follows:

a. Garment #1 Likely not to purchase ___ ___ ___ ___ ___ Likely to purchase
1 2 3 4 5

A value of one was assigned "likely not to purchase" whereas "likely to purchase" rated a value of five. A higher rating would indicate a greater potential of adoption/purchase intention.

Attributes of Innovation

The format in Section II was altered to measure factors considered "important" or "unimportant" in future protective apparel selections. Attributes of innovation was the variable employed to measure selection factors. Garment attributes were classified into the attributes of innovation categories and verified by researchers (Henry, 1980; Orlando, 1979) to represent the best statement for each attribute.

Response categories were "very unimportant," "slightly unimportant," "neither important nor unimportant," slightly important" and "very important." For scoring, a value of five was assigned the "very important" and a value of one point for "very unimportant." A neutral position "neither important nor unimportant" was assigned a value of three points. The general question format and instructions follow:

> Instructions. For the following set of question, please indicate how important each of the listed factors will be in the decision to purchase your next protective clothing by placing a circle around the appropriate number following each statement.

When mixing or applying pesticides, it is important/unimportant that work clothes:	Very Unimportant	Slightly Unimportant	Neither Important Nor Unimportant	Slightly Important	Very Important
1. Launder easily.	1	2	3	4	5

Risk Perception: Opinions of Protective Clothing and Pesticide Usage

Question formulation in this section was to some extent based on research by Henry (1980) and Dash et al. (1976). However, a number of alterations were essential to maintain consistency within the present study. For example, Dash et al. used a variety of response categories, varying from three to six point scales. In this study, response categories were limited to five point scales as follows: "strongly disagree," "slightly disagree," "neither agree nor disagree," "slightly agree" and "strongly agree." Scoring ranged from a scale value of one point through a scale value of five points, respectively. To ascertain the level of risk (risk perception) individuals associate with a product or product usage, questions were designed to assess users opinions regarding protective apparel and pesticide usage.

Risk Handling Tactics: Consumer Behavior-- Decision to Purchase

Question design in this portion of the instrument was intended to measure the extent consumers rely on risk-handling tactics, in adoption/purchase situation. Research undertaken by Roselius (1971) provided the framework for question formulation. Again, the original instrument was refined and adjusted in accordance with present study objectives. For instance, the inclusion of risk-handling tactics such as "free sample" or "word-of-mouth" was not an applicable approach in this study. Considerations included product cost/benefit and product availability. Response categories and scoring values are consistent with format employed in Section II of the questionnaire.

"Innovativeness" was included as a companion variable in this section to ascertain the degree individuals would be susceptible to change. Seemingly, the less receptive an individual is to change the less apt he would be to adopt or purchase a new innovation (product) regardless of what major improvements have taken place over existing products (see Appendix C). A delineation of innovativeness variable is provided in Table 3.2, page 37.

Background Information

Section V included questions designed to ascertain relevant demographic information regarding nature and/or type of farm, production capacity, extent of involvement with pesticides, age and educational level of respondents. A simple check (✓) type format was employed to solicit responses (see Appendix C).

Administering the Instrument

Subjects were randomly selected per county relative to specific groups (Group I, Group II, etc.). The questionnaire was forwarded to each via mail. Several follow-up techniques were implemented to encourage further participation in the study. They consisted of two postcard mailings (see Appendix D), personal telephone contact with extension leaders in low response counties and in some instances with potential respondents. Finally, a second mailing of the questionnaire to nonrespondents followed.

Data Analysis

Frequency distributions were constructed to ascertain data relevant to type farm, acreage and practices employed in farm operations. To test the first hypothesis, analysis of variance (ANOVA) was used to determine group differences based on garment attribute information (cost, penetration, comfort). Duncan's Multiple Range Test (DMRT), also referred to as a means separation test or step down multistage test, was performed to substantiate multiple comparisons across groups and changes occurring in garment adoption/purchase decisions. Contrast statements were formulated to test the effects of withholding information on the likelihood to purchase individual garments.

The proc fastclus within the Statistical Analysis System (SAS) was used to profile respondents into clusters to test the influence of certain characteristics on adoption/purchase decisions. Groups were profiled by similar responses to attributes of garments, risk perception and risk-handling tactics. In addition, chi-square analyses were performed to further describe the clusters. Finally, means of garment preferences by cluster were partitioned with Duncan's Multiple Range Test to test the second hypothesis.

CHAPTER IV

FINDINGS AND DISCUSSION

Introduction

The purpose of this chapter is to present the findings and discussion of this research. Hypotheses have been restated and data derived from the questionnaires are examined statistically to determine whether the hypothesis should be accepted or rejected. A summary is provided for each.

Distribution of Respondents

Initially, nine hundred six questionnaires were mailed prospective participants. The final data base was comprised of 421 respondents, a 47% response rate. Less than 5% of the returned questionnaires were unusable. Reasons for excluding these questionnaires from the study follow: two, due to tardiness; six, by personal request; thirteen, improper address provided; eleven, due to improperly completed or incomplete questionnaires. However, to allow use of as many questionnaires as possible, several were included which did not have all sections completed. No partially completed sections were included. As a result, variations in total response will be noted.

Type Farm and Acreage

Table 4.1 provides distribution of respondents by farm type and acreage. Sixty-three percent of the subjects were actively engaged in

Table 4.1. Distribution of Respondents by Type Farms and Acreage.

Response Category	Frequency	Percent
Grow Fruit:		
Yes	85	20.4
No	332	79.6
Number Acres (Fruit):		
Under 5	55	63.2
5-10	10	11.5
11-25	13	14.9
26-50	6	6.9
51-75	-	-
Over 75	3	3.5
Grow Tobacco:		
Yes	139	33.2
No	280	66.8
Number Acres (Tobacco):		
Under 1	9	6.4
1-2	33	23.6
3-5	42	30.0
6-10	24	17.1
11-15	9	6.4
Over 15	23	16.4
Type Farm:*		
Vegetable	22	5.2
Field Crops	150	35.6
Nursery Stock	9	2.1
Livestock/Dairy	106	25.2
Field Crops & Livestock/Dairy	190	45.1
Other	15	3.6
Number Acres Farmed:		
Under 50	33	8.3
50-99	18	4.5
100-250	74	18.6
250-500	119	30.0
Over 500	153	38.5

*Multiple responses.

fruit growing with total acreage of five or less. Sixty percent of the respondents were involved in tobacco growing with acreage of five or less, also. Field crops and livestock/dairy were the major type of farm operations, either in combination or as separate units. Less than 2% were engaged in nursery stock and only 5% were involved in vegetable raising. The "other" category consisted primarily of swine operations. Other areas mentioned were: poultry, beef cattle, turf and golf course maintenance. Over two-thirds of the farm operations were comprised of acreage in excess of 250 acres.

Applicators

Over 80% of the respondents were the principal person involved in pesticide application, less than 10% was attributed to commercial applicators. Production acreage which required air blast and hand held spraying equipment was under 25%. Approximately 20% of the air blast spraying equipment was attributed to production acreages of over 75% compared to 4% for hand held equipment (see Table 4.2). Major use of hand held equipment, 65%, was for acreage of less than 25%.

Age and Education

Distribution of respondents by age and education is shown in Table 4.3. The greatest number of the sample was within the 25-34 year age group, followed by the age groups of 35-44 years and 45-54 years. Ninety-five percent of the total population had at least attained a high school or above education. Thirty-five percent had attained at least a high school education, 44%, an associate or four year degree and 11% attended graduate school.

Table 4.2. Principal Applicator and Acreage Percentage Sprayed by Specified Equipment.

Response Category	Frequency	Percent
Principal Applicator:*		
Myself	352	84.2
A Relative	33	7.8
Farm Employee	59	14.1
Commercial Applicator	9	2.9
Other**	5	1.2
Percent Acreage by:		
Air Blast Equipment:		
None	195	48.2
Less than 25%	71	17.5
25-49%	36	8.9
50-75%	28	6.9
More than 75%	75	18.5
Hand Held Equipment:		
None	102	24.6
Less than 25%	270	65.1
25-49%	19	4.6
50-75%	7	1.7
More than 75%	17	4.1

*Multiple responses.

**Renter.

Table 4.3. Distribution of Respondents by Age and Education

Response Category	Frequency	Percent
Age:		
Under 25 years	12	2.9
25-34	128	30.5
35-44	112	26.7
45-54	84	20.0
55-65	67	16.0
Over 65	17	4.1
Education:		
Eighth Grade	21	5.0
High School	149	35.5
Some College or Business School	84	20.0
Associate or 2-yr. Degree	17	4.1
4-yr. College	101	24.1
Attended Graduate School	48	11.4

Hypotheses Testing

To assist in analysis and discussion of data in this section, each null hypothesis is restated for immediate reference.

Hypothesis One

H_{n1}: No significant difference exists between garment selection when information is withheld relative to product attributes, cost, comfort and penetration.

The randomized complete block design was used to profile the four sample groups (Group I, II, III and IV) representing the four subsets of information withheld and six garment choices. Group I consisted of all information regarding garment characteristics. For Group II, penetration information was withheld. Cost information was not

provided subjects in Group III. Information pertaining to comfort was denied subjects in Group IV. An analysis of variance (ANOVA) was used to determine the significance of information on respondent's choice of garment selection. Garment selection was found to be significant for all groups (see Table 4.4).

Table 4.4. Influence of Information on Respondent's Choice of Garment Selection Based on Mean Squares of Information Withheld.

	Degrees of Freedom and Mean Squares							
	Group I All		Group II Penetration		Group III Cost		Group IV Comfort	
Source of Variation	df	M.S.	df	M.S.	df	M.S.	df	M.S.
ID (Subjects)	90	2.83	119	3.04	105	2.87	99	2.55
Garments	5	20.82*	5	62.67*	5	57.16*	5	10.57*
Error	439	2.18	589	1.97	493	1.97	484	2.21

*$p < .01$.

Once the garment selection was found to be significant, means were partitioned via Duncan's Multiple Range Test to determine how garment choices differentiated when information was withheld on penetration, cost and comfort. Findings are reported in Table 4.5 with letters representing significant differences in garment selection.

The impact of withholding information on subject's garment choice varied across groups. Jeans and chambray shirt were the first preferences for three of the four groups, the exception being Group III. The mean of jeans and chambray shirt, designated by letter A, was

Table 4.5. Duncan's Multiple Range Test by Group for Garment Choice by Questionnaire Type.

Groups Questionnaire Type	Garment Choice	Mean	Duncan's Multiple Range
Group I All	Jeans & Chambray Shirt	3.36	A
	Gore-Tex (Style A)	2.38	B
	Neoprene	2.38	B
	Gore-Tex (Style B)	2.33	B
	Tyvek	2.07	B
	Tyvek w/Saranex	2.05	B
Group II Penetration	Jeans & Chambray Shirt	3.87	A
	Neoprene	2.33	B
	Gore-Tex (Style B)	2.25	B
	Tyvek	2.23	B
	Gore-Tex (Style A)	2.00	B
	Tyvek w/Saranex	1.92	C
Group III Cost	Gore-Tex (Style B)	3.51	A
	Gore-Tex (Style A)	3.50	A
	Jeans & Chambray Shirt	2.97	B
	Neoprene	2.22	C
	Tyvek W/Saranex	2.01	D
	Tyvek	1.78	D
Group IV Comfort	Jeans & Chambray Shirt	3.17	A
	Neoprene	2.70	B
	Gore-Tex (Style B)	2.41	B
	Tyvek w/Saranex	2.39	B
	Gore-Tex (Style A)	2.33	B
	Tyvek	2.32	B

significantly different from the remaining garments labeled B when complete information was provided. Jeans and chambray were the first preference of the subjects with no differentiation shown for the remaining garments.

In the absence of safety/penetration information, Group II, greater variation was apparent among garment choices. The mean of jeans and chambray shirt (A) differed significantly from the means of B and C. Jeans and chambray shirt were the first choice. Neoprene, Gore-Tex (Style B), Tyvek and Gore-Tex (Style A) were the second preference (B). Tyvek w/Saranex was the least preferred (C).

Greater variations were evident for the cost variable. When cost information was absent (Group III), the means of both Gore-Tex garments (A) were not significantly different from each other, but were from groups B, C and D. Rank order of garment choices were: the two Gore-Tex garments (A); jeans and chambray shirt (B); Neoprene (C); and the two Tyvek garments (D), respectively.

When comfort information was withheld (Group IV), garment preferences were the same as when all information was given (Group I). Jeans and chambray shirt (A) were the first preference. The second preference consisted of all other garments (B).

A visual representation of the changes in garment choice when different information was withheld can be seen in Figure 4.1. Jeans and chambray shirt can clearly be seen as a first preference for all groups with the exception of the group not receiving cost information.

As indicated in prior discussion, higher preference was noted for jeans and chambray shirt in the absence of penetration information.

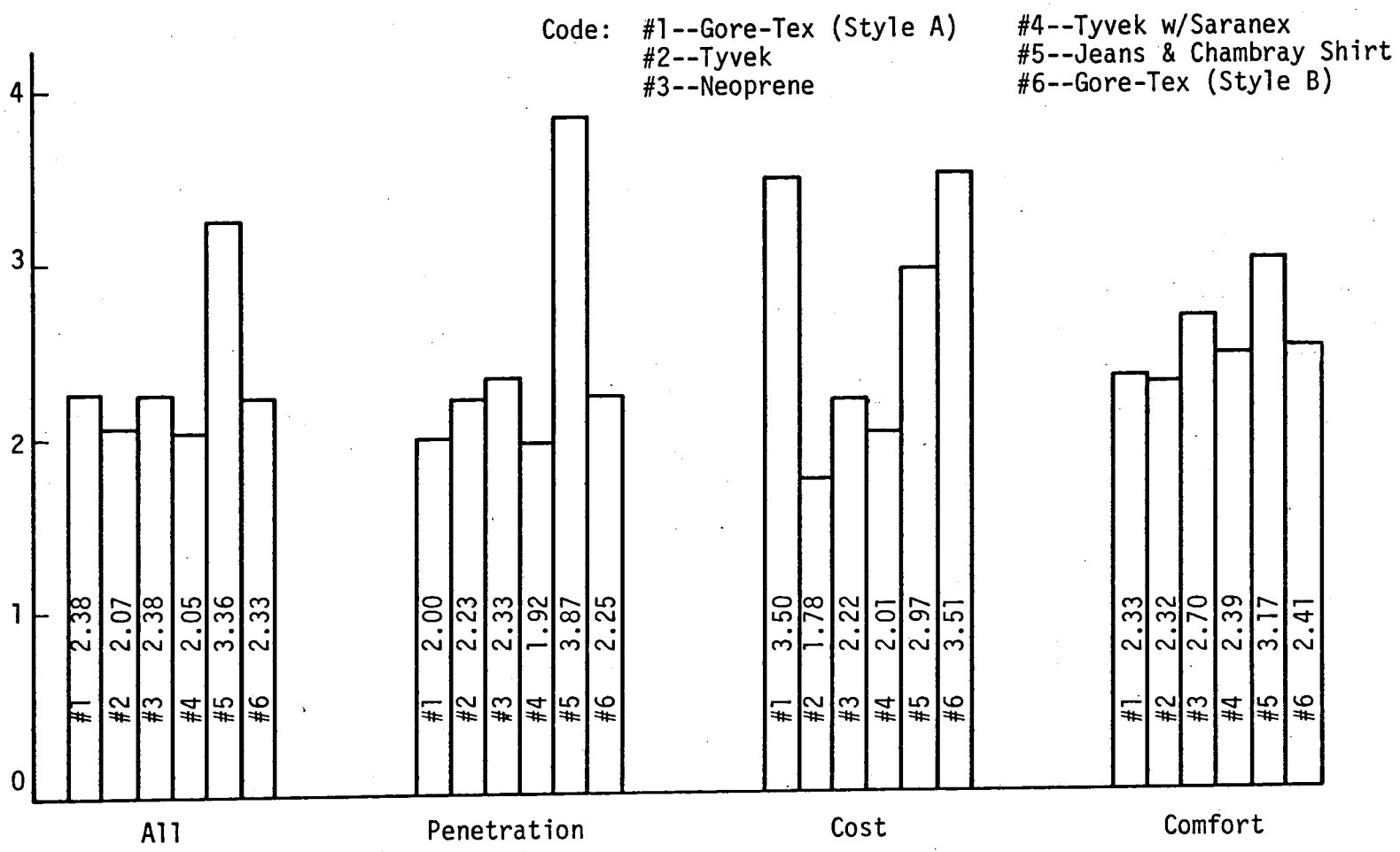


Figure 4.1. Variations in Garment Choice for Information Groups.

Gore-Tex (Styles A and B) are least preferred when penetration information is withheld than at any other instance. The two Gore-Tex garments (Styles A and B) tend to maintain similar levels of preference within each information group.

Neoprene was relatively stable in choice, however when comfort information was withheld it rose to second choice following jeans and chambray shirt. The two types of Tyvek garments were consistently in the lower half of the preferences. However, only in two groups, cost and penetration, were these garments significantly different from others least preferred.

Contrast statements were then formulated to investigate the changes occurring in garment preferences when certain information was absent. Data indicates there was a decisive shift in garment selections in the presence of all information versus the absence of information. Greater effects were observed when the cost variable was not present for the two higher Gore-Tex garments, F-value 31.61 and 28.7, respectively (see Table 4.6). The next significant difference was attributed to the penetration variable when associated with jeans and chambray shirt and Gore-Tex (Style A) garment. An initial conclusion being, cost is likely to have the greatest impact on subject's choices; also, subjects are more likely to assume the risk associated with penetration even when adequate information is available if the cost factor is apparent. Moderate variations were evident in the absence of comfort information for the two Tyvek and Neoprene garments. No significant changes were shown for the two Tyveks, Neoprene nor Gore-Tex

Table 4.6. Effects of Withholding Information on Likelihood to Purchase by Garment.

Source of Variation	Mean Squares	F-Value
A_0 vs. A_1 for G_1	7.63	3.67
A_0 vs. A_1 for G_2	1.67	n.s.
A_0 vs. A_1 for G_3	.11	n.s.
A_0 vs. A_1 for G_4	1.16	n.s.
A_0 vs. A_1 for G_5	13.47	6.49
A_0 vs. A_1 for G_6	.31	n.s.
A_0 vs. A_2 for G_1	59.69	28.7
A_0 vs. A_2 for G_2	3.60	1.73
A_0 vs. A_2 for G_3	1.12	n.s.
A_0 vs. A_2 for G_4	.16	n.s.
A_0 vs. A_2 for G_5	7.19	3.45
A_0 vs. A_2 for G_6	65.58	31.61
A_0 vs. A_3 for G_1	.16	n.s.
A_0 vs. A_3 for G_2	3.40	1.63
A_0 vs. A_3 for G_3	4.90	2.37
A_0 vs. A_3 for G_4	5.00	2.41
A_0 vs. A_3 for G_5	1.65	n.s.
A_0 vs. A_3 for G_6	.34	n.s.
Error	2.0759	--

*$p < .01$.

Code:

Type Information:

A_0 = All information provided
A_1 = Penetration information w/h
A_2 = Cost information w/h
A_3 = Comfort information w/h

Garment Choices:

G_1 = Gore-Tex (A)
G_2 = Tyvek
G_3 = Neoprene
G_4 = Tyvek w/Saranex
G_5 = Jeans & Chambray Shirt
G_6 = Gore-Tex (B)

(Style B) garments when penetration information was withheld. Only Neoprene and Tyvek w/Saranex were unaffected in the absence of the cost factor. The two Gore-Tex garments and jeans and chambray shirt were unaffected by the lack of comfort information.

Summary

The impact of withholding information was significant across all groups. Therefore, the null hypothesis "no significant difference exists between garment selection when information is withheld relative to product attributes, cost, comfort and penetration" was rejected.

The order of influence regarding information withheld was cost, penetration, all information, and comfort. Jeans and chambray shirt consistently were the first preference of each group except when the cost variable was absent. One would assume the presence of all information would more likely be the determinant factor in the final selection. More often the two Tyvek garments were least preferred. The Neoprene garment was a second preference when comfort and penetration information was evident. The fact that jeans and chambray shirt were yet a first choice in the presence of penetration information is difficult to discern. The irony being that seemingly a greater value is placed on cost versus safety or comfort. Therefore, subjects are willing to accept the risk in lieu of paying the price.

Hypothesis Two

H_{n2}: No significant difference exists between subjects' characteristics/profiles and garment selection.

The first step was to develop descriptive profiles of respondents to identify behavioral variations among groups related to product choices. A fastclus procedure referred to by Anderberg (1973) as nearest centroid sorting (a disjoint cluster analysis based on Euclidean distances) was used to differentiate respondents with similar characteristics into clusters or groups. The resultant clusters, 1, 2 and 3 (see Tables 4.7, 4.8 and 4.9), varied in characteristics for product attributes, risk perception, and risk-handling tactics. The three groups can best be differentiated by their responses to clothing characteristics as elicited through product attributes. Those showing the greatest awareness to clothing fell within Cluster 2. A moderate clothing awareness was found in Cluster 1 and those showing least interest in clothing awareness were in Cluster 3. Respondents falling in Cluster 2 had the highest scores for risk perception with respondents in Cluster 1 and Cluster 3 having lower and comparable risk-perception scores. Regarding risk-handling tactics, Cluster 2 again had the highest scores followed by Clusters 3 and 1. A summary of each cluster's responses provides greater insight into the subject's characteristic profiles.

Overall, Cluster 1 is more conservative in risk perception and risk-handling tactics but relatively high in clothing awareness. They have a high concern for product satisfaction, safety related risk, value the advice of friends, possess a moderate interest in cost, danger awareness, are less concerned with product importance (cost/benefits), available information and money-back guarantee. They are apt to be brand loyal and rely on manufacturer's reputation in purchases; are

Table 4.7. Deviations from Average Mean Score of Each Group's Factor Score for Attributes of Innovation.

Attributes of Innovation and Associated Variables	Statements	Mean Scores			R^2
		Cluster 1	Cluster 2	Cluster 3	
	When mixing or applying pesticides, it is important/unimportnat that work clothes:				
Relative Advantage					
Safety	Allow little or no penetration of pesticides.	4.36	4.82	1.34	.6098
	Will adequately cover areas of the body in danger from pesticide exposure.	4.53	4.90	1.43	.6665
Comfort	Are comfortable.	4.68	4.86	1.09	.7848
	Are not hot and bothersome.	4.59	4.88	1.14	.7371
	Are roomy (fit appropriately).	4.33	4.73	1.38	.6652
Compatability					
Ease of Use	Launder easily.	4.05	4.60	1.31	.4967
	Insure ease of dressing.	4.07	4.46	1.71	.4110
	Provide convenient features, such as pockets, to accommodate personal items and small tools. Provide convenient features, such as zippers, Velcro, drawstrings, etc., as opposed to buttons.	3.36	4.05	2.31	.1854
		3.47	4.23	2.00	.3054
Complexity					
Quality	Will last beyond one season.	4.09	4.56	1.49	.4609
	Will withstand heavy work and strain.	4.17	4.65	1.37	.5588
Cost	Are not any more expensive than regular work clothes.	4.07	4.27	1.60	.3820
	Can be worn for other agricultural use as well as pesticide application.	3.13	3.49	2.51	.0466
Aesthetics	Provide a good appearance for the wearer.	2.38	3.29	2.31	.1333
	Have the same or similar style and design features of regular work clothes worn by other agricultural workers.	2.79	3.45	2.66	.0711
Observability					
Visibility	Prevent any visible signs of pesticide residue on the skin.	4.35	4.82	1.50	.6301
	Insure the absence of any ill effects after pesticide usage.	4.60	4.91	1.26	.7581
	Be like that of commercial applicators.	2.41	3.55	2.40	.2060

Table 4.8. Deviations from Average Mean Score of Each Group's Factor Score for Risk Perception.

Product Risk Variables	Statements	Mean Scores			R^2
		Cluster 1	Cluster 2	Cluster 3	
1--Product Uncertainty (Product Specific)	Purchasing protective clothing is complicated by the many brands and conflicting performance claims of each manufacturer.	3.53	4.01	3.69	.0516
	Often protective clothing does not measure up to stated claim of the manufacturer.	3.28	3.84	3.60	.0878
Information Available	Pesticide workers would be better off if there were more public awareness concerning pesticide usage.	3.74	4.57	3.94	.1577
	There is a limited amount of information available to farmers regarding protective clothing.	-3.90	-4.25	-3.94	.0290
	If more information were available on protective clothing, the demand would be greater.	3.53	4.21	3.94	.1133
2--Product Importance	Compared to other things or subjects that interest me, the use of protective clothing is of considerable importance.	3.22	4.09	3.63	.1342
	The benefits derived from using protective clothing outweighs the money invested.	3.76	4.43	3.80	.1085
	The inconvenience of having to shop special stores for protective clothing is worth the time and effort.	3.13	4.01	3.54	.1345
	Farmers are taking unnecessary risk when using pesticides without protective clothing.	3.64	4.50	3.86	.1637
3--Product Consequence (Product Specific)	Protective clothing and equipment currently available for pesticide users are hot and bothersome.	4.01	4.02	3.91	.0009
	I would consider it very serious if I purchased protective clothing and it proved to be unsatisfactory.	4.37	4.83	4.29	.0920
Danger Awareness	The exposure that occurs when handling some pesticides could be harmful to the body.	4.61	4.87	4.53	.0420
	Pesticide users should be more concerned about the dangers of pesticide to themselves.	4.51	4.84	4.46	.0633
	The popular press has overstated the risks of agricultural pesticides.	-3.28	-2.95	-3.20	.0135
	Continued use of agricultural chemicals (pesticides) leads to increasing safety risk.	3.48	4.33	3.74	.1377
	The day to day risk of exposure from organic chemicals (pesticides) by farmers is small in comparison to usage by other applicators.	-3.26	-3.43	-3.34	.0041
4--Consumer Confidence (Product Specific--Effect on Purchasing)	I have considerable confidence in my ability to make a good choice in my selection of protective clothing.	3.87	4.38	3.86	.0712
	I feel confident I have the ability to judge the quality of protective clothing (work clothes) that I use.	3.71	4.35	3.69	.0922
Personal Resource(s)	Private companies are not as reliable as government agencies in testing the adequacy of protective apparel.	2.98	3.51	3.31	.0465
	Recommendations and experiences of friends or associates are often more reliable than manufacturers' claims regarding protective clothing.	3.55	4.16	3.20	.1086

Table 4.9. Deviations from Average Mean Score of Each Group's Factor Score for Risk-Handling Tactics and Innovation.

Risk-Handling Tactics	Statements	Mean Scores			R^2
		Cluster 1	Cluster 2	Cluster 3	
	When Buying Work Clothes, I Feel It Is Desirable to:				
Endorsement	Buy the product whose advertising has endorsements from a person like me.	2.83	3.65	3.00	.0942
	Buy the product whose advertising has endorsements from a celebrity.	1.45	1.84	1.74	.0360
	Buy the product whose advertising has endorsements from an expert on the product.	3.50	4.31	3.91	.1113
Brand Loyalty	Buy the product I have used before and have been satisfied with in the past.	4.48	4.73	4.09	.0506
Major Brand Image	Buy a major, well-known product, and rely on the reputation of the manufacturer.	3.35	3.81	3.57	.0461
Product Testing	Buy the product that has been tested and approved by a private testing company.	3.37	3.97	3.77	.0788
	Buy the product that has been tested and approved by an official branch of the government.	3.19	4.16	3.46	.1507
Store Image	Buy the product from a reputable store.	3.50	4.20	3.46	.1084
Money-Back-Guarantee	Buy the product that offers a money-back-guarantee.	3.50	4.18	3.63	.1049
Cost/Benefit	Shop around on my own and comapre product features of similar products in several stores.	3.56	3.98	3.20	.0653
	Buy the most expensive product available in a product line.	1.43	1.86	1.60	.0469
	Buy the most elaborate design/style available in a product line.	1.39	1.77	1.51	.0379
Innovation	Buy a new product just to see what it is like.	1.84	2.05	1.86	.0378
	Be the first of my friends to buy/try a new style or design.	1.37	1.74	1.74	.0008

less likely to seek incentives such as celebrity endorsements, government tested products or be the first of their friends to buy or try a new product.

Cluster 2 is very high in clothing awareness and risk perception. They show a very positive concern for personal appearance, safety, comfort, product satisfaction and importance, public interest, self confidence, advice by experts and friends, shopping, brand loyalty, government tested products and store and brand image. Less concern is shown for dressing like or similar to others, price, being first to purchase or buy an elaborate or expensive product, celebrity endorsement and innovativeness. However, when compared to other groups, this group is more likely to be innovative.

Cluster 3 is more "middle-of-the-road" type in terms of risk perception and risk-handling tactics. They are least concerned with personal appearance and garment characteristics but show a moderate preference for not being different in dress. They have a positive concern for danger awareness, availability of information, product importance and uncertainty; show less concern for brand loyalty, advice of friends or associates, product performance, shopping and comparing product features than other groups.

Chi-square analyses were used to determine if demographic and socioeconomic data could help describe differences between clusters. Age and education were significantly different across all clusters (see Table 4.10). The main differences in age among groups was found in Cluster 2 with that group being somewhat older. Cluster 3, though

Table 4.10. Relationship of Age and Education Between Clusters Based on Adoption/Purchase Decision.

Variables	Cluster 1		Cluster 2		Cluster 3		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Age:[a]								
Under 25 yrs.	2	.5	10	2.4	--	--	12	2.9
25-34 yrs.	65	15.5	55	13.1	8	1.9	128	30.4
35-44 yrs.	48	11.4	55	13.1	9	2.1	112	26.6
45-54 yrs.	32	7.6	42	10.0	10	2.4	84	20.0
55-64 yrs.	27	6.4	35	8.3	5	1.2	67	16.0
65 and over	1	.2	13	3.1	3	.7	17	4.1
Total Base	(175)	(41.7)	(210)	(50.0)	(35)	(8.3)	(420)	(100.0)
Education:[b]								
Eighth Grade	4	1.0	12	2.9	5	1.2	21	5.0
High School	43	10.2	94	22.4	12	2.9	149	35.9
Some College or Business School	37	8.8	39	9.3	8	1.9	84	20.0
Associate or 2-yr. Degree	10	2.4	6	1.4	1	.2	17	4.1
4-yr. College Degree	57	13.6	38	9.1	6	5.0	101	24.1
Attended Graduate School	24	5.7	21	5.0	3	.7	48	11.4
Total Base	(175)	(41.7)	(210)	(50.0)	(35)	(8.3)	(420)	(100.0)

[a] $\chi^2 = 21.096$; p .0204; 10 d.f.
[b] $\chi^2 = 32.843$; p .003; 10 d.f.

fewer in number, tended to have a greater number under the age of 54 years.

The difference in education between groups were: Cluster 1 has more subjects with higher degrees; Cluster 2 had fewer people with above high school education; and Cluster 3 had the least number of subjects with higher education.

Overall, age and education did not seem to profile the clusters very well. The fact that Cluster 2 was older and that more were in the lower education group tends to support the idea that they are more apt to rely on experience for their conscientiousness relative to garment selection. They were higher in clothing attributes, risk perception and risk-handling tactics than the other two clusters.

Cluster 1 tended to be younger and better educated than other groups. Their youth and education may help to explain their lack of consistency across categories; moderate concern for clothing attributes and risk perception and only a slight interest in risk-handling tactics. The high concern among this cluster for endorsements by experts, private tested products, major store and brand image and shopping to compare product features further supports their lack of confidence in product offerings on the consumer market. These factors are apt to improve one's level of confidence relative to product performance.

Cluster 3 evidenced the least number of respondents in higher education groups. Age distribution was relatively similar throughout the various levels, the exception being the under 25 years of age category. The lack of education and diverse age distribution tends to support their lack of concern for clothing attributes.

No significant differences were noted when other demographic data were considered. That is, farm size, type of crops and principal applicator could not be differentiated by clusters.

To determine differences in adoption/purchase decision by clusters, a Duncan's Multiple Range test was performed (see Table 4.11). For Cluster 1, jeans and chambray shirt were a first preference in all instances, even in the presence of penetration information. There was no difference in garment choice between Group I, all information and Group II, penetration information withheld. Jeans and chambray shirt were the first choice (A) for both groups. However, the means scores varied, 3.65 and 4.49, respectively. There was no differentiation among any of the other garments. When cost information was not given to Cluster 1, the garments fell into two groups (A and B). Garment choices preferred first (A) were jeans and chambray shirt and the two Gore-Tex garments. The remaining garment choices were all of second choice (B). Garment choices partitioned in the absence of comfort information for Cluster 1 comprised three groups, A, B, and C. The mean of garment choice, 3.45 for jeans and chambray shirt was significantly different from that of groups B and C.

Considering this cluster is youngest of the three, seemingly they would be more susceptible to change. However, this was not the case. The reason could be related easily to their least concern among the clusters for the risk perception (danger awareness) factor. Perhaps the idosyncrasy being, youth reduces the perception of the risk factor. Also, this tends to support the heuristic nature of risk assessment on the part of respondents.

Table 4.11. Differences Among Garments Partitioned With Duncan's Multiple Range Test by Cluster and Questionnaire Type: Cluster 1.

Groups Questionnaire Type	Garment Choice	Mean	Duncan's Multiple Range
Group I			
All	Jeans and Chambray Shirt	3.65	A
	Gore-Tex (Style B)	2.23	B
	Tyvek	2.18	B
	Gore-Tex (Style A)	2.10	B
	Neoprene	2.08	B
	Tyvek w/Sraanex	2.03	B
Group II			
Penetration	Jeans and Chambray Shirt	4.49	A
	Neoprene	2.14	B
	Tyvek	2.10	B
	Gore-Tex (Style B)	1.80	B
	Tyvek w/Saranex	1.73	B
	Gore-Tex (Style A)	1.72	B
Group III			
Cost	Jeans and Chambray Shirt	3.18	A
	Gore-Tex (Style B)	3.15	A
	Gore-Tex (Style A)	3.05	A
	Neoprene	2.18	B
	Tyvek w/Saranex	2.03	B
	Tyvek	1.87	B
Group IV			
Comfort	Jeans and Chambray Shirt	3.45	A
	Neoprene	2.66	B
	Tyvek w/Saranex	2.34	B
	Tyvek	2.27	B
	Gore-Tex (Style A)	1.93	C
	Gore-Tex (Style B)	1.84	C

The findings for differences among garments partitioned with Duncan's Multiple Range test for Cluster 2 are reported in Table 4.12. When all information was present, the two Tyvek garments were least preferred (B) which indicates the other garments were similarly grouped (A). For the penetration variable, the garments differentiated into three groups (A, B and C). Jeans and chambray shirt (A) were a first choice followed by Gore-Tex (Style B) (B). The remaining garments were grouped together as a third choice (C). When cost information was withheld, the garments fell into three groupings (A, B, and C). The two Gore-Tex garments were a first preference (A). The second garment choice was jeans and chambray shirt (B), followed by remaining garments (C) which were viewed as equal choices. For the comfort variable, mean scores were comparable with no preference among garments. Since this group was somewhat older of the three groups, it is highly likely that these individuals would prefer garments they have used before and with which they have been satisfied in the past. On the basis of mean scores, individuals tended to be more likely to be brand loyal than the other clusters.

There was less differentiation in garment choice by subjects in Cluster 3 than in either of the other clusters (see Table 4.13). When penetration and comfort information was withheld, all garments were viewed as equal (A). When cost information was withheld and all information was given only Tyvek (B) was viewed as a lower choice than all other garments (A). For this group, selections appear to be randomly made in spite of information available. This fact could relate

Table 4.12. Differences Among Garments Partitioned With Duncan's Multiple Range Test by Cluster and Questionnaire Type: Cluster 2.

Groups Questionnaire Type	Garment Choice	Mean	Duncan's Multiple Range
Group I			
All	Jeans and Chambray Shirt	3.11	A
	Neoprene	2.71	A
	Gore-Tex (Style A)	2.65	A
	Gore-Tex (Style B)	2.51	A
	Tyvek w/Saranex	2.09	B
	Tyvek	2.05	B
Group II			
Penetration	Jeans and Chambray Shirt	3.66	A
	Gore-Tex (Style B)	2.64	B
	Neoprene	2.42	C
	Tyvek	2.32	C
	Gore-Tex (Style A)	2.24	C
	Tyvek w/Saranex	1.93	C
Group III			
Cost	Gore-Tex (Style A)	3.86	A
	Gore-Tex (Style B)	3.70	A
	Jeans and Chambray Shirt	2.81	B
	Neoprene	2.09	C
	Tyvek w/Saranex	1.90	C
	Tyvek	1.66	C
Group IV			
Comfort	Jeans and Chambray Shirt	2.90	A
	Gore-Tex (Style B)	2.88	A
	Neoprene	2.75	A
	Gore-Tex (Style A)	2.71	A
	Tyvek w/Saranex	2.50	A
	Tyvek	2.39	A

Table 4.13. Differences Among Garments Partitioned With Duncan's Multiple Range Test by Cluster and Questionnaire Type: Cluster 3.

Groups Questionnaire Type	Garment Choice	Mean	Duncan's Multiple Range
Group I			
All	Jeans and Chambray Shirt	3.16	A
	Gore-Tex (Style A)	2.28	A
	Tyvek w/Saranex	2.14	A
	Neoprene	2.00	A
	Gore-Tex (Style B)	1.85	A
	Tyvek	1.67	B
Group II			
Penetration	Neoprene	2.67	A
	Tyvek w/Saranex	2.53	A
	Jeans and Chambray Shirt	2.53	A
	Gore-Tex (Style B)	2.40	A
	Tyvek	2.33	A
	Gore-Tex (Style A)	2.07	A
Group III			
Cost	Gore-Tex (Style B)	4.00	A
	Neoprene	3.43	A
	Jeans and Chambray Shirt	3.14	A
	Gore-Tex (Style A)	2.86	A
	Tyvek w/Saranex	2.71	A
	Tyvek	2.00	B
Group IV			
Comfort	Jeans and Chambray Shirt	3.40	A
	Gore-Tex (Style B)	3.00	A
	Neoprene	2.60	A
	Tyvek	2.00	A
	Gore-Tex (Style A)	2.00	A
	Tyvek w/Saranex	1.80	A

to their lack of interest in clothing or appearance. However, when cost information was withheld, Gore-Tex (Style B) was among the first preference which is consistent with the other clusters, 1 and 2. Too, this is consistent with the fact that they showed the least concern for cost among clusters. They were unconcerned about whether a product lasted beyond one season or could withstand the work stress. The lack of interest in safety or comfort and ease of use features also supports the random pattern in garment choices.

Relationship to Consumer Decision-Making Model

To further examine the factors influencing the adoption/purchase intent, the characteristics of each cluster were compared to the consumer decision-making model presented in Chapter I. Findings indicate the more significant factors attributed to demographic data among subjects are age and education (see Table 4.10, p. 65). None of the groups could be characterized as innovators. However, on the basis of mean scores from the risk-handling tactics, the more likely group to be innovative is Cluster 2.

Relative to product attributes, Cluster 2 showed a higher concern across all areas, product attributes, risk perception and risk-handling tactics. Higher concern among this group were for observability (danger awareness factors) and relative advantage (safety and comfort). Complexity and compatibility were similar in concern. Cluster 1 was similar in pattern to Cluster 2, however they were somewhat more conservative. Compared to other clusters, Cluster 3 showed least

concern for product attributes related to safety or danger awareness factors. A moderate interest was shown for compatibility (aesthetic and cost) and observability (dress like others).

In the area of risk perception, Cluster 2 was more likely to consider product importance, product consequence and rely on consumer confidence or product uncertainty (information available), in this order of decision-making. No risk-handling tactic was unique for this group. However, in terms of preference, the following ordering was observed: (1) brand loyalty, (2) reputable store or government tested products, and (3) shop and compare product features or private tested products or manufacturer's reputation. A number of similarities were apparent across preferences. Actions among this group may reflect the maturity and lesser education attainment of respondents, older age group and fewer above high school level. Patterns of decision-making may be well established and not easily altered.

Summary

The second null hypothesis that there is no difference between subjects characteristics/profiles and garment selection was rejected. Significant differences were observed across all groups. Three unique profiles observed may be delineated as follows: Cluster 1, conservative, yet opinionated in decision-making; Cluster 2, conscientious or high awareness levels across all categories; and Cluster 3, middle-of-the-road in decision making. Variation among clusters may be attributed to age and education. The older, Cluster 2, was included

toward tradition and experience; the young, Cluster 1 was likely to be inconsistent in decision-making behavior.

Relative advantage (safety and comfort) and observability (danger awareness) were rated more important by Clusters 1 and 2. Conclusive here is that respondents are aware of product need, but were reluctant to change since no associated health hazards were as "yet" apparent. Similarities were also found between the same clusters of respondents for the attributes of complexity and compatibility. For complexity, Cluster 1 rated quality higher; cost and quality ranked higher for Cluster 2 followed by aesthetics for Cluster 3. Perhaps the appropriate question to raise at this point is, are individuals willing to pay the price for quality? Prior findings (Murray, 1982) tend to suggest that they will not since cost was a major determinant in overall garment choice when information was withheld.

Garment care and ease of dressing were most important to Cluster 1 and 2 and convenient features were of more concern among Cluster 3 which supports their lesser interest in clothing awareness. More often, observability related to danger awareness factors for all groups except Cluster 3 whose major concern was being like or similar in dress to others.

No discernible pattern was noted across clusters in risk perception. However, product consequence was rated first by Clusters 1 and 3 whereas product importance was a first concern among Cluster 2. The level of significance or value an individual places on a commodity/product could easily influence adoption/purchase intent. Other

attributing factors may be the degree of complexity and how compatible it is with existing consumer needs or demands.

Brand loyalty more often was the major incentive or risk-handling tactic employed by respondents across all groups, followed by expert endorsement among Clusters 2 and 3. The second preference for Cluster 1 was to shop and compare product features. Manufacturer's reputation was the least preferred among the top five incentives employed. Product nature is like to be the guideline used to determine which of the risk-handling tactics one would use.

A final decision-making process is seldom based on one criterion. The following behavioral patterns were observed among the clusters:

Cluster 1 was likely to base decision-making on product attributes and risk perception.

Cluster 2 was likely to base decision-making on product attributes, risk perception and risk-handling tactics.

Cluster 3 was likely to base decision-making on risk perception and risk-handling tactics.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The intent of the study was to evaluate the effects of perceived product attributes of functionally designed protective apparel and risk related factors related to adoption/purchase decisions. Researchers have concluded that protection, comfort and cost more often are the deciding factors related to adoption/purchase decisions.

A two part questionnaire was used to ascertain subject responses: Part I was limited to the illustration of protective apparel products with descriptions and fabric samples for each; Part II consisted of five response categories: garment selection, product attributes, risk perception, risk-handling tactics and demographic data. Four different questionnaire types were used for Part I; one contained all information whereas either penetration, cost or comfort information was withheld from the remaining three. A scale response, one through five range, was employed for each variable.

The mailed questionnaire was used to elicit data from active pesticide applicators from the five Agricultural Extension Service Districts or ninety-five counties in the state of Tennessee. Six products which varied in characteristics were studied. In one instance, the product was not available on today's consumer market.

Success or failure of a product hinges on its rate of adoption. Therefore, the study was undertaken to examine product and consumer

characteristics which would better enable marketers to reach prospective markets. An applicable approach to address the rate of adoption was Rogers and Shoemaker's (1971) attributes of innovation which provided the conceptual framework for this research. As theorized, the perceived attributes of relative advantage, compatibility, complexity, observability and trialability are significantly related to a product's rate of adoption.

The relative advantage of the product as perceived for this study were safety and comfort. Factors to determine compatibility were quality, cost and aesthetics. Ease of use was the variable used for complexity while visibility was the associated criterion for observability. The trialability attribute was associated with adoption/purchase intent in reference to garment choice.

In that product attributes are not the sole criterion on which to base adoption/purchase intensions, additional dimensions considered were risk perception, risk-handling tactics and demographics. The risk-perception dimension was delineated as follows: product uncertainty, product specific and information available; product importance; product consequence, product specific and danger awareness; and consumer confidence, product specific and personal resource.

Discriminating variables associated with risk-handling tactics related to product endorsement (person like self, celebrity or expert), brand loyalty, major brand image, private and government testing, store image, money-back guarantee and cost benefits (comparison shopping, expensive versus elaborate design/style of product). Demographic data was limited to type of farm and acreage, type of application

equipments (air blast or hand held), principal applicator, age and education. Each dimension (product attribute, risk perception, risk-handling tactics and demographics) was incorporated into a decision-making model to better describe the relationship of each in a decision-making process.

Four hundred twenty-one applicators responded to the mailed questionnaire. More than half were engaged in fruit and tobacco growing with acreage of five or fewer acres. The majority, 80% of farm operations were field crops and livestock/dairy and field crops, either as separate units or a combination. Less than 2% were engaged in nursery stock. More often mentioned for the "other" category were swine, poultry or beef cattle operations.

The principal applicators were the respondents; only 10% of the respondents used commercial applicators. Air blast or hand held equipment was used in less than 25% of total farm acreages.

A large number of respondents were within 25 to 44 years of age while less than 5% were either under 25 or over 65 years of age. Sixty percent of the respondents were above the high school level in education. Twenty-six percent had attained a four-year degree or had attended graduate school. Only 5% were at the eighth grade level and 35% were at the high school level.

Respondents were divided into four groups, Group I, II, III and IV, according to information withheld by questionnaire type. The results of withholding information on respondent's choice of garments was significant. Variations by questionnaire type indicate penetration,

cost, all information and comfort respectively were significant. However, when differentiated on the basis of changes in garment choices across groups, greater effects were observed for the cost variable, followed by penetration, all information and comfort. In each of the above instances cited, jeans and chambray shirt were the preferred garment choices among groups, except when cost information was withheld. The preferred garment choices in the absence of cost information were the two Gore-Tex garments. Only moderate significance was observed among the other garment preferences when penetration, comfort and all information was a concern.

Descriptive profiles devised by the fastclus statistical procedure to identify behavioral characteristics among groups in relation to garment selection are identified below. Cluster 1 was observed to be more conservative among groups, moderately high in risk perception and risk-handling tactics, but higher in clothing awareness factors. The more conscientious group, Cluster 2, rated all areas of awareness, product attributes and risk, higher than other groups. Least concern for personal appearance was evidenced by Cluster 3. However, they ranked second in risk perception and risk-handling tactics.

Chi-square analyses were used to substantiate relative significance among cluster characteristics and garment preferences based on demographics in the absence of information on cost, penetration and comfort. Only age and education were positively related. Cluster 2 was older with fewer respondents above the high school level. Cluster 1 was the youngest plus best educated group whereas Cluster 3 tended to be under 54 years of age and least educated.

Differences in adoption/purchase decisions as validated by the Duncan's Multiple Range Test indicated greater variations in garment selection in the absence of cost information than did any other variable across clusters. Still, jeans and chambray shirt were a first preference, except when cost information was a factor.

Some similarities were anticipated across clusters in decision-making, however significant variations were evident among the clusters. No one criterion was used, meaning a variety of strategies were unique to each. Whereas Cluster 2 used all dimensions as criterion, Cluster 1 was more prone to rely on product attributes and risk perception variables. Cluster 3 was more inclined to resort to risk perception and risk-handling tactics in a decision-making process. Considering the higher awareness levels associated with other dimensions included in the decision-making model, respondents across groups are not likely to be innovative in behavior.

Conclusions

Several conclusions were derived from this study. First, a significant relationship exists between garment choice and product attributes when certain information is withheld. The more positive effect was apparent when cost information was withheld. It was demonstrated that in spite of information given, individuals will undergo unnecessary risk in lieu of cost-benefits derived. Jeans and chambray shirt were consistently the preferred garment choice when cost was unknown. Gore-Tex (Style A and B) was consistently a first choice when cost was unknown.

Besides looking at the effects for certain garment attributes when information was withheld garment attributes developed from attributes of innovation categories were also examined. Cost (compatibility) tends to be the more critical factor when determining adoption/purchase intent. Overall, safety (relative advantage) was secondary in spite of high danger awareness levels of association by respondents. Comfort (relative advantage) was a moderate concern as was ease of use (complexity).

Regarding risk perception, respondents lacked consistency between awareness factors and garment choice. Danger awareness and product consequence were the factors more favorably associated with product attributes. However, it was confirmed that cost was the more significant variable in adoption/purchase decisions. These results indicate that unless hazards associated with pesticide usage are better documented, respondents are prone to rely on unrealistic risk assessments in adoption/purchase decisions.

Respondents rated brand loyalty high in risk-handling tactics. However, it was shown that a variety of tactics are employed. Marketers should be alert to a variety of approaches in advertising protective apparel.

In examining subjects, age and education are more significantly related than other demographic data. Older respondents perceive all areas of product attributes, risk perception and risk-handling tactics more positively than do other groups yet are probably not likely to alter garment selections in terms of cost-benefits derived by doing so.

The propensity among the younger and better educated group, Cluster 1, to assume unnecessary risk is not easily discerned. This group indicated least concern toward danger awareness and risk-handling tactics.

Decision-making patterns vary with groups. Cluster 2 relates positively to all dimensions, Cluster 1 to product attributes and risk perception and Cluster 3 to risk perception and risk-handling tactics.

Recommendations

Successful marketing of innovations can be complex. The present study was an attempt to further research efforts in the area of functionally designed protective apparel and to successfully market such apparel. The proposed hypotheses drew on the conceptual framework of attributes of innovation and previous research related to the impact of risk perception and risk-handling in consumer behavior. Special attention was given to the effect of information, cost, penetration and comfort as related to product attributes with adoption/purchase intent. The following recommendations are delineated in anticipation of further investigation in this area:

1. The inclusion of commercial applicators should be considered to further diversify population studied.
2. Another approach, other than the catalog concept, could be employed which provides the opportunity for actual examination of product(s) offered.
3. Similar studies may be undertaken with other product innovations.

4. Follow-up study to verify if adoption/purchase of protective apparel has transpired as a result of information provided.

The following recommendations can be made to those marketing protective apparel:

1. Marketers should focus more on communicating product attributes (characteristics). High perception levels associated with product risk were not consistent with adoption/purchase response (garment selection).
2. Marketing strategies should include a variety of incentives as no particular group relied on a single criteria.
3. Marketers should be alert to the value of cost associated with product offerings. The cost factor is apt to be the more likely criteria in adoption/purchase decisions.

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APPENDIXES

APPENDIX A

TENNESSEE MAP OF EXTENSION SERVICE DISTRICTS

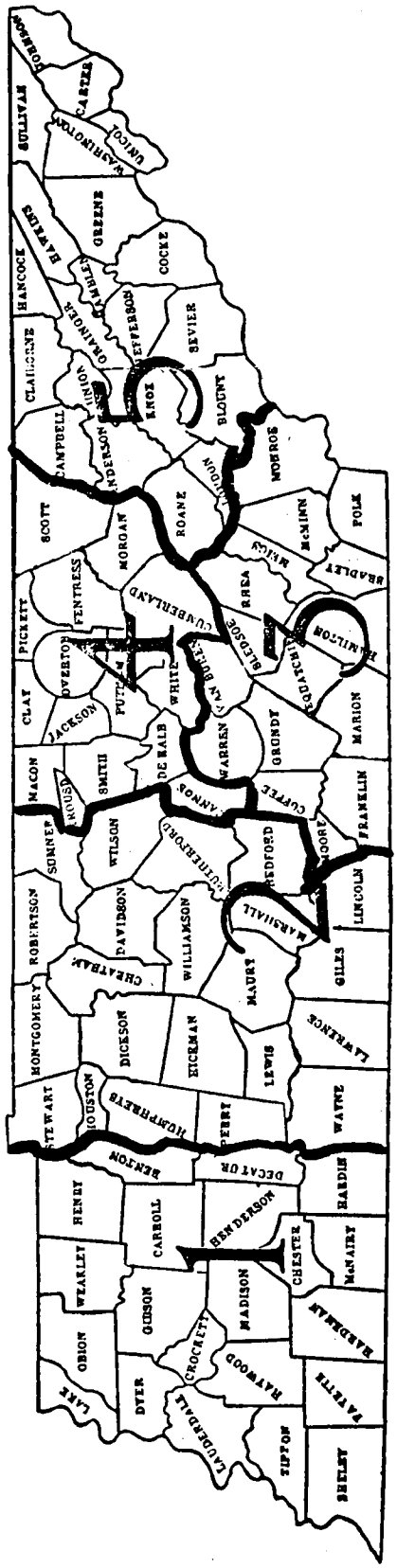

Figure A.1. Tennessee Map of Extension Service Districts.

APPENDIX B

LETTER TO EXTENSION SUPERVISOR TO SELECT PARTICIPANTS

Textiles, Merchandising & Design
COLLEGE OF HOME ECONOMICS / THE UNIVERSITY OF TENNESSEE, KNOXVILLE 37996-1900 / (615) 974-2141

Apparel and Textiles • Housing • Interior Design • Merchandising • Textile Science

May 9, 1983

Dear Tennessee Agricultural Service Personnel:

We at The University of Tennessee, Knoxville in the Department of Textiles, Merchandising and Design are trying to determine current and future apparel needs of farmers who are or will be involved in pesticide application. Your response is vital to the success of this research, which aims for truly representative findings.

Hazards often associated with pesticide application have generated new concern among today's society. Seemingly, the impact of this concern has eluded the pesticide applicator group. The fact is, appropriate apparel usage is limited, in spite of product innovations within today's market. The question of how do we reach or encourage increased usage of such apparel among this group is important. By examining diverse users' preferences, opinions and experiences, considerable insight into the complexities of usage of protective apparel may be obtained. The benefits derived may be reflected through:

1) awareness of applicators relative to product benefits

2) improved marketing strategies

3) dissemination of information relative to product advantages and disadvantages

4) improved product offerings

We are asking for your help in providing names of agricultural workers to be included in this study. Our request is that Extension personnel in:

1) Tennessee Districts 1 and 2, submit the names and addresses of fifteen (15) farmers per county that are actively involved in pesticide application

2) Tennessee Districts 3, 4 and 5 submit the names and addresses of five (5) farmers per county that are actively involved in pesticide application.

We also ask that you give us your name and the respective county(ies) in which you are employed.

Each individual will be sent a copy of the enclosed questionnaire and asked to complete and return it to us. We guarantee that individual responses will remain anonymous. Our interest is in statistical relationships only.

Your prompt response will be helpful. We would appreciate receiving your list by June 1st. A complete packet of the questionnaire has been provided for your information. Your cooperation is important to us and is very much appreciated.

Sincerely,

Ruth M. King
Ph.D. Candidate

Jacquelyn O. DeJonge
Professor and Department Head

APPENDIX C

QUESTIONNAIRE

PROTECTIVE APPAREL QUESTIONNAIRE

INSTRUCTIONS:

This questionnaire has several sections each dealing with different aspects of your preferences and opinions relative to protective apparel and/or pesticides and experiences in the market place.

You will find that the questions have been designed so that you can answer the entire questionnaire quickly. For your questionnaire to be included in the analysis, you must answer all questions, even those for which you have little preference or no strong opinions.

(Please proceed to **SECTION I.**)

SECTION I: SELECTION OF PROTECTIVE APPAREL

Several protective apparel products with appropriate description and fabric sample for each have been included. Carefully read the information that is provided for GARMENTS #1, #2, #3, #4, #5, and #6. For each of the garments listed, please **check** (✓) the location on the scale that best describes your likelihood to purchase or not to purchase the garment.

a. GARMENT #1	Likely not to purchase	___ 1	___ 2	___ 3	___ 4	___ 5	Likely to purchase
b. GARMENT #2	Likely not to purchase	___ 1	___ 2	___ 3	___ 4	___ 5	Likely to purchase
c. GARMENT #3	Likely not to purchase	___ 1	___ 2	___ 3	___ 4	___ 5	Likely to purchase
d. GARMENT #4	Likely not to purchase	___ 1	___ 2	___ 3	___ 4	___ 5	Likely to purchase
e. GARMENT #5	Likely not to purchase	___ 1	___ 2	___ 3	___ 4	___ 5	Likely to purchase
f. GARMENT #6	Likely not to purchase	___ 1	___ 2	___ 3	___ 4	___ 5	Likely to purchase

SECTION II: SELECTION FACTORS FOR FUTURE PROTECTIVE APPAREL

For the following set of questions, please indicate how **important** each of the listed factors will be in the decision to purchase **your next** protective clothing by placing a **circle** around the appropriate number following each statement.

WHEN MIXING OR APPLYING PESTICIDES, IT IS IMPORTANT/UNIMPORTANT THAT WORK CLOTHES:	VERY UNIMPORTANT	SLIGHTLY UNIMPORTANT	NEITHER IMPORTANT NOR UNIMPORTANT	SLIGHTLY IMPORTANT	VERY IMPORTANT
1. Launder easily.	1	2	3	4	5
2. Are comfortable.	1	2	3	4	5
3. Insure ease of dressing.	1	2	3	4	5
4. Are not hot and bothersome.	1	2	3	4	5
5. Will last beyond one season.	1	2	3	4	5
6. Are roomy (fit appropriately).	1	2	3	4	5
7. Will withstand heavy work and strain.	1	2	3	4	5
8. Provide a good appearance for the wearer.	1	2	3	4	5
9. Allow little or no penetration of pesticides.	1	2	3	4	5
10. Are not any more expensive than regular work clothes.	1	2	3	4	5
11. Will adequately cover areas of the body in danger from pesticide exposure.	1	2	3	4	5
12. Provide convenient features, such as pockets to accommodate personal items and small tools.	1	2	3	4	5
13. Have the same or similar style and design features of regular work clothes worn by other agricultural workers.	1	2	3	4	5
14. Can be worn for other agricultural use as well as pesticide application.	1	2	3	4	5
15. Provide convenient features, such as zippers, Velcro, drawstrings, etc., as opposed to buttons.	1	2	3	4	5
16. Prevent any visible signs of pesticide residue on the skin.	1	2	3	4	5
17. Insure the absence of any ill effects after pesticide usage.	1	2	3	4	5
18. Be like that of commercial applicators.	1	2	3	4	5

SECTION III: OPINIONS ON PROTECTIVE CLOTHING AND PESTICIDE USAGE

For the following general statements about protective clothing and pesticide usage, please **circle** the number following each statement which best describes your extent of agreement or disagreement.

IN GENERAL:	STRONGLY DISAGREE	SLIGHTLY DISAGREE	NEITHER AGREE NOR DISAGREE	SLIGHTLY AGREE	STRONGLY AGREE
1. Protective clothing and equipment currently available for pesticide users are hot and bothersome.	1	2	3	4	5
2. Compared to other things or subjects that interest me, the use of protective clothing is of considerable importance.	1	2	3	4	5
3. The exposure that occurs when handling some pesticides could be harmful to the body.	1	2	3	4	5
4. I have considerable confidence in my ability to make a good choice in my selection of protective clothing.	1	2	3	4	5
5. Pesticide users should be more concerned about the dangers of pesticide to themselves.	1	2	3	4	5
6. Purchasing protective clothing is complicated by the many brands and conflicting performance claims of each manufacturer.	1	2	3	4	5
7. The benefits derived from using protective clothing outweigh the money invested.	1	2	3	4	5
8. Pesticide workers would be better off if there were more public awareness concerning pesticide usage.	1	2	3	4	5
9. I feel confident I have the ability to judge the quality of protective clothing (work clothes) that I use.	1	2	3	4	5
10. I would consider it very serious if I purchased protective clothing and it proved to be unsatisfactory.	1	2	3	4	5
11. The inconvenience of having to shop special stores for protective clothing is worth the time and effort.	1	2	3	4	5
12. The popular press has overstated the risks of agricultural pesticides.	1	2	3	4	5
13. Farmers are taking unnecessary risk when using pesticides without protective clothing.	1	2	3	4	5
14. Continued use of agricultural chemicals (pesticides) leads to increasing safety risk.	1	2	3	4	5
15. The day to day risk of exposure from organic chemicals (pesticides) by farmers is small in comparison to usage by other applicators.	1	2	3	4	5
16. There is a limited amount of information available to farmers regarding protective clothing.	1	2	3	4	5
17. Private companies are not as reliable as government agencies in testing the adequacy of protective apparel.	1	2	3	4	5
18. Often protective clothing does not measure up to stated claim of the manufacturer.	1	2	3	4	5
19. Recommendations and experiences of friends or associates are often more reliable than manufacturers' claims regarding protective clothing.	1	2	3	4	5
20. If more information were available on protective clothing, the demand would be greater.	1	2	3	4	5

SECTION IV: CONSUMER BEHAVIOR: DECISION TO PURCHASE

For the following set of questions, please indicate how **important** each of the listed factors will be in the decision to purchase **your next** protective clothing by placing a **circle** around the appropriate number following each statement.

WHEN BUYING WORK CLOTHES, I FEEL IT IS DESIRABLE TO:	VERY UNIMPORTANT	SLIGHTLY UNIMPORTANT	NEITHER IMPORTANT NOR UNIMPORTANT	SLIGHTLY IMPORTANT	VERY IMPORTANT
1. Buy the product whose advertising has endorsements from a person like me.	1	2	3	4	5
2. Buy the product whose advertising has endorsements from a celebrity.	1	2	3	4	5
3. Buy the product whose advertising has endorsements from an expert on the product.	1	2	3	4	5
4. Buy the product I have used before and have been satisfied with in the past.	1	2	3	4	5
5. Buy a major, well-known product, and rely on the reputation of the manufacturer.	1	2	3	4	5
6. Buy the product that has been tested and approved by a private testing company.	1	2	3	4	5
7. Buy the product from a reputable store.	1	2	3	4	5
8. Buy the product that offers a money-back guarantee with it.	1	2	3	4	5
9. Buy the product that has been tested and approved by an official branch of the government.	1	2	3	4	5
10. Shop around on my own and compare product features of similar products in several stores.	1	2	3	4	5
11. Buy a new product just to see what it is like.	1	2	3	4	5
12. Buy the most expensive product available in a product line.	1	2	3	4	5
13. Buy the most elaborate design/style available in a product line.	1	2	3	4	5
14. Be the first of my friends to buy/try a new style or design.	1	2	3	4	5

SECTION V: BACKGROUND INFORMATION

For each of the following statements, please check (✓) the appropriate response for each.

1. Do you grow fruit? ___ Yes ___ No
   If yes, how many acres are farmed?
   ___ under 5 ___ 11-25 ___ 51-75
   ___ 5-10 ___ 26-50 ___ over 75

2. Do you grow tobacco? ___ Yes ___ No
   If yes, how many acres are farmed?
   ___ under 1 ___ 3-5 ___ 11-15
   ___ 1-2 ___ 6-10 ___ over 15

3. What is the **major** type of farming done by you if other than fruit or tobacco?
   ___ vegetable ___ livestock/dairy
   ___ field crops ___ field crops & livestock/dairy
   ___ nursery stock ___ other: Specify _____
   How many acres of these are farmed?
   ___ under 50 ___ 100-250 ___ over 500
   ___ 50-99 ___ 250-500

4. What would you estimate is the percentage of your production that requires air blast spraying?
   ___ none ___ 25-49% ___ more than 75%
   ___ less than 25% ___ 50-75%

5. What would you estimate is the percentage of your production that requires hand held spraying equipment?
   ___ none ___ 25-49% ___ more than 75%
   ___ less than 25% ___ 50-75%

6. Who is the **principal** person involved in pesticide application on your farm?
   ___ myself ___ farm employee
   ___ a relative ___ commercial applicator
   ___ other: Specify _____

7. What is your age?
   ___ under 25 yrs. ___ 35-44 yrs. ___ 55-64 yrs.
   ___ 25-34 yrs. ___ 45-54 yrs. ___ 65 and over

8. Check the highest level of education completed.
   ___ eighth grade ___ associate or 2-yr. degree
   ___ high school ___ 4-yr. college degree
   ___ some college or business school ___ attended graduate school

Textiles, Merchandising & Design
COLLEGE OF HOME ECONOMICS / THE UNIVERSITY OF TENNESSEE KNOXVILLE 37996-1900 (615) 974-2141

Dear Sir:

I am a graduate student at The University of Tennessee at Knoxville that is conducting a survey of pesticide applicators' preferences toward protective apparel in the state of Tennessee. I am trying to determine consumer preferences in order to provide you more satisfactory protective clothing alternatives in terms of comfort, safety, price and availability. Your experiences and opinions will provide valuable information which can help shape the future of protective apparel. The results will be shared with many individuals who are in a position to improve protective apparel usage among pesticide applicators.

Will you please help me by taking a few minutes to complete the enclosed questionnaire? You will see that the questionnaire is interesting and can be completed easily.

You have been selected by your Agricultural Extension Agent in your county, to assure representativeness. Thus, your reply is vital to the success of this research, which aims for truly representative findings.

Complete anonymity will be assured each individual response, so please do *not* sign your name. My interest is in statistical relations only.

Your prompt response will be helpful, as we are attempting to meet a deadline. For your convenience, carefully fold the questionnaire to reveal the return mailing address and postage paid side, then secure seal tab to assure proper mailing. Please know that your cooperation is important to me and is very much appreciated.

Yours truly,

Ruth M. King
Graduate Student

Dr. Jacquelyn DeJonge
Professor and Head
Textiles, Merchandising and Design

FOLD HERE FOR MAILING

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 477 KNOXVILLE, U.S.A.
POSTAGE WILL BE PAID BY THE ADDRESSEE

Textiles, Merchandising & Design
College of Home Economics
The University of Tennessee
Knoxville, Tennessee 37996-1900
Attn: Ruth M. King

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SECURE TAB

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APPENDIX D

FOLLOW-UP POST CARD

Dear Sir:

Recently you received a letter from me soliciting your participation in a study of protective apparel. If you have returned the completed questionnaire, please let me express my personal appreciation for your helpfulness.

If you have not completed the questionnaire, may I ask you to do so as soon as it is convenient. If the questionnaire has been misplaced, I will be most willing to send you an additional one. You may call collect 615-522-0790.

The purpose of this survey is to help you in your future work with pesticide application. Information gained from this study will be used to improve the design and availability of protective apparel which will meet the needs of tomorrow as well as those of today. However, we need your assistance.

As the deadline is rapidly approaching, your prompt response will be of great help. Thank you for your coopeation.

Sincerely yours,
Ruth M. King
Ruth M. King
Graduate Student

Figure D.1. Follow-Up Post Card.

VITA

Ruth Marie King, the daughter of Mary Ruth and Granville King, was born and reared in Russellville, Logan County, Kentucky. She graduated as class valedictorian from the Knob City High School. Educational experiences since that time include: a Bachelor of Science degree in Home Economics Education from Kentucky State University at Frankfort; Teacher Certification in Elementary Education from Western Kentucky State University at Bowling Green; Master of Arts degree in Textiles and Clothing from Michigan State University at East Lansing; and advanced graduate study at the University of Kentucky at Lexington.

Ms. King began her teaching career with the Logan County School System. Other professional experiences include teaching positions with the following school/state systems: Russellville Public Schools; Jefferson County, Kentucky, Louisville Public and Vocational Schools; Kentucky State University, Frankfort, where she is presently chairman of the Department of Home Economics.

She was the recipient of the Ida Anders Scholarship and the Graduate and Professional Study Grant Fellowship (GPOP) while a doctoral candidate at The University of Tennessee, Knoxville. Ms. King is a member of Omicron Nu and Alpha Kappa Alpha Sorority, Incorporated.