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City University of New York PH.D 1981

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PERCEIVED RISK: A STUDY OF ITS DETERMINANTS IN THE PURCHASE OF A CAPITAL GOOD

MARTIN T. TOPOL

A dissertation submitted to the Graduate Faculty in Business in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

The City University of New York

1981

For my parents,
BENJAMIN AND ESTHER TOPOL

This manuscript has been read and accepted for the Graduate Faculty in Business in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

May 8, 1981
date

Chairman of Examining Committee

May 11, 1981
date

Executive Officer

Supervisory Committee

The City University of New York

Abstract

PERCEIVED RISK: A STUDY OF ITS DETERMINANTS IN THE PURCHASE OF A CAPITAL GOOD

by

Martin T. Topol

Advisors: Professor Conrad Berenson

Professor Leon G. Schiffman

This dissertation investigated the hypothesis that industrial buyers' perceptions of risk regarding the purchase of a technically complex and financially demanding product will be influenced by four broadly defined factors. These factors are; (1) the characteristics of the purchase problem, (2) the characteristics of the buyer, (3) the characteristics of the buyer's organizational environment, and (4) the characteristics of the vendors of the product. The overall objective of this study was to empirically test whether these four factors could explain differences in the risk perceptions of individual buyers.

The research setting used for this study was the electric utility industry. A particular product, namely a "telephone-based" automatic meter reader was selected for study. This product was selected since it is technically complex and requires a major expenditure on the part of buy-

ing firms. More importantly, few buyers have purchasing experience with the product although the product has been available for many years. This latter consideration was believed to be critical to a test of perceived risk, for it has been argued that any examination of one's perceptions after a purchase has been made may actually reflect cognitive dissonance and not perceived risk.

The findings of this research are based upon 189 respondents of 284 firms who were mailed questionnaires after an inital telephone interview. The telephone interview was a critical element to the research program, for it enabled the researcher to identify the individual within each firm responsible for such a purchase decision.

Twenty-two hypotheses were formulated in light of previous research relating to perceived risk in industrial buying. To test these hypotheses two groups were formed. Buyers were classified as either "high" or "low" risk perceivers, depending upon their response to a single item measuring perceived risk. Data analysis revealed, that of all the factors considered, the vendor's characteristics in particular were most critical to buyer's perception of risk. In addition, it was observed that many of the information sources considered by buyers were viewed quite differently. These information sources were grouped and classified as being "subjective" or "objective." It was found that buyer's

risk perception is associated with their certainty that the "objective" sources of information identified will provide good information. In addition, it was found that buyer's perceived risk is associated with their product specific self-confidence.

Of a related nature, it was found that of all the factors that were identified in preliminary research as presenting risks to the firm buying such a product, that only the threat of a performance failure is associated with buyer's risk perceptions.

Of the twenty-two hypotheses tested, only six were supported. The fact that many of the hypotheses, which were formulated in light of previous research, were not supported is significant. These results cause this researcher to question whether perceived risk will be of any practical value to industrial marketers.

Curiously, every instance that an association was observed some aspect of "uncertainty" was introduced in the independent variable. Hence, it is beleived that the observed associations may be the result of a weakness in the research instrument. That is, that the items used to measure the independent variables (although consistent with previous research) may not have been measuring anything more than some generalized aspect of fear, uncertainty, or risk. Therefore, it may not be possible to investigate perceived

risk in the context of industrial marketing, and further research may not be warranted in this area.

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Chapter I

INTRODUCTION

1.1 INDUSTRIAL BUYER BEHAVIOR RESEARCH: AN OVERVIEW

Industrial buyer behavior has received considerable attention in recent years and evidence of this fact is given by Sheth (1977) who reviewed more than 1,000 articles on this subject. A number of these articles have included explicit and implicit presentations of models of the industrial buyer's behavior as it relates to various aspects of purchasing. Essentially, these models have been offered as explanations of the complex decision making process which members of organizations engage in (to a greater or lesser extent in) their procurement of materials, goods and supplies needed by their firms.

Robinson, Faris and Wind (1967), Sheth (1973) and Webster and Wind (1972) have each provided important models which may be utilized by researchers in further investigation of industrial buyer behavior. These models, however, like many comprehensive consumer behavior models are not fully utilized by researchers. This failure may be due in part to their complexity and other reasons related to the data requirements of such models. Other models have been

offered which concentrate on specific dimensions of the buyer, the task and other factors pertaining to buying. These less comprehensive, middle-range models have generated substantial interest and attention, and are quite appealing for a number of reasons. First, the complexity of these models and conceptual frameworks are less grandiose and often appear to be easier (although not easy) to examine and research. Second, many of these frameworks have a precedent in (household) consumer behavior research which often provides a much more well established foundation for further study of the underlying model(s).

1.2 RESEARCHING PERCEIVED RISK IN INDUSTRIAL BUYER BEHAVIOR

One such area of particular interest to researchers of industrial buyer behavior is the study of the impact and nature of individual buyer's perceived risk when set in the context of industrial buying. As in the consumer behavior setting, the central proposition underlying this research is founded upon the notion that "decision making can be viewed as risk taking activity" (Newall, 1977, p. 167).

Research on the industrial buyer has focused upon the dimensions of risk, and the antecedents of risk in particular with references drawn that are suggestive of the purchase outcomes resulting from the level of risk perceived by the industrial buyer. In much of the research conducted in

this area it has been posited that certain factors may be expected to influence the level of perceived risk in a given purchase decision. In addition, it has been suggested that the course of action that most succesfully reduces risk is preferred by the decision maker (Cox, 1967; McMillan, 1972a; Newall, 1977). Basically, the latter view is one wherein the buyer's behavior is conceived of as risk handling. Note however that before much progress can be made in the study of risk handling one must first identify and understand the determinants of risk and their impact upon one's subjective perceptions of risk. Similarly, these dimensions must be understood if the perceived risk framework is to be helpful in determining whether or not purchasing will occur, or whether certain modifications in the product-service mix will be advised.

Applications of the above proposition - viewing consumer decision making as risk taking activity - have been plentiful in the study of consumers (Ross, 1975; Stem, Lamb and MacLachlan, 1977) although this general framework has not been quite so fully utilized in the industrial buying situation.

1.3 THE PURPOSE OF THIS RESEARCH

This research studies industrial buyers responsible for the purchase of a capital good and examines whether four categories of risk determinants previously identified by research-

ers (Newall (1975,1977; McMillan, 1972a, 1972b;) are capable of explaining differences in the amount of risks perceived by industrial buyers. The buyers under study here are actually prospective buyers, for this research concentrates on a technically complex good, which has yet to achieve market accpetance, due in part to the major expenditure that would be required of firms buying this product. It is believed that this research, because of both the unique research setting and the technical and financial characteristics of the product (i.e., automatic meter reading equipment) will contribute to marketer's knowledge of industrial buyer behavior and a better understanding of the concept of perceived risk.

While it is not intended to precisely define, at this point, the approach used to examine the four categories of risk, it is important to note that a mail questionnaire was the primary means of collecting the information required for this research. This mail qustionnaire (see Appendix) was sent to 284 electric utility firms of 292 firms intiially contacted by telephone. These firms are scattered throughout the continental United States. The reasons for sampling these companies were governed by two factors: (1) the product selected for study - a "telephone-based automatic meter reader" - has been designed for this particular industrial market, and (2) the federal government has called upon certain classes of electric utility firms to investigate the potential such products might offer with respect to energy control and conservation.

Each electric utility firm contacted was requested to identify the individual within their firm who is most responsible for handling the decision as to whether such a product as a "telephone-based AMR" would be purchased by the firm.

This individual was interviewed briefly and requested to participate in this research.

This research therefore is based on those individual decision makers who responded to the mail questionnaire that they sent. (A more complete discussion of the data collection process is found in Chapter 3.)

1.4 RESEARCHING CAPITAL INTENSIVE EQUIPMENT PURCHASES

Few marketing studies have been conducted concerning the purchase behavior of buyers of capital equipment. When such research has been conducted, researchers often appear more concerned with the flow of decision making - taking the process and not the antecedents of the decision as the focus of attention. This may be explained by the marketer's practical concern for and with repetitive buying decisions so that complex, one-time purchases remain ignored and may therefore explain the apparent shortage of such research. Too, given the concern for repetition, the decision process may be thought to be relatively uniform and regular. Hence, such a focus of research attention may be similarly ex-

plained. Consequently, the study of capital goods with particular attention to the antecedents of purchase-related activities and behavior should constitute an important contribution to marketer's knowledge of industrial buyer's behavior as they are engaged in such decision situations. It may be that the marketer's practical concern for and with repetitive buying decisions might explain the apparent shortage of such research. Consequently, the study of capital goods should constitute an important contribution to marketers' knowledge of industrial buyers' behavior engaged in such decision situations.

It is believed that the perceived risk framework, especially the model and most specifically the substructure presented by Newall (1977), will facilitate examination of the influence and importance of perceived risk on industrial purchase behavior.

1.5 RESEARCHING BEHAVIORAL DIMENSIONS OF INDUSTRIAL BUYING

It should also be noted that historically most studies in industrial buying have concerned themselves with a very heavy bias toward an economic orientation, viewing the industrial buying situation as an instance where rationality (economic rationality to be sure) prevailed. In other words, only "objective" and primarily economic criteria were to be taken into consideration in the decision process. This is especially true of the large number of studies that

have been concerned with vendor selection criteria and vendor evaluations (Kiser, Rao, and Rao, 1974; Kiser, Rao and Rao, 1975; Banville and Dornoff, 1973; Copeland, 1924; Dickson, 1966; Dempsey, 1978; Shillif and Bodis, 1975). In fact some researchers see vendor evaluations as "an economic function" (Oehmler,1967) and one of the evaluation approaches used by industry, namely the "Cost-Ratio Method" attempts to aggregate cost of poor performance to arrive at an adjusted relative cost of purchase including price. This method however is infrequently used (Wieters and Ostrom, 1979).

No doubt economic concerns such as price and the terms of sale are important considerations to most, if not all, industrial buyers. However, it is increasingly apparent that behavioral dimensions are also important and that many supposedly objective and quantifiable aspects of the product offering are evaluated by individual buyers quite subjectively (Banville and Dornoff, 1973; Shoaf, 1959; Wind, 1967). Banville and Dornoff (1973, p.252) consider not only the "economic motivational theory" of industrial purchasers but also point to the "proponents of emotionalism in purchasing behavior (that) suggest that buyers are influences in their product, brand and source selection decisions by environmental factors that are personal and prejudiced. Moreover, the criteria used to define emotionalism are based on one's desire to satisfy his senses, pride, sociability,

and other nonrational factors." Additional support for this "emotional" or "nonrational" approach to industrial buying is given by Shoaf (1959) and Wind (1967). Furthermore, Dempsey (1978, p. 258) points out that "the final determinant(s) in the selection of a vendor may be found among those attributes rated at the intermediate level or perhaps even at lower levels of importance. The moderately important attributes, both implicit and explicit in nature will become marginally significant in situations where the suppliers offer standardized marketing mixes in oligopolistic markets."

It has been suggested that the perceived risk framework might enable researchers to obtain some more global measure of the subjective evaluations of various products by buyers and prospective buyers. McMillan (1972a, 1972b, 1973) has undertaken the integration of these concerns by studying the risk perceived by industrial buyers on various vendor and product dimensions that are regarded as important vendor selection criteria in industrial buying. Put simply, McMillan (1972a) had hypothesized that perceived risk could be used to explain differences between buyers and non-buyers of an industrial product. It is believed that such research may benefit a great deal if examined within a broader theoretical framework posited by Newall (1977) who focuses not only upon the individual decision maker within the buying organization, but upon other potential "antecedents" or components

of perceived risk which occupy major portions of the risk based model of industrial buyer behavior that Newall offers. (These "antecedents" will be explained more fully in the following chapter.)

1.6 HAVE RESEARCHERS STUDIED PERCEIVED RISK OR SOMETHING ELSE?

Most researchers who have studied risk and/or vendor selection have done so in settings where a product (class or brand) could clearly be referred to by the researcher and by the respondent. This situation has many distinct advantages to the conduct of research although certain shortcomings are evident.

Generally, researchers have utilized lists of known purchasers or sales prospects who have had an opportunity to evaluate the product-service offering. This practice is understandable for a variety of reasons. First, it can be assumed that the respondent has some familiarity with this product and therefore can relate their subjective evaluations of the same. Second, these lists would seem to assure that those actually involved in such purchases are studied. Third, it is not likely for a researcher to engage in studying risk perceptions of a non-existent and hypothetical product for respondents may have considerable difficulty in performing any evaluation of an otherwise unknown product. Fourth, a hypothetical evaluation of an unknown product may

have quite limited generalizability. Finally, it should be also recognized that outside of product concept testing, the study of an industrial buyer's risk perception of a product that has yet to receive wide scale trial, let alone adoption, may hold little practical significance.

However, and this is a crucially important argument, since the data are typically obtained from respondents who are known to have already made a decision to purchase (be it positive, or negative) the respondents may not necessarily be relating their perceptions of risk but rather some expression of their cognitive dissonance (Ross, 1975). This argument may be viewed as a critical flaw in much of the previous research that is not typically noted by researchers of this subject, and in essence sets the research reported here apart from other efforts in this area.

1.7 RESEARCHING PERCEIVED RISK IN RELEVANT INDUSTRIAL CONTEXTS

What is being presented here is the study of industrial buyer's perceived risk for a product whose general concept and technical viability is well known among prospective purchasers, but whose economic viability for many if not all prospective users is currently deemed unclear. As such, one may focus upon risk irrespective of the question of economic rationality (for the economic feasibility of this "product" cannot be ascertained and is not questioned either by the

researcher or subjects). Hence, other objective (non-price) and behavioral components of risk are concentrated upon and by design become ever more readily observed. In other words, this research considers the evaluation of a product whose economic value is not known and purportedly cannot be accurately determined at the present time.

Note however that this product has been subjected to a number of extensive technical evaluations which have been well publicized over the past twenty years. These evaluations have generally not placed much attention on the economic feasibility of the product and it appears that economic concerns have not deterred further evaluation by prospective customer firms. As such, the question of economic rationality can no longer be of direct concern in such a situation, (for it cannot be measured readily by the researcher or subject) and hence the less objective (non-price) and behavioral components of risk become ever more readily observed.

Therefore, it is believed that marketers will find such a situation representative of numerous instances where new technologies appear and product concepts are generated and the examination of marketing obstacles (such as perceived risk) must be determined in advance by the selling organization if proper product-service mix decisions (relating to design, technical development, advertising, and personal

selling) are to be made. As such, it is believed that the study of an industrial product that is currently "uneconomical" may have an important bearing on our understanding of the behavioral (e.g., subjective and perceptual) factors of industrial buying.

Moreover, in light of the highly competitive industrial atmosphere where products and services become more and more objectively identical over time, such behavioral dimensions may, as often suggested (Klass, 1961; Kiser, Rao and Rao, 1974; Dempsey, 1978) determine industrial purchase decisions. The same view might be advanced where specifications set by the buyer dictate product design and "product" features.

Accordingly, this research proposes to integrate earlier work on perceived risk, especially as it has been utilized in the sphere of industrial buyer behavior research, within the context of Newall's (1977) substructure which specifies the underlying determinants of risk in industrial buying. The specific concerns of this research will be elaborated upon in the following sections which introduce the various dimensions of risk and the variables that are studied.

1.8 ORGANIZATION OF THE REMAINDER OF THE DISSERTATION

Chapter Two will review the efforts at modeling the antecedents of risk in industrial buying, and establish the underlying framework for the hypotheses that are described in Chapter Three which describes and explains the research methodology employed in this research. Chapter Four will report the findings for each of the hypotheses and conlcude with a discussion of the findings. Chapter Five will briefly summarize the findings and advance a number of recommendations for the implementation of the findings and for additional future research.

Chapter II

MODELING THE ANTECEDENTS OF RISK IN INDUSTRIAL BUYING

Many factors have been hypothesized to affect the level of perceived risk. Newall (1977) examined a great number of these and developed a model which he refers to as the "Conceptual Structure Underlying the Determinants of Risk in Industrial Buying." This model is essentially one of a number of "substructures" proposed that are the foundation for a more comprehensive Perceived Risk model that he develops. It should be noted here that Newall's substructures were analyzed independently and derived through empirical research. Newall's perceived risk model, although more comprehensive, is merely a conceptual integration of the various substructures. The research presented here does not seek to test the more comprehensive model, but rather utilizes the first substructure which is presented in Figure 1.

One reason for focusing on Newall's first substructure is that it is believed that the consequences of perceived risk that are included in the larger framework cannot be fully determined in the situation of interest here, which is acomponent of Newall's other "substructures" and larger model. Basically, it would seem precarious to expend much effort on measurement of those "consequences of risk" which

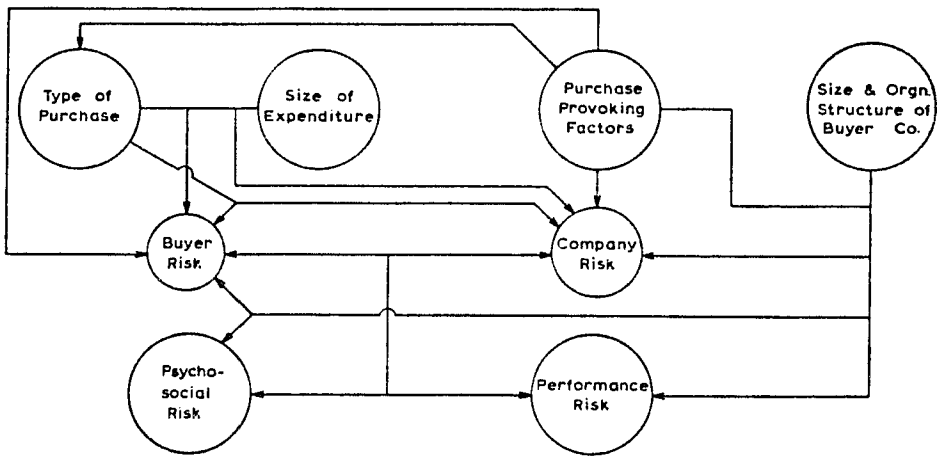

Figure 1: Conceptual Structure Underlying the Determinants of Risk

constitute the remaining elements of the larger perceived risk model where the product of concern has yet to achieve market acceptance, and prospective customers are not compelled to engage in risk reducing activity or behavior. Furthermore, the consequences described by Newall include information search activity, the degree of buyer loyalty, the number of sources of supply considered, the time expended on such a decision, and the size and composition of the decision group. These elements may not be readily evaluated or measured especially where they involve activities that are normally undertaken by buyers only after a problem has been identified and a resolution of the problem is sought. Hence, one must presume for the larger model to become applicable that (a) a problem has been identified and (b) that a resolution is sought by the buyer. This however may not accurately reflect the situation encountered by the firm offered the new product. That is, there remains the possibility that the "problem" envisioned by the seller is not similarly recognized by the "prospective" customer.

Similarly, situations arise where a problem has been identified by the marketer, and perhaps by the prospective buyer too, although the need to resolve such a problem is not deemed especially pressing by the prospective buyer or perhaps the value of the solution is unclear. (As is believed to be the case in the study reported here.)

Moreover, where obstacles to market acceptance are acknowledged by the marketer, a further understanding of these and other factors that may retard the product's acceptance founded in the customer's perceptions of risk may be useful in removing such obstacles encountered by the parties involved. Ultimately, such research may facilitate the ready acceptance of the product once the identified hurdles have been successfully overcome be they economic, technical, product or service related. Alternatively, firms may ascertain in advance that they are simply incapable of overcoming certain hurdles in a timely or economic fashion and may prepare themselves for an appropriate NO-GO decision. Accordingly, they would terminate their marketing and product development activities. Such decisions hold important economic ramifications for marketers for they are enabled to redirect their resources in accordance with overall corporate objectives.

2.1 CATEGORIZING THE DETERMINANTS OF PERCEIVED RISK

Focusing attention on the determinants of risk, Newall (1977) has synthesized three broad groupings to classify the factors likely to determine the level of risk. He refers to these as:

1. The characteristics of the purchase problem.

2. The characteristics of the industrial buyer.

3. The characteristics of the organizational environment.

Each of these categories have a number of dimensions, which have been considered in previous studies of buyer behavior. A discussion of these follow.

2.2 RESEARCHING THE CHARACTERISTICS OF THE PURCHASE PROBLEM

Without a question, it is quite apparent that not all decisions present equivalent levels of risk for the buyer or decision maker. Simply, "some decisions may be inherently more risky than others" (Newall, 1977, p. 167). Accordingly, researchers must attend to the dimensions or "characteristics" of the problem as it is perceived by the individual decision maker/buyer.

A variety of factors referring to the characteristics of the purchase problem that may likely affect the level of risk perceived by the buyer have been examined by a number of researchers. Those of relevance to this research are given below:

1. The size of the product expenditure (Cardozo and Cagley, 1971).

2. The degree of novelty contained in the type of purchase or buying task (Robinson, Faris and Wind, 1967).

3. The degree of product essentiality (Marrian, 1965).

4. The factors provoking purchase (Webster and Wind, 1972).

With respect to the size of the product expenditure, it is believed that given the cost of money today and the scarcity of financial resources experienced by many firms, the level of risk perceived may readily rise with increments to the size of expenditure involved. The size of expenditure in this research cannot be accurately determined although it will rise in almost direct proportion to the size of the firm (which in this instance is a function of the number of customers served).

As for the type of purchase or buying task, a considerable amount of research has been conducted that attempts to ascertain to what extent individuals involved in industrial purchasing may alter the importance they attach to various vendor selection criteria (being the characteristics of the suppliers) in various buying or task situations (Kiser, Rao and Rao, 1974; Kiser, Rao and Rao, 1975; Gronhaug, 1975; Dempsey, 19778; Banville and Dornoff, 1973; Wieters, 1976; Kelly and Coaker, 1976; Kiser and Rao, 1977; Lehmann and O'Shaugnessy, 1974). The buying-task situation has frequently been conceived of in terms of its novelty (e.g., new task, modified rebuy, straight rebuy) and has been treated

as an independent variable (Groanhaug, 1975; Robinson, Faris and Wind, 1967). Note that the buying situation may also be looked upon as a dependent variable, being a function of personal experience (not company experience).

Although the nature of the task may be critically important to marketers offering products to consumers with varying degrees of familiarity and experience (and hence sales presentations and advertising materials may require adjustment), it is believed that for new products (or for that matter new product concepts) where such direct experience with the given product is precluded, efforts to segment respondents along these lines of experience will not be fully possible. This matter is further addressed in the discussion of the product selected for study (see Research Methodology section).

The "degree of product essentiality" has been considered by Marrian (1965) in her review of marketing characteristics of industrial goods and industrial buyers. Specifically, Marrian (1965, p. 19) states that:

> (I)t is possible to rank the purchases made by any organisation according to the significance of particular types of commodities to the purpose of the organization. Thus at one end of the scale lie those purchases which are essential to the operations of the organisation.... At the other extreme are those items for which the decision to purchase could be, and in less profitable periods will be deferred.

Furthermore, Marrian suggests that the perceptions of importance to the buyer, that is the essentiality, will influence the patronage of particular sources of supply. As Marian (1965, p.20) states:

> While patronage of a particular source may result from the experience and preference of one or more individuals in the organization, the basis for continued patronage and reciprocal trading, especially in the case of essential purchases, have more to do with the reduction of uncertainty and risk, than with beliefs regarding the intrinsic differences between products.

As such, the subjective evaluation of the product is seen to be a function of perceived risk which is dependent upon the degree to which a product is believed to be essential.

As for the research presented here, the essentiality of the product cannot be determined well in advance since the product to be studied offers capabilities foreign to most sales prospects, at least in the sense that the relative advantages cannot be easily quantified at the present time (especially in light of this product's currently puported economic infeasibility).

Although the product of interest may not be seen as "essential" prior to purchase in the sense that the existing product in use (or other substitute products) present little danger, uncertainty or risk to the buyer and the organization, the purchase of the new product may present grave risks to the individual buyer and the organization.

These risks become apparent when one considers that (a) there may be some uncertainty about the actual performance capabilities and cost of operation of the new product, and (b) the risks are perceptibly different due to the increasingly interdependent nature of the new product offered to the buyer.

To be sure, the new capital equipment may involve considerable expense - expenses reflected in the price, the terms of sale, and the costs endured in the course of replacement (e.g., downtime, start-up costs, lost depreciation). In addition to these "objective" costs are those associated with "insurance" now required to compensate the firm should a performance failure of the component product result in a wide-scale or even system-wide failure. Essentially, more attention must be given to those risks that result from the interdependencies that evolve from adoption of new capital equipment. Specifically, the adoption (purchase commitment) of the product in question may be evaluated by prospective customers in terms of its potential for introducing a system-wide failure, which would affect the "production" or "revenue generating" capacity of the firm. Hence, as is the case with many capital goods purchases, the importance placed upon exacting performance and accuracy is especially high.

As for the situation of interest, buyers may recognize these risks associated with the purchase of the new product design and may hence evaluate the product's "essentiality" in a different light. However, where the purchase of such equipment is seriously considered, it is believed that "product essentiality" becomes especially critical, for the proper functioning of the product could affect the revenue side of the firm's profit equation. Hence, products that are integral components to system operations present many risks to the firm. System reliability and continuity is mandatory and only products assuring continuity may be able to reduce such risks.

In this light, then it would appear that the subjective evaluation of a product's utility, its benefit bundle, or "essentiality" is what will ultimately direct the buyer's decision to purchase. Hence, the study of perceived risk appears to be a very useful approach to the study of such dimensions.

Turning now to the "factors provoking purchase," (which are basically situation specific), it is clear that some underlying needs must prevail in order for a buyer to justify a decision to purchase. Newall (1977) focused attention upon two "purchase provoking factors," these being; (a) purchases due to expansion of the work load within the buyer's company and (b) purchases due to dissatisfaction

with the range and/or quality of equipment in existence within the buyer's company.

These factors are no doubt important, however these needs may not offer meaningful classification of generalizable categories. No doubt the marketer who recognizes a need created by a performance gap, be it precipitated by growth or inferior quality or capabilities, may capitalize on the differential advantage created and presented by the new product. However, this presumes that these needs have been identified accurately, not only by the marketer but by the prospective purchaser too.

One should remember that there have been instances where marketers have offered products with trivial and/or unimportant features and tauted them as major improvements. As a result buyers are often skeptical of the products they are offered, and try to respond only to products that will truly satisfy their perceived needs.

A number of purported needs for the product under consideration have been enumerated in the literature pertaining to the product's function, development and test. These "needs" and a few more general concerns will be included to ascertain whether certain needs are indeed felt to exist among prospective purchasers. It may very well be that manufacturers, trade associations and even government agencies responsible for the development and test of the pro-

duct under consideration have assumed that a number of specific needs prevail among prospective users that are not predominant. If the latter is true (that the needs are not predominant) then this assessment is important for it will help ascertain whether or not these purported factors are in fact seen as needs underlying, or central to, one's purchase decision.

2.3 RESEARCHING THE CHARACTERISTICS OF THE INDUSTRIAL BUYER

Researchers in attempting to explain differences as well as similarities observed among buyers have examined various dimensions of the individual. As such, concentration on certain personal characteristics may help explain buyer behavior. Consistent with this general line of thought is the notion that the level of risk perceived by the buyer may vary according to the individual's personality, experience, or professional affiliation.

A number of dimensions of such personal characteristics have previously been examined. Concern for the impact that an individual's self-confidence might have on the level of risk perceived has been investigated by Cunningham (1965) who focused upon the individual's "general self-confidence" and by Bell (1967) who focused upon the individual's "specific self-confidence." Deering and Jacoby (1972) also have studied aspects of self-confidence in their examination of perceived risk.

It is believed that researchers should concentrate attention on the prospective buyer's specific self-confidence, for this seems relevant to the marketer's pragmatic concern of (a) selling the product, and (b) adjusting the product-service mix in a manner that would enhance the prospective buyer's self-confidence as it relates to the purchase decision of particular concern. Furthermore, Newall (1975) points out that his respondents had made clearly adverse remarks regarding the inclusion of questions dealing with general self-confidence, suggesting that the inclusion of such questions may present problems for researchers. As such, one is advised to employ only those instruments that measure specific self-confidence.

Other personal characteriistics studied by market researchers have been the buyer's experience with playing the purchasing role (Ozanne and Churchill, 1971; Spekman, 1977; Spekman and Stern, 1979; McMillan, 1972a, 1972), the individual's purchase history; that is of buying within a particular product area (Webster, 965; Newall, 1975); and the degree of technical and professional affiliation (Ozanne and Churchill, 1971; Newall, 1975).

The relevance of these personal characteristics would seem relatively clear; one's personal experience and knowledge may readily explain observed differences (or for that matter similarities) in the risk perceived in a given purchase decision.

2.4 RESEARCHING THE CHARACTERISTICS OF THE ORGANIZATIONAL ENVIRONMENT

A number of researchers have suggested the study of the dimensions of the buyer's organization that may explain the context in which the decision maker operates. This context is important for it may guide or govern the individual's behavior. In fact one can look to Bauer (1960) who suggests that there are two bases of risk; buyer risk and company risk. Certainly it would seem obvious that there is a direct relationship between the two (Newall, 1977).

A variety of measures of the organizational environment may therefore allow for a fruitful examination of buyer and company risk. These measures include: the size and financial standing of the firm (Webster, 1969) and the other dimensions pertaining to the purchasing structure, that is the degree of the centralization of decision making (O'Shaughnessy, 1966); the degree of decision routinization (Gronhaug, 1975); and the degree to which authority and responsibility is concentrated or distributed amongst members engaged in buying for their organization (Spekman, 1977).

Note however that "company risk" may not be readily ascertained directly; rather one may secure this by way of investigating buyer's understanding and/or perception of the company's risk in terms of its (the individual buyer's) implicit understanding of his/her firm's financial capabilities. In essence then, the individual's assessment of

his/her firm's ability to both tolerate and handle risk is seen to be subsumed within their own more global assessment of the financial and performance risks associated with the product-service offering of the product as made available by the firm. Accordingly, each individual buyer's personal perceptions of risk regarding the product-service offering may be directly tied to their assessment of company risk, and taken as a proxy for the latter. (This approach had been suggested by Newall (1977) and may represent a reasonable way for researchers to estimate "company risk".)

Chapter III

RESEARCH METHODOLOGY

3.1 INTRODUCTION

Attention is now directed to the theoretical underpinnings of the methodology employed in the research presented here. A discussion of the relevant models of perceived risk as they pertain to the research are presented and will be followed by an explanation of the variables to be researched and their operationalization. Finally, research hypotheses and the research instrument will be presented.

3.1.1 Perceived Risk Models

It must be pointed out that there is no universally accepted definition or model of perceived risk. That is, of the many efforts to study perceived risk, few have utilized the very same framework. Diversity arises here not only with the operationalization of the variables, but more importantly with regards to whether perceived risk should be based solely on one factor (uncertainty) or two factors - the combination of uncertainty and importance (Cunningham, 1967; Ross, 1975; Stem, Lamb, and Maclachlan, 1977, McMillan, 1972a; McMillan, 1972b). In addition, in the case whe-

re a two factor model is presented the question of whether an additive or multiplicative model should prevail often arises (McMillan, 1972a; McMillan, 1972b).

In the additive models, the uncertainty and importance components are simply added; whereas, in the multiplicative model, the two components are multiplied. Generally the assumptions of both versions of the two models of perceived risk are that (a) the components should be equally weighted, and (b) the gradations are spaced equally on both the uncertainty and importance scales with the distance between each gradation the same on each scale (Cunningham, 1967, p. 86).

3.1.2 Defining Perceived Risk

In addition to the controversy of whether the model should be additive or multiplicative, a more basic problem is raised when a review of the literature proposes the use of a two factor model which defines risk in terms of uncertainty and consequences (Cox, 1967).

It is argued here that consequences may not be readily operationalized, particularly for products that are truly new to the prospective purchaser. Furthermore, the consequences remain at the level of perception - they are perceived and not realized by the individual at least prior to product trial. Where products are not, nor have not been tried extensively (even by others) the buyer's "consequenc-

es" are believed to be embodied in the performance and psychosocial risks perceived by the individual. Unlike previous research, the research presented here sets its attention on a rather unique purchasing problem. Here the product's basic technical feasibility is known to prospective buyers but the product's economic feasibility remains uncertain and there is no evidence that market acceptance exists to date. Hence, this purchase problem does not lend itself to a study of the consequences of risk, since they have yet to be identified through use of the product over time. As such, the two-factor uncertainty and consequence model cannot be subjected to thorough examination.

This research has not set out to investigate which model is best, although the research instrument to be used should afford an opportunity to subsequently examine this theoretical question. It is believed that since there has not been clear cut evidence of the superiority of the one-factor over the two-factor model, attention need not be devoted to this issue. Rather the focus of this research is the integration of various dimensions of perceived risk purported to explain buyer behavior in the theoretical framework proposed by Newall(1977).

This study utilizes a one-factor approach to operationalizing perceived risk in a fashion in accordance with that utilized by Newall (1975) and is measured by the response to the following question:

Which of the following best describes the amount of risk you feel regarding the purchase of AMP equipment?

Very High Risk	High Risk	Moderate Risk	Low Risk	Very Low Risk
_____	_____	_____	_____	_____

This item represents the dependent variable "perceived risk" that will be examined throughout this research.

It is especially important to note at this time that this research does not seek to replicate Newall's (175, 1977) work, rather the goal is to integrate within Newall's framework the concerns identified by McMillan (1972) and Spekman and Stern (1979) which may thereby enable a more complete examination of the dimensions of perceived risk as they pertain to industrial buyer behavior. Hence, this research will append the three categories of influences identified by Newall (1975, 1977), namely the characteristics of the purchase problem; the characteristics of the industrial buyer and the characteristics of the organizational environment with those influences identified by McMillan (1972a,

1972b), being the characteristics of the vendor, and influences identified by Spekman and Stern (1979) being the influence of organizational decision making procedures as they in turn may affect the buyer's perception of risk. It is believed that an investigation of these additional dimensions taken simultaneously will add considerably to that which marketers already know about the dimensions of perceived risk for complex purchase decisions of durable goods in general.

3.2 PRODUCT/MARKET ENVIRONMENT

The product of interest is commonly referred to as an automatic meter reader. Automatic meter readers (AMRs) have been given a considerable amount of attention by a variety of utilities - electric, gas and water utilities - over the past 20 years. In fact a number of trials (experimental installations) have been conducted that have often been sponsored by manufacturers, various utilities, trade associations, research groups, and by government agencies.

The fact that a number of trials have been conducted is thought to be helpful to engaging in this research for a number of reasons. First, the product (in its many designs) has been discussed in a number of trade journals over the past 15 years and has prompted a fair amount of interest among many of the individuals from all sectors - manufacturers and users as well as government. Accordingly, it is be-

leived that the general concept of AMRs is known and understood by those members of utility companies who would be presented with such a product by its manufacturers. Hence, awareness and understanding of the product can be presumed to exist among the prospective industrial buyers (here being electric utilities). Second, the trials have indicated that the product is technically feasible, however, the economic feasibility is and has been questioned. This too is important for there is reason to believe that with advances in technology acting to reduce the costs of AMRs and the simultaneous rise in costs associated with manually read meters (i.e., labor costs) may shortly make AMRs economically viable. In addition, there are certain capabilities that AMRs provide (i.e., the potential for energy or load management) that present manually read and operated designs do not offer.

It should be pointed out that only electric utility concerns are studied, even though AMRs can be used by gas and water utilities too. The reason for concentrating on electric utilities is that it is apparent that certain functions performed by AMPs enable the electric utilities to derive important capabilities such as energy and/or load management, line condition reporting (tamper detection) and direct load control that may not be relevant or readily integrated into an AMR design for other utility concerns. Furthermore, electric utility companies have an important

advantage over other utility concerns as they may use their own power lines to carry the information transmitted to and/or from the automatic meter reader installation. (Such a system is referred to as a power line carrier system.) This capability is dependent upon the type of electrical network used by the utility. Consequently, not all electric utilities are able to use such a "power line carrier" system throughout their service area. Respondents were therefore asked to evaluate an AMR design deemed by many to be most technically feasible form of transmission (at least in terms of its wide-scale applicability); a design that uses existing telephone lines instead of power lines.

Repondents were given a description of a telephone-based automatic meter reader design and reminded of the fact that such designs have been proven to be technically feasible.

In order to ascertain who the relevant decision makers were in each prospective firm, a telephone survey was conducted. At that point the names of these individuals were obtained, and a mailing of the research instrument was made. Moreover, every effort was taken to contact each major investor owned electric utility that comes under government regulations. In addition, those municipal/public-owned and rural electric cooperatives that have been directed to investigate load management programs were also contacted.

This sample, although based upon judgment, seems to represent the most likely candidate firms within the public utility industry and was supplemented by a smaller sample of other (smaller) firms that do not come under such federal directives, but who have been identified by executives and/or government reports as being likely candidates. Discussion of the sampling frame with executives within the electric utility industry has given much support to this approach, especially from prospective manufacturers of such AMR equipment as to be studied here.

3.3 PRETEST PROCEDURE

A three phase procedure was employed to develop the questionnaire. First a preliminary questionnaire was presented to executives and engineers at a number of firms engaged in the development of the product in question (a "telephone-based" automatic meter reader), and to relevant industry executives repsponsible for research on this product. Second, researchers at the City University of New York knowledgeable in marketing research were presented with a revised questionnaire. Using the constructive comments provided by these individuals a third questionnaire was prepared. This third instrument was then returned once again to the executives and engineers engaged in development of similar products at a number of manufacturing concerns. In addition, members of an industry research institute were

asked for their constructive comments as well, and their suggestions were utilized in the development of the final questionnaire. This fourth instrument was found to be acceptable to all those involved in its development, and was finally typeset and printed on 11"x25.5" paper. The research instrument was folded in such a manner that six pages of 8.5"x11" dimensions was obtained. The reason for having this layout was that this researcher believed that a continuous form (one piece of paper) might positively affect the rate of response, which was believed to be very important. A sample of the questionnaire is given in the Appendix.

3.4 DATA COLLECTION PROCEDURE

As the research instrument was rather lengthy, and the focus of attention placed upon a rather complex purchase decision, it was decided that firms should be contacted in advance of sending out the research instrument. This was done for two reasons; first, to secure the participation of the firms, by explaining the nature of the research project and its general purpose, and second, to identify the member of each firm who would be responsible for the decision to purchase such a product. The individual identified in this manner would then be contacted by telephone, and arrangements would be made to forward a questionnaire to that party.

Accordingly, several hundred telephone calls were made to electric utility firms across the United States. A list of firms to be sampled had been developed prior to this point. This list consisted of all firms that (a) were known to come under governmental energy acts requiring utilities to investigate products of this general nature (due to the purported energy conservation benefits of the product), or (b) were identified as an "investor-owned" utility, or (c) was a firm known to have already investigated other related "energy management" or "load control" devices. A mailing was made in September, 1980 and was followed by a second mailing one month later.

The results of this multi-phase approach are as follows: a total of 292 firms were contacted by telephone, and eight of these refused to cooperate at that time. Accordingly, 284 firms were sent the research instrument. Of these, 227 questionnaires were returned. Unfortunately, 38 questionnaires were not usable, as 34 were incomplete and 4 were returned with a cordial letter of refusal. Note that the first mailing yielded 216 responses, while the second mailing netted another 14 returns. Of the latter 14 returns, five were not usable since they were returned several weeks after coding had been completed.

This researcher attributes the high response rate of over 80 percent to a number of factors. First, the list de-

veloped by the researcher was personalized, as the names of each firm's executives were secured from industry directories and industry association membership rosters. Hence, the preliminary telephone calls were immediately directed to top executives in each of the firms. Similarly, each of the 284 firms were mailed a personalized questionnaire packet. The packet included, a personalized cover letter, a questionnaire, a postage pre-paid envelope for the return of the questionnaire, and a postal card for requesting a copy of an "Executive Summary Report" that was offered to participants. This packet remained the same for both the first and second mailings with the exception of the body of the cover letter. A sample of the cover letters and of the questionnaire is given in the Appendix.

3.5 RESEARCH VARIABLES

This section will focus attention upon the four categories of risk determinants and their sub-elements. Discussion centers upon an explanation of how the four categories have been studied previously and how they are operationalized in this research.

3.5.1 Characteristics of the Purchase Problem

Purchasing situations are often subject to considerable variation. In fact the same product may represent a different purchase problem for different purchasers. Hence, the differences between purchasers, as expressed in terms of the purchase problem, must be dealt with carefully by researchers. This research has followed the tradition established by Newall (1975) where (a) the size of the product expenditure (b) the degree of "product essentiality" and (c) the factors provoking purchase were considered as important dimensions that characterize the purchase problem. Note that the concern of Newall (1975) and of Robinson, Faris and Wind (1967) to include the degree of novelty contained in the type of purchase or buying task will not be assessed directly due to the fact that this research will focus upon a product that has yet to receive adoption and as such cannot be analyzed in terms of whether the purchase is a "straight rebuy," "modified rebuy," or "new task." It is believed and assumed here that most respondents will approach the evaluation of the product of concern here as a "new task."

Returning to the individual characteristics of the purchase problem that are examined here, a presentation of each of these individual characteristics and their respective operationalizations are given below.

3.5.1.1 Size of the Product Expenditure

Typically, researchers can secure estimates of the size of the product expenditure either by determining the proposed purchase price of the product (as well as the number of units to be purchased), or by review or estimate of the amount of funds budgeted for such purchases, or where possible, by securing the evidence of purchasing expenditures (sales order invoices). Unfortunately, none of these approaches are easily applied to products that have as yet to be priced. As a result, the size of expenditure must be evaluated along some other relevant continuum than purchase price. A proxy for size of expenditure is still possible, and may be obtained by examining the number of customers served by the purchaser. This would in this particular instance give an indication of the maximum number of units to be purchased by the prospective purchaser. This approach is certainly appropriate to all purchases of durable goods or other non-repetitive purchases of products whose price is uncertain or unknown but where multiple units may be required at the outset. (Here one unit may be required for each customer served by the purchasing firm).

3.5.1.2 The Degree of Product Essentiality and Purchase Provoking Factors

In general, researchers have often touched upon this dimension although perhaps subconsciously. The examination of a product's "importance" as well as the importance of various features or attributes of the product, the vendor, and the services provided, have each been undertaken in the past. However "importance" does not necessarily directly address the question of whether the product is seen to be "essential" to the flow of manufacturing, production or revenues of the firm. In fact, it is believed that where new products are concerned, essentiality may not ever be directly assessed as previously explained. Nonetheless, review of the product's capabilities and application provide insight into the "essentiality" of the product. Information gleaned from trade journals, magazines and reports from government agencies, industry associations and even suppliers give an indication that this product may become quite "essential" to many firms. This may be the result of a complex set of concerns related in part to attempts to minimize cost; in part to effectiveness or service issues; and in part to government regulations. (These concerns are addressed in the research instrument and will be discussed subsequently.)

As this research focuses upon a product that has not received market acceptance to date, it is difficult to measure essentiality. Therefore, a preliminary investigation

was conducted directed at the identification of the needs supposedly served by this product. The result of this investigation is a list of needs that are taken as an proxy for the "degree of product essentiality."

Similarly, since purchasing has yet to take place for this product (outside of a few experimental trials), it is not possible to measure the purchase provoking factors directly either. Consequently, a list of purported "needs" has been developed from information contained in reports and research conducted by government, industry associations and suppliers. This list may be used to measure the subjective importance attached to the needs identified by the individual buyer, as well as identify more clearly the multiple needs that may exist simultaneously.

In essence, the purchase provoking factors when studied previously had addressed the reasons why the purchase had been made. This cannot be done at this time. What one can do is try to determine why or for what reasons the purchase would be made and ascertain the relative importance of each reason. Accordingly, the degree of product essentiality is treated as being tied to purchase provoking factors via the underlying needs served by the product.

These two concerns are operationalized respectively as the individual buyer's assessment of (a) his/her organization's overall need for such a product, as well as (b) the

individual needs of the organization associated with specific problems that may be served by the product.

The former dimension will be handled by the following question:

Are AMRs something you personally feel your company needs?
Very Great Need 1 2 3 4 5 Not At All Needed

The latter individual needs will be evaluated by respondents on a five point scale (Not At All Important,.....,Very Important). These needs are specified as follows:

Need for monitoring electricity use
Need for controlling electricity use
Need for reducing electricity use
Need to reduce the costs of meter reading
Need to increase the speed of billing customers
Need to increase the accuracy of billing

Need to eliminate estimated bills
Need to map power outages
Need to eliminate turnover of meter reading personnel
Need to meet regulatory requirements

3.5.2 Characteristics of the Vendor

Although Newall (1975) does note the importance of past experience, and also includes two dimensions of experience - that of the buyer with purchasing in general, and experience expressed in terms of the type of task involved (straight rebuy, modified rebuy or new task) - no explicit consideration is given to the multitude of vendor characteristics normally seen to factor into the purchase decision. This subject has been addressed by a number of researchers, however only McMillan (1972) has undertaken an effort to examine these characteristics in the context of perceived risk. This research will therefore integrate the items studied by McMillan and append his list of vendor characteristics with three other dimensions, i.e., "experience with the vendor," "used by other firms," and "vendor is a local source of supply." One item has been deleted from McMillan's list of

vendor characteristics, this being the "salesman's dependability of promises." This last item has been eliminated since it is not exactly certain how this new product will be offered presented to these firms. Furthermore, as there is already one item that appears to be quite similar that is included - "vendor's dependability of promises," it is felt that discrimination between these two items (in light of the nature of the somewhat hypothetical situation) will not be readily obtained. (In addition, discussion with individuals involved in this product's development voiced skepticism of this particular item's clarity and meaningfulness.)

As for the three items added to McMillan's list of vendor characteristics, namely "experience with the vendor," "used by other firms," and "vendor is a local source of supply." These have been included for they have been noted in other studies of vendor characteristics to be of some importance to decision makers dealing with a variety of purchases (Wind, 1970; Kiser, Rao and Rao, 1974; Kiser, Rao and Rao, 1975; Dempsey, 1978).

Finally, it should be pointed out that respondents will be asked to evaluate these characteristics in terms of (a) their <u>certainty</u> that the vendor they would select would be equal to another vendor of AMRs, and (b) how <u>important</u> each of the characteristics are to their purchase decisions.

Both certainty and importance will be measured on a five point scale. The certainty scale utilized two anchors; "Not At All Certain, and "Very Certain," whereas the importance scale utilized "Not At All Important," and "Very Important" as its two anchors. Other gradations between these points were not specified by labels. This two-phase approach is used to accomodate an evaluation of the two-factor model of perceived risk. The complete list of vendor characteristics is given below:

Ability to deliver on schedule
Innovative nature of vendor
Service
Vendor's dependability of promises
Capability of supplying future demand
Reciprocity
Emergency assistance
Experience with vendor
Vendor is a local source of supply

Used by other firms
Overall rating of the vendor
Product performance
Product quality
Total cost
Product quality consistency
Salesman's honesty
Salesman competency
Salesman's effectiveness (in presenting the product to solve your problem)

The various vendor characteristics may be grouped into three categories. It is believed that such a classification, which is consistent with McMillan's (172) treatment will allow for a more probing analysis of the impact these characteristics may have on the individual's overall perceived risk. These categories are classified here as "sa-

lesman-related," "product-related," and "general vendor" dimensions of vendor characteristics.

3.5.3 Characteristics of the Industrial Buyer

According to the many writers on buyer behavior, individual characteristics such as self-confidence, problem solving experience and professional affiliations are factors which may influence the decision making process. It should be noted that although there is much intuitive appeal to the study of such variables, the research findings to date have not been especially encouraging (Ozanne and Churchill, 1971; Deering and Jacoby, 1972; Ross, 1975; Stem, Lamb and Maclachlan, 1977). Nonetheless, these dimensions have been incorporated into the research presented here.

3.5.3.1 Specific Self Confidence

Of particular interest here is the study of specific self confidence (as opposed to generalized self confidence) which refers to the degree of certainty of judgment which a person has for a particular situation. Although an individual may consistently have a greater (or lower) self confidence than another, it is assumed that individuals will display varying degrees of self confidence with respect to different situations. According to this notion it is thought that the buyer will judge the various components of the decision (needs, vendor characteristics, types and

sources of information, etc.), with different levels of confidence.

The above concerns are directly addressed in the following manner. A modified version of Deering and Jacoby's (1972) measure of specific self confidence has been constructed which assesses the individual's self confidence in (a) being able to evaluate the product's quality and (b) the performance of the new product relative to the product(s) it would replace (see Table 1).

Coupled to these questions are a number of items that reflect upon the individual's certainty of the product's performance and reliability.

Each of the above concerns are addressed to questions clearly focusing on the particular product of interest, hence they address various components of the individual's self confidence. Furthermore, these questions are scaled 1 to 5 with two anchors designated at each end of the scale.

In addition to these questions of "specific self confidence" are the following items which query related concerns. Essentially, questions pertaining to risk and uncertainties incident to the product, vendor and the information provided, and to what extent a trial or additional information will be desired, should all reflect upon the individual's self confidence too.

TABLE 1

Questions Pertaining to Specific Self Confidence

How certain are you that an AMR will work as well as your company's present meter reading equipment?
Very Certain 1 2 3 4 5 Very Uncertain

We all know that not all products work as well as others; compared to other meter-related products, how much danger would you say there is in trying an AMR that you have never used before?
Very Great Danger 1 2 3 4 5 No Danger At All

How confident would you say you are about judging the quality of an AMR?
Absolutely Confident 1 2 3 4 5 Not At All Confident

In terms of money required to buy this product (AMRs), how much would you say your firm would have to invest
A Great Deal of Money 1 2 3 4 5 Not Much Money At All

How easily can most buyers estimate ahead of time how dependable AMRs will be if they are to be used over and over again?
Very Easy to Estimate 1 2 3 4 5 Impossible to Estimate

Consequently, specific self confidence will be measured first by a revised version of Deering and Jacoby's (1972) instrument and second by a mix of items described below which are believed to be correlated to measures of specific self confidence.

TABLE 2

Items Related to Specific Self Confidence

Which of the following best describes how certain you are that AMRs will perform well?

Very Certain	Certain	Moderately Certain	Uncertain	Very Uncertain
_____	_____	_____	_____	_____

Assuming you are faced with the task of having to buy an AMR, is there anything or anybody you feel that you would have to consult before you decided to go ahead and buy?

Yes ____, No ____.
If yes, who and/or what would it be?

Source _____
_____
Name _____Dept. & Title _____
Name _____Dept. & Title _____

Do you think it is necessary for purchasers of AMR equipment to continue to seek information on other makes and/or types of AMR equipment once a purchase has been made?

Yes ____, No ____, Do Not Know ____.

Do you feel that within your company, you are generally regarded as a good source of advice about AMRs?

Yes ____ No ____.

3.5.3.2 Problem Solving Experience

Without question there is much to recommend an analysis of respondents in terms of their problem solving experience.

Experience in problem solving in general, and especially in terms of purchasing, may serve to increase one's decision making skills. Furthermore, experience may ease the processing of information since a familiarity with problems may result in the individual's routinization of decision making. Relatedly, such experience may affect one's self confidence too. Hence, investigation of differences among respondent's problem solving experience becomes important, as this dimension may factor into the individual's overall perception of risk in the purchase situation studied.

Questions relating to this dimension ask the respondent to provide data on their personal work history indicating their length of experience in the area of purchasing.

3.5.3.3 Professional Affiliation

It is often thought that those with a greater number of professional contacts and ties to professional organizations or groups will more likely and more readily come into contact with important new information relevant to their work activities and interests. Support for this contention is given by the findings reported by researchers interested in technology and information transfer and studies on the diffusion of innovations (Rogers and Shoemaker, 1971; Kaufman, 1974; Allen, 1966). Accordingly, the subjects will be asked to indicate their current affiliation with professional, industry and trade associations or institutions.

TABLE 3

Personal Purchasing Experience

How long have you been working with this company?

__a. less than 2 years
__b. 2 - 5 years
__c. 6 - 10 years
__d. 11 -15 years
__e. more than 15 years

How long ago (in years) was it that you first took part in a decision to purchase a piece of equipment of any sort?

__a. less than 2 years
__b. 2 - 5 years
__c. 6 - 10 years
__d. 11 -15 years
__e. more than 15 years

How long ago (in years) was it that you first took part in a decision to purchase a piece of equipment of any sort on: (A) behalf of this company, and (B) on behalf of your current department?

"THIS COMPANY"	"YOUR CURRENT DEPARTMENT"
__a. less than 2 years	__a. less than 2 years
__b. 2 - 5 years	__b. 2 - 5 years
__c. 6 - 10 years	__c. 6 - 10 years
__d. 11 - 15 years	__d. 11 - 15 years
__e. more than 15 years	__e. more than 15 years

3.5.4 Characteristics of the Organizational Environment

Although the purchase decision is made by an individual or group of individuals, these individuals operate within an organization which maintains either explicitly or implicitly a variety of goals that guide the work and decision making of those whom it employs. Clearly then, the characteristics of the organizational environment may factor strongly into

the decision maker's perception of the purchasing problem in terms of its importance and risk to the firm as well as to the decision maker.

3.5.4.1 Measuring Company Risk

The perceived importance and risk of the purchase problem therefore are both salient dimensions to study. Unfortunately, "company risk" cannot be directly determined, however, it is possible to approximate this by questioning the decision maker's assessment of the firm's ability to tolerate and handle risk in terms of the firm's financial capabilities. In addition, assessment of the financial and performance risks to the firm as perceived by the decision maker should also tap into "company risk" too.

Specific questions pertaining to whether a trial of the product has been conducted by the firm, and what aspects of the purchase contain risk for the firm (i.e., capital investment requirements, union problems, etc.) tap general organizational concerns ("company risk") indirectly associated with the personal risks of the decision maker. Similarly, organizational design, that is structure, may also factor into how company risks are handled by the firm and its members.

3.5.4.2 Measuring Organizational Structure

Clearly the degree of centralization and routinization of decision making appear as important risk handling mechanisms that affect how organizations approach a decision problem in advance of its occurence. Questions pertaining to these dimensions of organizational structure as they relate to purchasing activities are also incorporated for this reason (see Table 4). A modification of Spekman and Stern's (1979) instrument on "buying task structure" is to be used. (Modifications are basically necessary to accommodate differences in the purchasing problem.)

3.5.4.3 Measuring Financial Standing

As for measuring the financial standing of the firm, it would be most desireable to obtain the financial ratings from Moody's or from Standard & Poor's for the responding firms. These ratings would be desireable as they are likely to be much more objective than a self report given by a respondent and hopefully indicative of the capability of the firm to secure additional capital that might be needed for funding such a purchase as that which would be entailed for the product of concern here. Unfortunately, such ratings are basically unavailable for many of the firms to be surveyed. The reason for this is that many of the "firms" are utilities that are operated by municipalities and even if a rating of the most senior debt instrument were available for

TABLE 4

Organizational Decision Making Procedures

The following questions are concerned with the FREQUENCY with which you encounter various decision making procedures in your firm for products such as Automatic Meter Readers.

Please circle the appropriate value.
The scale values are as follows: 1=Never, 2=Seldom, 3=Occasionally, 4=Rather Often, 5=Nearly All the Time, 9=Does Not Apply.

When a new type of purchasing-related decision is to be made, how often do you yield to the recommendations of another member in your organization?

--1--2--3--4--5--9

How often are purchasing-related decisions made by you that are handled adequately with existing rules and procedures?

--1--2--3--4--5--9

How often do your specific purchasing-related responsibilities change from day to day?

--1--2--3--4--5--9

How often do you feel your purchasing-related responsibilities are clearly specified?

--1--2--3--4--5--9

How frequently are purchasing-related decisions made without your involvement?

--1--2--3--4--5--9

How often do you follow strict operating procedures when making purchasing-related decisions?

--1--2--3--4--5--9

When a purchasing-related decision is to be made for which rules and procedures do not exist, how often do you act without referring that matter to another member in your organization?

--1--2--3--4--5--9

When a purchasing-related problem arises, how

often do you go to another member in your organization for an answer? --1--2--3--4--5--9
How often do you handle purchasing-related problems which arise by following a standard procedure? --1--2--3--4--5--9
How often do you take an active part in purchasing-related decisions? --1--2--3--4--5--9
How often do you feel the purchasing-related decisions for which you are responsible are repetitive in nature? --1--2--3--4--5--9
How often do you handle problems which arise in the buying process by following written and verbal instructions previously established by other members in your organization? --1--2--3--4--5--9
How frequently are you asked by the other members in your organization to participate in decisions that involve your job responsibilities? --1--2--3--4--5--9
How often do other members in your organization make decisions related to your job role without consulting you? --1--2--3--4--5--9
How often are uncommon purchasing-related problems dealt with without regard for existing rules and procedures? --1--2--3--4--5--9
How frequently do other members in your organization perform the same duties as you? --1--2--3--4--5--9
How frequently does another member in your organization issue instructions when existing rules and procedures are not adequate to make purchasing-related decisions?

the given municipality, it may not be illustrative of the

ability of the municipality (or rural electric cooperative) to obtain funds needed for the product of concern. It has been suggested that the firm's sales revenues might be taken as the next best available proxy for the firm's capabilities of financing such a capital equipment purchase envisioned here. However this too is mired with difficulties since revenues are a function of the type, size and number of customers; of the degree to which the various firms have some discretion over pricing; and the stability of the organization. Given the regulated environment within which these firms operate and the wide variance in customers (e.g., by type, size, etc.) analysis of a firm's financial standing maybe akin to classifying random numbers or events as if they share some important dimension. One other factor that may be of some related importance is the number of employees within the firm and the ratio of sales to employees may offer some indication of the "productivity" of employees which could possibly be viewed as another proxy for the firm's financial capabilities. Unfortunately, the availability of such information is limited, and where it does exist, it is somewhat obscured by less than uniform reporting.

3.6 RESEARCH HYPOTHESES

This section will enumerate the hypotheses that will be tested in the course of the current research program. The hypotheses that follow are grouped in terms of those that relate to (a) the characteristics of the purchase problem, (b) the characteristics of the vendor, (c) the characteristics of the buyer (respondent), (d) the characteristics of the organizational environment and (e) more global concerns.

3.6.1 Hypotheses Related to Characteristics of the Purchase Problem

H-1: Perceived risk is directly related to the number of customers served by the buying organization.

H-2: Perceived risk is directly related to the number of residential customers of the buying organization.

H-3: Perceived risk is directly related to the number of non-residential customers of the buying organization.

H-4: Perceived risk is directly related to the individual's (respondent's) perception of the organization's need for the product.

H-5: Perceived risk will be greater for individuals that have not considered trying or purchasing the product

compared to those individuals who have considered trying or purchasing the product.

H-6: Perceived risk will be greater for the individuals that have not tried or purchased the product compared to those individuals who have tried or purchased the product.

3.6.2 Characteristics of the Vendor: Some Hypotheses

H-7: Perceived risk will be directly related to the certainty the individual perceives with respect to salesman-related dimensions of of vendor characteristics.

H-8: Perceived risk will be directly related to the certainty the individual perceives with respect to product-related dimensions of of vendor characteristics.

H-9: Perceived risk will be directly related to the certainty the individual perceives with respect to general-vendor dimensions of of vendor characteristics.

3.6.3 Characteristics of the Buyer/Respondent: Some Hypotheses

H-10: Perceived risk will be greater among those individuals who have lower self-confidence (specific self-confidence).

H-11: Perceived risk will be inversely related to the amount of experience the individual has with the product in question.

H-12: Perceived risk will be inversely related to the level of certainty attached to the information sources by the individual.

H-13: Perceived risk will be directly related to whether additional information on the product is desired by the individual.

H-14: Perceived risk will be higher among those individuals who are more likely to be asked to provide information as compared to those who are less likely to be asked to provide information (on the product) to others within the organization.

H-15: Perceived risk will be higher among those individuals who feel it is necessary to continue their search for

product or vendor information as compared to those individuals who do not.

H-16: Perceived risk will be higher among those individuals who claim to be regarded as a good source of advice for the product in question as compared to those individuals who do not.

H-17: Specific self-confidence will be higher among those individuals who claim to be regarded as a good source of advice for the product in question as compared to those individuals who do not.

H-18: Specific self-confidence will be higher among those individuals who are more likely to provide information on the product in question than those individuals who are not.

H-19: Perceived risk will be inversely related to the number of professional, industry or trade associations, or institutions that the individual maintains membership in.

3.6.4 Characteristics of the Organizational Environment: Some Hypotheses

H-20: Perceived "company risk" will be directly related to the individual's perception of risk.

H-21: Perceived risk of the individual will be directly related to the degree of routinization of decision making.

H-22: Perceived risk of the individual will be inversely related to the degree of centralization of decision making.

3.6.5 A General View of Industrial Buyer Behavior: A Hypothesis

H-23: Perceived risk of the individual is directly related to the individual's composite evaluation of company needs, company risks, the importance of other organizational members, the desire to continue searching for product information, and the expressed need for conducting a trial.

3.6.6 Research Foundation for Hypotheses on the Purchase Problem

H-1: Perceived risk is directly related to the number of customers served by the buying organization.

The preceding hypothesis is derived from the theoretical framework previously reviewed. First, Newall (1975) had posited that the size of the product expenditure would factor into the degree of risk perceived by the prospective purchaser. More specifically, as the size of the expenditure associated with buying a product increases, so does one's perception of risk. This is consistent with the contention that purchasers are generally concerned with the financial and performance risk inherent in all purchases, but which tends to be more apparent when a major commitment is required on the part of the purchaser (Cox, 1967, pp. 9-10). The commitment required here however is many-fold. First, the product of concern is a durable good, one which in this instance requires at the present time an estimated commitment of many thousands if not millions of dollars for firms of even moderate size. Second, this product is complex and may be thought of as an integral part of the production and revenue generating apparatus of the firm. As such, the immediate and long-term consequences of product failure are great and may be expected to be reflected here in the amount of risk a buyer perceieves. This may, furthermore, be mag-

nified as (a) the number of units involved increases and therein the probability of a defect or a performance failure, and (b) the magnitude of the investment decision increases along with its financial ramifications.

Since, as explained previously, sales invoices or other records revealing the size of the expenditure involved are unavailable, and since no full-scale purchase has ever been known to take place, a proxy for the size of expenditure is used here. This proxy is derived by estimating the maximum number of units of the product that would be required if a decision to commit the firm to such a purchase was made. Note that since the number of units required by the purchasing firm is proportionate to the number of customers served by the buying organization, the absolute number of customers will be used to estimate the relative size of the expenditure required (assuming that no significant savings may be derived from economies of scale).

It is hypothesized that as the number of customers increases so will the tendency toward perceiving the purchase of this product (automatic meter reading equipment) as having a higher degree of risk for the prospective purchaser.

H-2: Perceived risk is directly related to the number of residential customers of the buying organization.

As above, in H-1, the number of customers are hypothesized as factoring directly into the amount of risk perceived by the prospective purchaser for all of the same reasons given above in "H-1". The distinction however is made between all customers and residential customers served by the prospective purchaser. This distinction is drawn for the following reasons. First, there may be a great difference between firms of large and small size in terms of their respective capabilities and in the type of customers customers that each firm may serve. Electric utilities, which constitute the sample utilized, typically have different types of customers classified as residential, commercial, industrial and institutional. These classifications either reflect differences in the amount of energy consumed, the amount of money charged for energy, the type of equipment utilized or a combination of all or part of these three aspects. Consequently, such classifications may be taken as useful variables in describing the different values and/or problems associated with such a purchase. For instance, two companies can serve the same total number of customers but one company may serve many more residential customers and therefore serve far fewer non-residential customers. Hence, the purchase problem facing each firm may be viewed by prospective purchasers as very different. Therefore, the distinction is drawn between these "types" of firms and an analysis of the differences which exist between firms is

undertaken in this light. The result then is the above hypothesis that examines whether firms with more residential customers than others will be more likely to perceive more risk in the purchase of AMR equipment.

H-3: Perceived risk is directly related to the number of non-residential customers of the buying organization.

Again, consistent with the above explanation, an attempt to sift out differences based upon the presumed differences in the way the purchase problem is perceived by prospective purchasers is undertaken here. Specifically, the sum of all residential customers (per firm) are subtracted from the total number of cutomers served to provide a figure for the number of non-residential customrs served by each firm. Then, as hypothesized, an examination is made of the relationship between the amount of perceived risk and the number of non-residential customers served. It is important to note that summing up the numbers of commercial, industrial, institutional and "miscellaneous" customers is equivalent to this number of "non-residential" customers. The reason for summing over these groups is that these classifications ("commercial" versus "industrial," etc.) are occasionally the result of governmental prescriptions for "rate classifications" which may vary from from state to state and from utility to utility. Hence, the term "non-re-

sidential" affords a uniform common denominator that is believed to be most appropriate for the purposes of this research. (Another practical consideration is that the reporting by utilities of the number of classifications to the industry-recognized directory is not complete for each of the component classifications of non-residential buyers.)

It is hypothesized that as the number of non-residential customers increases so will the amount of risk perceived by the purchaser, for the reasons already enumerated above in "H-1" and "H-2" above.

H-4: Perceived risk is inversely related to the individual's (respondent's) perception of the organization's need for the product.

This hypothesis is stated given the following assumptions: (1) that the respondent's (decision maker's) stated perception is an accurate reflection of the company's needs, and (2) that the particular product under consideration (AMRs) may be evaluated in the context of certain company needs which conceivably are addressed by this product.

Given these assumptions, it is hypothesized that where a product addresses a set of problems or concerns facing the decision maker, that the decision maker will perceive more risk the more he/she believes that the product is "essen-

tial" or needed by the firm. The greater the need, the more critical the product is to the firm's operations, the less likely such purchases can be deferred. According to Marrian (1965), such a situation would more likely call for the purchaser to concentrate attention on reducing the uncertainty and risk that results from experience with vendors as opposed to the intrinsic differences between products.

H-5: Perceived risk will be greater for individuals that have not considered trying or purchasing the product compared to those individuals who have considered trying or purchasing the product.

This hypothesis stems in part from the view maintained in the literature that those who have thought about a problem will be more positively predisposed toward resolving such a problem, as compared to those who have not. (In consumer behavior models this is equivalent to the "need recognition" phase of the consumer's decision making process. Without such recognition of a need, no further evaluation of the problem or its possible solutions would follow.)

In addition, those who have "considered" trying or purchasing the product would most likely have more experience or knowledge about the product's features and its potential to solve a problem identified by (or for) the decision maker. The more knowledge or experience one has, the less risk

one will percieve with regard to the purchase of such a product. Finally, since in reality only very few firms have experimented with this equipment, this hypothesis taps the notion of the degree to which the individual firm might perceive this problem-purchase as a new task. This latter notion is particularly relevant to those industrial marketers who maintain that the buying process is largely affected by the newness of the task (or "buyclass") one is confronted with (Faris, 1967; Robinson Faris and Wind, 1967; Ferguson, 1979; Wind and Robinson, 1968).

Accordingly, those who have considered trying or purchasing the product are hypothesized to perceive less risk than those who have not.

H-6: Perceived risk will be greater for the individuals that have not tried or purchased the product compared to those individuals who have tried or purchased the product.

This hypothesis is a further extension of "H-5" in that those who have tried or purchased will have more experience with the product and therefore will be in a much better position to evaluate the product. Also, such experience should enable the prospective purchaser to reduce the amount of perceived risk, or better handle the amount of risk per-

ceived in such a purchase. Hence, those who have not tried or purchased such equipment in the past should, perceive more risk in the prospective purchase of such equipment.

3.6.7 Research Foundation for Hypotheses on Vendor Characteristics

H-7: Perceived risk will be directly related to the certainty the individual perceives with respect to salesman-related dimensions of of vendor characteristics.

McMillan (1972a) has examined this point in his research. Essentially, he has hypothesized that salesman-related dimensions (such as "salesman's honesty," "salesman's competency," and "salesman's effectiveness" will be evaluated as dimensions that embody great risk (uncertainty) for purchasers.

Here the salesman-related dimensions will be examined first to see if they in fact are associated with risk as posited by McMillan (1972a). That is, whether there is an association between overall perceived risk and the uncertainty-risk perceived on these dimensions. Any attempt to assess whether the three dimensions identified (namely, "salesman-related," "product-related," and "general-vendor") differ from one another as inputs into one's overall percep-

tion of risk attendant to the purchase of AMRs can only be performed judgmentally.

H-8: Perceived risk will be directly related to the certainty the individual perceives with respect to product-related dimensions of of vendor characteristics.

In the same view as the immediately preceding hypothesis, examination of the product related dimensions, (i.e., "product quality," "product performance," "product quality consistency," and "total cost" of the product) is called for. McMillan (1972a) has incorporated each of these items in his research of industrial buyers, and has postulated that an association between overall risk and the uncertainty-risk perceived on this dimension would be significant. This hypothesis was supported in McMillan's research and calls for inclusion of these items here. This is especially appropriate in light of this researcher's criticism of previous research, much like that conducted by McMillan (1972a) and Newall (1975, 1977)) that does not appear to have focused upon truly risk laden purchases. The argument already voiced by this researcher is that previous research may have examined purchasers' cognitive dissonance and not their perceived risk.

H-9: Perceived risk will be directly related to the certainty the individual perceives with respect to general-vendor dimensions of of vendor characteristics.

Again, following the recommendation of McMillan (1972a), it is posited that vendor-related ("general-vendor") dimensions will introduce and embody great risk (uncertainty) concerning the vendor, and therefore concerning the purchase of the product too. McMillan refers to these general-vendor characteristics as "company" related dimensions. These company-related dimensions are referred to here as "general-vendor" dimensions in order to avoid confusion as to which company is being referred to (i.e., seller or buyer). The "general-vendor" dimensions conceived by McMillan are: "ability to deliver on schedule," "service," "innovative nature of the vendor," "vendor's dependability of promises," "capability of supplying future demand," "reciprocity," "technical capability," and emergency assistance." In addition, two other items are added to this group of vendor characteristics, i.e., "vendor is a local source of supply," and "used by other firms." The rationale for these additions is the attention being given to the location and proximity of suppliers (Wind, 1970; Shillif and Bodis, 1975; Dempsey, 1978) in the selection of suppliers and the knowledge that a given supplier is used (and presumed to be acceptable to) other firms, which is thought

to reflect company reputation and experience which are all viewed as salient to vendor evaluation and selection (Kiser, Rao and Rao; 1974, 1975: Dempsey, 1978).

The above two hypotheses indicate that buyers may be more or less trusting of the manufacturer/distributor of such products. In addition, a prospective purchaser may, if desired, research the manufacturer/distributor and their product(s) with regards to the manufacturer's technical, financial, production and service capabilities and reputation. Such being the case, differences are therefore thought to exist between the risk perceived with respect to this dimension (as compared to the other two dimensions pertaining to the supplier).

H-10: Perceived risk will be greater among those individuals who have lower self-confidence (specific self-confidence).

Consistent with the literature on specific self-confidence which examines the degree of certainty of judgement which a person has in a particular situation, (Deering and Jacoby, 1972; Stem, Lamb and Maclachlan, 1977, Newall, 1975) it is hypothesized that a prospective purchaser's perception of risk will vary directly with the ability to evaluate the product's quality and their confidence in the new product's

performance. In addition, Deering and Jacoby (1972) also consider (a) the perceived danger inherent in a new product (compared to the product(s) to be replaced), (b) the long-run dependability of the product, and (c) the amount of money required to purchase the new product Accordingly, a composite measure of these items of specific self-confidence has been constructed to ascertain whether the postulated indirect relationship between (product) specific self-confidence and overall perception of risk is supported.

In other words these five dimensions are to be evaluated and a composite of specific self-confidence constructed. This derived variable is a slight modification of Deering and Jacoby's (1972) measure. The modifications introduced here are necessary as Deering and Jacoby (1972) dealt with consumer products and not industrial products, and also questions included in their composite measure directly addressed the concern for the "consequences" component of perceived risk which cannot be determined for the product in question.

H-11: Perceived risk will be inversely related to the amount of experience the individual has with the product in question.

This hypothesis recognizes the point that some variation in the decisions made by a firm may be attributed to characteristics inherent in the decision maker.

One aspect believed to factor into buyers decision making is the previous experience they have had with the product. In the context of this research, those having greater experience may be expected to perceive relatively less risk than someone with less experience. Unfortunately, given the paucity of experimentation with the product in question, experience at this point may simply be the cumulative knowledge that one has gained from reading ,hearing or talking about the product. Since it is not possible to examine one's knowledge or experience directly, a proxy is adopted which involves taking respondents self- report of the frequency they were personally responsible for raising the subject of AMRs. Remembering that the respondents were identified as being responsible for such a decision within their firms, it seems the extent of their product-related conversation is an appropriate proxy for experience.

Another alternative would be to employ purchasing experience as a proxy for experience with the product. Although this might have relevance to the <u>purchasing</u> of this product in the future, it does not say anything about knowledge or experience with the product per se. Furthermore, the decision maker for this product may not have much "pur-

chasing" experience (as a purchasing agent or purchasing manager) rather the individual may have a technical or administrative background. (Many of the respondents held executive rather than managerial titles.)

H-12: Perceived risk will be inversely related to the level of certainty attached to the information sources by the individual.

This hypothesis follows from the notion that individuals who are responsible for purchasing decisions will engage in information search. This view is established in each of the major models of buyer behavior but it is given special attention by Levitt (1965) and McMillan (1972a, 1972b) in their research. This view is also integrated within McMillan's (1972a, 1972b) research.

More specifically, a variety of sources of information may exist and be either sought out or simply made available to decision makers. Regardless of whether the search is passive or active, it is believed that the degree of certainty about each source, and the quality of information provided by the source will factor into the evaluation of the product. Hence, sources which are perceived to provide accurate, reliable and useful information will, if available, be essential to reducing risks perceived (in terms of

uncertainty) about the product in question. Therefore, it is hypothesized that perceived risk will be inversely related to the level of certainty attached to the information sources by the individual. This view was maintained by McMillan (1972a, 1972b) and will be reexamined. The test of this hypothesis will involve the examination of the amount of "certainty" attached to each individual information source. An examination of related groupings of these sources of information was developed through factor analytic techniques. The particular sources of information incorporated into the research instrument were selected after extensive preliminary interviews with members of industry, government agencies, and trade associations as well as a review of the relevant literatures.

(A copy of the final questionnaire is attached, see Apppendix.)

H-13: Perceived risk will be directly related to whether additional information on the product is desired by the individual.

This hypothesis embodies one widely expressed notion, that a purchase decision may not proceed unless the decision maker has completed his search for information. A related issue, is whether the individual finds it necessary to seek additional information that goes beyond that which the

decision maker may have already come into contact with through experience or the normal course of events. Accordingly, it is hypothesized that perceived risk will be greater among those who seek out additional information than those who do not seek out additional information relevant to the product in question.

H-14: Perceived risk will be higher among those individuals who are more likely to be asked to provide information as compared to those who are less likely to be asked to provide information (on the product) to others within the organization.

This hypothesis examines the purported relationship between the decision maker's perception of risk and the likelihood the decision maker believes others within the firm would solicit him/her to provide information pertinent to the purchase of such a product. Newall (1975) examined this matter and posited that the amount of risk perceived by the decision maker would be higher whenever they believed they would be more likely to be asked to provide information relevant to the product whose purchase was under consideration. Essentially, it is presumed that one who responds in the affirmative - that they would be more likely to be asked for advice - bears additional responsibility. This added responsibility may be reflected in the "psychosocial" risk

attendant to such problems. Thus the individual's concern about the reactions of other people within the organization, will factor into their overall perception of risk for the product in question (Webster and Wind, 1972).

H-15: Perceived risk will be higher among those individuals who feel it is necessary to continue their search for product or vendor information as compared to those individuals who do not.

This hypothesis is posited in light of the research on specific self- confidence and to a certain extent, research on cognitive dissonance. Note that no such link was emphasized by Newall (1975). As already pointed out one's perception of risk may be a function of their self-perceived capability of evaluating a problem along a number of dimensions and their self-confidence in this regard. Too, it has been suggested that search for information may not only precede decision making as part of information search but may also follow the decision in an effort to reduce any remainingg uncertainty. This is consistent with the theory of cognitive dissonance (Festinger, 1957). It is conceivable that the decison maker may feel the need to convince himself that the purchase decision was appropriate and therefore may engage in a number of strategies to reduce "post-purchase cognitive dissonance." One such strategy of the many iden-

tified (Schiffman and Kanuk, 1978) is to to continue searching for information, information that will act to confirm the decision already made.

Relatedly, Schiffman and Kanuk (1978) point out that the extent of post-purchase analysis (or in this instance, post-purchase information search) will largely depend upon the importance of the product decision. Given the value, nature and type of purchase under consideration in research, it is believed that many if not most of the prospective decision makers will admit to the need for engaging in such risk handling, strategies in the future. Hence, it is hypothesized that those decision makers who do not see the need for any further search for information (once a purchase has been made) are likely to perceive less risk in the purchase decision in general, and certainly in comparison to those who do believe it is necessary to continue searching for such information.

H-16: Perceived risk will be higher among those individuals who claim to be regarded as a good source of advice for the product in question as compared to those individuals who do not.

As in "H-14" above, this hypothesis gives recognition to the role the individual plays within the organization and

emphasizes how one's perceived role (being regarded as a good source of advice (with respect to AMPs)) may affect their perception of risk for the product in question.

It should be noted that someone may claim to be regarded as a good source of advice for a number of reasons. First, they may actually be knowledgeable in this area. Second, others are either perceived to be or may in fact be less knowledgeable, and therefore the responding decision maker may relatively speaking be a good source of advice with regards to this purchase-problem. Third, others simply or routinely refer to this individual as being a good source of advice. Therefore, these are all reasons why this claim may be made.

H-17: Specific self-confidence will be higher among those individuals who claim to be regarded as a good source of advice for the product in question as compared to those individuals who do not.

It has already been hypothesized that the decision maker's perception of risk may be related to (a) the decision maker's specific self-confidence, and (b) whether the decision maker claims to be a good source of advice within the organization. Here it is hypothesized that one's self confidence will be directly related to one's claim of being a good source of advice for the product- problem in question.

This hypothesis is founded in earlier research conducted by Newall (1977). Unfortunately, Newall (1977) merely states but does not analyze how one's specific self-confidence may be a determinant of risk. Nonetheless, considering his framework and following up on his theoretical notions, it may be hypothesized that someone who claims to be regarded as a good source of advice will likely have greater self confidence, specific to the product.

The above may be explained as follows: Individuals high in specific self-confidence may attain this level of confidence by engaging in extensive information search and by maintaining their ability to evaluate such a complex purchase decision. Consequently, activities may be undertaken to maintain one's "referent," "expert" or "opinion leader" position in the firm.

Accordingly, this is advanced in an effort to examine the logical (and intuitive) extension that such a relationship should be observed. Note that the direction of the relationship appears to contradict hypotheses "H-15" and "H-16." One plausible explanation for this apparent discrepancy is that individuals with high specific self-confidence may perceive less risk in the problem under study, and may not be motivated to engage in activities needed to maintain their credibility as being a good source of advice. In this context, their self-confidence may supercede the assumed de-

mands of being an opinion leader. Alternatively, those who do not perceive themselves as a good source of advice may therefore perceive little risk because the product evaluation may be simply dismissed.

Only through examination of this hypothesis may an intuitive leap be drawn between the two hypotheses, and therein assess whether such an association is supported.

H-18: Specific self-confidence will be higher among those individuals who are more likely to provide information on the product in question than those individuals who are not.

It has already been hypothesized above that the decision maker's perception of risk may be related to (a) their specific self-confidence and (b) whether they will be more likely to be asked for advice as compared to other members in their firm. Here it is hypothesized that self-confidence will be related to the perception and claim that they would be more likely to be asked for advice.

This hypothesis is founded in part on perceived risk research conducted by Bell (1967), Cunningham (1967) and more recently the research of Newall (1975, 1977) in the context of industrial buying. Newall considered examining a variety of personal characteristics, one being self-confi-

dence. An attempt is made here to examine this concern of Newall's for self-confidence, however only in terms of its relationship to whether the decision maker will be more likely to be asked for advice by others in the firm. Previous research conducted on specific self-confidence by (Bell, 1967), asked questions about the purchase that resemble in many respects items which if answered in the affirmative would seemingly identify someone that other persons might wish to seek for advice. Hence, it is believed that someone high in specific self-confidence may be either perceived by others as an expert and may be sought out in regards to this purchase decision or one's self confidence extends to the individual's own perception of importance to others and the same claim may be made.

H-19: Perceived risk will be inversely related to the number of professional, industry or trade associations, or institutions that the individual maintains membership in.

This hypothesis examines the relationship between another factor posited both by Newall (1977), and by Ozanne and Churchill (1971) as affecting the buyer's level of perceived risk.

Ozanne and Churchill's (1971) measure of professional affiliations was constructed by asking respondents to specify not only membership in, but also the "extent of association with engineering, management, and purchasing organizations" that their subject maintained memberships in. Unfortunately, no explicit explanation is offered by Ozanne and Churchill (1971) as to how the index that they supposedly developed was actually formulated. That is, they fail to explain how they measured "extent of association," and how the components were weighted. Newall (1977) merely posits that one's professional affiliation may affect the buyer's level of perceived risk, but does not subject this dimension to analysis, nor indicate a measurement procedure to employ.

Here the absolute number of memberships in professional, industry or trade associations held by the decision maker is taken as the measure of professional affiliation.

3.6.8 Research Foundation for Hypotheses on the Organization-Environment

H-20: Perceived "company risk" will be directly related to the individual's perception of risk.

This hypothesis is founded on the notion advanced by Newall that differences between organizations may account for different perceptions of risk maintained by decision

makers. Newall (1977, p. 168) points out; however, that "precedents within the literature are not so forthcoming." Newall does cite Bauer (1960) who suggested that there are two bases of risk. The first being buyer risk and the second, company risk. Bauer suggests that the two bases are likely to be directly related. Company risk may be conceptualzed as the extent that a company is able to tolerate risk (Newall, 1977). Accordingly, Newall (1977) suggests this is dependent upon the size and financial standing of the decision maker's firm and also the extent that purchasing routines are available to handle risk. No operationalization of company risk has been offered that directly addresses "company risk" in previous research, yet Newall (1977) does seem to suggest this would be in order.

Given the industry-wide nature of this study an effort was made at the preliminary stages of the research to identify specific concerns about the purchase of the product in question that may present important risks to any company considering the purchase of such a product. These "risks" were identified via extensive interviews with executives and engineers at firms involved in the development of such equipment, with technical specialists at both industry associations and their research institutes. These "risks" are taken here as proxies for "company risk" and include the following five factors: the firm's capital investment requirement," "union problems," the "lack of a service bu-

reau," the "inflexibility of (the AMR) design," and "threat of (an) AMR performance failure."

Since each of these factors are in some respects exclusive of one another they are examined independently. As a result, testing this hypothesis requires the examination of five independent items, which will hopefully provide a clearer view of "company risk." An alternative to this approach would be to simply consider the decision maker's perceptions of risk as the embodiment of company risk, with no consideration of such specific concerns that will vary from product to product and from company to company, (i.e., not every company has a union to deal with). Such an approach would be consistent with Newall's resignation that company risk and buyer's risk are likely to be related. Yet this researcher believes that the former approach has significant advantages, especially in light of the extensive interviewing that preceded the development of the research instrument.

H-21: Perceived risk of the individual will be directly related to the degree of routinization of decision making.

This hypothesis is based on the theoretical framework presented by Newall (1977) where he suggests that the degree

of decision routinization within the firm may factor into the individual's perception of risk. Newall (1975) constructed statements representative of the purchasing procedure which focused essentially upon whether or not the purchase decision was a first time purchase, or a modified rebuy or a straight rebuy. Statements in opposition to one another were drafted for each type of buying task and taken as a proxy for the degree of routinization. Spekman and Stern (1979) utilized a somewhat different approach where a series of items was designed to tap the degree to which the decision of concern was handled by buyers in a routine fashion. A modification of Spekman and Stern's instrument is utilized here for two reasons. First, Newall's measure is concerned woth whether or not the decision was a new task, a modified rebuy or a straight rebuy, which although appropriate and meaningful, given the products Newall studied (office reproduction equipment) it is not deemed appropriate here. In this research, the product is assumed to be viewed by all prospective buyers as a new task (since no full-scale adoption is known to exist. Hence, concern is not appropriately addressed by focusing upon the type of task but rather focusing upon how relevant decision makers would proceed through the decision making process. In other words, attention is directed at whether the respondent and their company would go about this decision process routinely.

Another reason for utilizing the variety of items included in Spekman and Stern's (1979) research is that it is believed that one or two questions alone may not truly tap the process of decision making, nor the degree to which the process is routinized. A factor analysis of all the items will be required to see whether a related set of items do in fact hold together as one dimension of routinization of decision making. Assuming that a factor emerges that contains a set of items that do indeed reflect routinization of decision making, a composite of these items will be constructed to form a new variable - the sum of the individual raw data values - and will then be examined to determine whether a relationship does exist between the individual's perceived risk and routinization of decision making within the firm. (The latter will call for subjecting these two variables to a Mann-Whitney U test.)

It is believed that such a composite of items provides a better understanding of the relationship hypothesized above.

H-22: Perceived risk of the individual will be inversely related to the degree of centralization of decision making.

This hypothesis seeks to examine another organizational characteristic posited by Newall (1975, 1977) in his theoretical framework that may also influence the individual decision maker's perception of risk. Newall (1975) constructed statements representative of the purchasing procedure which focused upon whether the purchase decision under study was handled by the firm in a manner indicative of centralized decision making; that is, via committee discussions or formal meetings, or alternatively by a spontaneous and decentralized approach.

Spekman and Stern's (1979) research also addressed the issue of centralization of decision making as part of their study of industrial buyers and since a battery of items was developed to this end (as opposed to a single question used by Newall(1975)) this research has adapted the instrument used by Spekman and Stern. The adaptation involves those items indicative of various aspects of centralization, and which when taken collectively are believed to provide a better test of whether the relationship hypothesized between perceived risk of the decision maker and the degree to which decision making is centralized in the organization is supported. The latter is a reflection of the incidence of more formalized procedures.

Such support is quite plausible in that the personal and psycho- social risks associated with a poor decision are

minimized whenever decision making is centralized. The reason for this is that the responsibilities (and therefore the risks) associated with the decision are shared amongst members in the organization. Another reason for utilizing the variety of items included in Spekman and Stern's (1979) research is that it is believed that one or two questions alone may not truly tap the process of decision making, nor the degree to which the process is centralized. A factor analysis of all the items will be required to see whether a related set of items do in fact hold together as one dimesion of centralization of decision making. Assuming that a factor emerges which contains a set of items that do indeed reflect centralization of decision making, a composite of these items will be constructed to form a new variable - the sum of the individual raw data values - and will then be examined to determine whether a relationship does exist between the individual's perceived risk and centralization of decision making within the firm. (The latter will call for subjecting these two variables to a Mann-Whitney U test.)

3.6.9 Toward A Global View: A Hypothesis for the Future

H-23: Perceived risk of the individual is directly related to the individual's composite evaluation of company needs, company risks, the importance of other organizational members, the desire to continue searching for product information, and the expressed need for conducting a trial.

This hypothesis attempts to establish the dimensions which given the preceding hypotheses might be taken together as a composite view of important and salient dimensions indicative of an individual's perception of risk in industrial buying situations. Furthermore, this hypothesis endeavors to integrate the decision maker's understanding as to whether the product is needed by the firm, while simultaneously considering the "company risks" and the predilection of the decision maker, to consult others before such a purchase and continue to search for more information regarding such products even after a decision to purchase is made.

While this hypothesis cannot be tested due to the data requirements (i.e., a far greater number of firms would have to be sampled than those which exist in the industry studied), it is presented to reflect the wide variety of inputs collectively considered in the preceding hypotheses. Moreover, it offers direction for future research, by providing a composite and complex picture of industrial buyer behavior.

3.7 STATISTICAL PROCEDURES

This section will first outline the statistical procedures employed and explain the manner in which the data has been handled. Second, the results of the statistical proce-

dures employed in the analysis of the hypothesized relationships will be presented.

3.7.1 Statistical Tests

Two non-parametric procedures are used in the test of the hypotheses outlined in this section. They are the Mann-Whitney U test and the chi-square test. The Mann-Whitney U test was selected for the following reasons: (1) the underlying assumptions are that the groups are independent and that the data are ordinal; and (2) the Mann-Whitney is one of the most powerful non-parametric tests, being approximately 95 percent as powerful as the parametric alternative, the Student t test (Siegal, 1956).

A second approach utilizes the Chi-square test. This test is a technique to assess "goodness-of-fit" and may be used to ascertain whether a significant difference exists between an observed number of objects or responses falling in each category and an expected number based on the stated hypothesis (Siegal, 1956). More importantly, one may (a) determine whether a systematic relationship exists, and (b) gain greater insight into observed associations by examining the cell frequencies and deviations.

In addition, a third, statistical procedure is also utilized in an effort to determine the interdependencies that might exist among a number of variables. The approach

used here involves the application of log linear and logit models to given sets of qualitative or categorical variables. These procedures which are used to evaluate multi-way contingency tables. These are presented in light of some of the theoretical underpinnings of this research, but are not directed at testing specific hypotheses (Feinberg, 1977).

The Median test is also used to supplement the explanation of the results wherever the Mann-Whitney U test results indicate a significant difference between the high and low risk groups.

Factor analysis using the varimax rotation procedure will be used for the purposes of data reduction. That is, factor anlaytic techniques enable the researcher "to see whether some underlying pattern of relationships exists such that the data may be "rearranged" or "reduced" to a smaller set of factors or components that may be taken as source variables accounting for the observed interrealtions in the data (Nie, Hull, Jenkins, Steinbrenner and Brent, 1975, p.469) Given this capability, it is possible to use factor analytic techniques for confirmatory purposes, testing the structuring of variables and related hypotheses.

3.7.2 Data Analysis

The chi-square statistic is used to test the following hypotheses their respective numbers as found in Chapter III):

H-5, H-6, H-13, H-14, H-15, and H-16.

The Mann-Whitney U test is employed to test the remaining hypotheses:

H-1, H-2, H-3, H-4, H-7, H-8, H-9,
H-10, H-11, H-12, H-17, H-18, H-19.

The chi-square test is employed here whenever the hypothesis involves examination of two nominally scaled variables. Where one nominally scaled and one ordinally scaled variable are under examination the Mann-Whitney U test is used.

As already explained in each of the preceding sections, the variable of central concern in this research is perceived risk. This variable is treated as the dependent variable and is handled in the following manner for all tests of the hypotheses. (There are three exceptions to this, and they will explained at the point of departure.) Since the research objective is basically to determine differences between respondents who are "high risk" perceivers and those who are "low risk" perceivers, an attempt to classify respondents as such is required. Since the research instrument

utilized a five-point scale to assess the individual's perception of risk for the product of concern, (e.g., "Which of the following best describes the amount of risk you feel regarding the purchase of AMR equipment? --Very High Risk-High Risk-Moderate Risk-Low Risk-Very Low Risk) and the intention here is to classify respondents at only two levels - "high-risk" and "low-risk" it was necessary to collapse over the original levels of risk.

3.7.3 Collapsing procedure

In attempting to handle the data as objectively and uniformly as possible, every instance where collapsing of scales does occur the same convention was followed.

Accordingly, the two "high" values (high in terms of risk) are combined to form one category of "high-risk" perceivers (N=87), and the three remaining values - the two "low" and one "moderate" - are combined to form the second category; of "low-risk" perceivers (N=102). The rationale for this particular approach is based not only upon the theoretical and intuitive appeal of keeping "high-risk" responses together and distinct from other lower risk responses, but is also based upon review of the frequency distributions of the five original response possibilities which also suggests a natural break in the data.

3.7.4 Further Data Manipulation

As already mentioned there are three exceptions to the above procedure of collapsing over the perceived risk responses. In setting up the data for analysis, especially in terms of testing H-1, H-2, and H-3, the values associated with the number of customers in each of the firms are in the form of continuous variables that present both problems and opportunities for this research. The "opportunity" lies in the ability to analyze differences between firms, which would be of practical importance to any marketer of such products. The fact that marketers often seek to segment markets based on their respective propensity to consume products underlies the effort to consider analyzing firms according to known differences in their

customer classifications. Essentially, the number of units a marketer of AMRs might be able to sell to a firm is governed by the number of customers that the electric utility (the target market) serves. Consequently, the number of customers represents a proxy for propensity to consume. This propensity however, may vary according to the types of customers served by the electric utility. Therefore, an attempt to classify firms in terms of the relative number of customers they serve, by customer type, may afford one insight into differences between firms which have practical importance to the marketer of AMRs.

Given the fact that the number of customers served is in the form of a continuous variable, for each customer classification, it was decided that a conservative manner in which to treat this data would be by ranking each of the firms and identifying the median number of customers (median total, residential, and non-residential number of customers) and classify firms in relation to one another based on the median. That is firms greater or equal to the median "size" (number of customers) are treated as "large" firms, the remainder, those below the median - are treated as "small" firms for the particular "rate classification" of concern.

This manipulation results in a nominally scaled variable (for the total number of customers, number of residential customers and the number of non-residential customers). As a result a Mann-Whitney U test may be performed that treats the number of customers as a dependent variable since it is nominally scaled, and utilize the full range of responses to the "perceived risk" question. Although the theoretical presentation calls for treatment of risk as the dependent variable since ranks are used by the Mann-Whitney U test, it is believed that the above approach will still enable analysis of a potentially meaningful segmentation variable. This examination does not negate the test of H-1, H-2 or H-3, rather it is presented in addition to the test called.

Chapter IV

RESEARCH FINDINGS

4.1 INTRODUCTION

Each of the hypotheses will be examined and the results of the statistical analyses outlined in the preceding chapter are presented here. Note that the results will be presented in groups following the sections outlined in the review of the literature and as presented earlier when the hypotheses were introduced. In addition, a .05 level of significance will be used throughout.

4.2 FINDINGS RELATED TO CHARACTERISTICS OF THE PURCHASE PROBLEM

H-1: Perceived risk is directly related to the number of customers served by the buying organization.

The Mann-Whitney U test was used to test this hypothesis and no support is given for the hypothesized relationship.

H-2: Perceived risk is directly related to the number of residential customers of the buying organization.

Again, the Mann-Whitney U test was used to test this hypothesis and no support is given for the above hypothesized relationship.

H-3: Perceived risk is directly related to the number of non-residential customers of the buying organization.

The Mann-Whitney U test was used here too, and the hypothesized relationship was also found to be not significant at the .05 level.

H-4: Perceived risk is inversely related to the individual's (respondent's) perception of the organization's need for the product.

Again, using the Mann-Whitney U test, the hypothesized relationship was not supported when the "macro" level of analysis suggested in the previous chapter was conducted. This "macro" level analysis is based upon the repondent's replies to the question "Are AMRs something your company needs?" and does not include a "micro" level analysis of the many specific "needs" identified in the literature review that may be served by this product. A discussion of this will follow in the next chapter.

H-5: Perceived risk will be greater for individuals that have not considered trying or purchasing the product compared to those individuals who have considered trying or purchasing the product.

As the variables involved here are nominally scaled (one by design and one -perceived risk- after collapsing) a 2x2 crosstabulation is constructed. The chi-square statiis-tic measuring "goodness-of-fit" was calculated, the result of which does not indicate support of the above hypothesis.

H-6: Perceived risk will be greater for the individuals that have not tried or purchased the product compared to those individuals who have tried or purchased the product.

This hypothesis was tested by constructing a 2x2 cros-stabulation and calculating a chi-square statistic. Again, no support is obtained for this hypothesis and as such no relationship is observed. One interesting finding however is that in testing for this relationship one additional firm was identified here as having tried or purchased such equip-ment not identified by the most recent industry association study of its member firms. Hence, the data base seems to accurately reflect the "real" world.

4.3 CHARACTERISTICS OF THE BUYER: SOME FINDINGS

H-7: Perceived risk will be directly related to the certainty the individual perceives with respect to salesman-related dimensions of of vendor characteristics.

The Mann-Whitney U test was used here to test the hypothesized relationship and it is supported at the .05 level of significance (p=.014). Accordingly, there is a relationship between an individual's perceived risk about the product in question and their uncertainty as to whether salesman-related characteristics of the vendor selected to supply such equipment would meet the individual buyer's expectations.

This finding is especially relevant to both buyers and sellers of such equipment as will be explained in the next chapter.

H-8: Perceived risk will be directly related to the certainty the individual perceives with respect to product-related dimensions of of vendor characteristics.

This hypothesis was tested using the Mann-Whitney U test. The hypothesized relationship is supported at the .05

level (p=.025). Hence, there is a relationship between an individual's perceived risk about the product in question and their uncertainty as to whether product-related characteristics of the vendor selected to supply such equipment would meet the individual buyer's expectations.

This finding is not surprising since it supports the underlying premise of the theory of perceived risk. Accordingly, if someone has much uncertainty about the "product-related" dimensions - namely total cost, product quality and performance and product quality consistency - then they would tend to perceive a greater amount of risk. The recerse would also follow the same logic. As such, one might say that this finding offers validy to the research instrument.

H-9: Perceived risk will be directly related to the certainty the individual perceives with respect to general-vendor dimensions of of vendor characteristics.

This hypothesis was tested using the Mann-Whitney U test, and the hypothesized relationship is supported at the .05 level of significance, (p.=.0028). Accordingly, there is a relationship between an individual's perceived risk about the product in question and his uncertainty as to whether the "general-vendor" characteristics of the vendor

selected to supply such equipment would meet the buyer's expectations.

This finding is especially important to sellers of such products as will be explained in the next chapter.

4.4 CHARACTERISTICS OF THE VENDOR: SOME FINDINGS

H-10: Perceived risk will be greater among those individuals who have lower self-confidence (specific self-confidence).

This hypothesis was also tested using the Mann-Whitney U test and the hypothesized relationship is supported at the .05 level of significance, (p=.0000). The association between perceived risk and specific self confidence is strong, and deserves special attention.

It should be recognized that the five items that were combined from the research instrument to develop this measure of specific self-confidence tap a variety of components of risk and taken together they provide greater insight into the decision maker's concerns about the product in question. This finding is particularly important for a number of reasons, both theoretically and practically and they will be explained in the following chapter.

H-11: Perceived risk will be inversely related to the amount of experience the individual has with the product in question.

The above hypothesis was tested using the Mann-Whitney U test and was not supported.

H-12: Perceived risk will be inversely related to the level of certainty attached to the information sources by the individual.

To test this hypothesis a factor analysis was conducted on each of the nine sources of information presented to respondents for their consideration. This was done in order to try to identify which items are related to one another so they may be grouped together for other analyses explained shortly. Two factors emerged via the varimax rotation procedure. These two factors are presented in the following two tables presented (see Tables 5 and 6). Note that the names of the items are given along with their respective values and the factor "name" derived by the researcher's judgment. (It seems that the common denominator among these items is the degree of "subjectivity" or "objectivity" inherent in the information source.)

TABLE 5

FACTOR 1: Subjective Information Sources

Variable Item:	Factor Loading
advertising in trade publications	.686
news stories in trade publications	.655
literature (direct mail, brochures)	.849
salespeople from AMP vendors	.730
trade shows	.573

TABLE 6

FACTOR 2: Objective Information Sources

Variable Item:	Factor Loading
trade association data	.496
regulatory agency data	.572
other purchasing professionals	.553
the firm's engineers	.465

Given the above, two new variables were created consisting of each of the components of the respective factors obtained. A Mann-Whitney U test was performed on a general composite of information sources (being the sum of all the information sources), and on each of the two new variables.

The results of the above analysis follow. First, the overall composite of the nine items was found to be supportive of a relationship between perceived risk and the level of certainty (uncertainty) attached to the various information sources. This relationship is significant at the .05 level of significance, (p=.0288).

Looking at the first of the two "variables" derived by the factor analysis, labelled "subjective information sources," it was found that no significant difference was observed between "high" and "low" risk perceivers, and as such there would be no support for the hypothesis that "subjective" information sources are associated with "perceived risk."

Finally, examination of the results obtained from performing the Mann- Whitney U test on the second "variable" created upon the results obtained from the varimax rotated factor analysis, indicates that there is an association between perceived risk and certainty attached to the "objective" sources of information.

H-13: Perceived risk will be directly related to whether additional information on the product is desired by the individual.

To test this hypothesis a 2x2 crosstabulation was performed and a chi-square statistic calculated. The results of this analysis indicates that the hypothesized relationship cannot be supported.

H-14: Perceived risk will be higher among those individuals who are more likely to be asked to provide information as compared to those who are less likely to be asked to provide information (on the product) to others within the organization.

This hypothesis was tested by constructing a 2x2 crosstabulation and calculating the chi-square statistic. The results of this analysis does not support the above hypothesis. No relationship was observed between risk perception and whether the individual would be more or less likely to be asked for information by others in the firm.

One likely explanation for this is that the subjects were pre-screened and therefore "more likely" to be asked for information within their respective firms and this explanation may be supported by the fact that 94 percent of all respondents, whether "high" or "low" risk perceivers, claimed that they would be more likely to be asked for information regarding the product of concern as compared to other member of their company.

H-15: Perceived risk will be higher among those individuals who feel it is necessary to continue their search for product or vendor information as compared to those individuals who do not.

This hypothesis was tested using a 2x2 crosstabulation, and by calculating the chi-square statistic. The result of the analysis does not support the above hypothesis. Again, there was very little observable difference between "high-risk" and "low-risk" perceivers as 95 percent of all respondents indicated that they felt it was necessary to continue searching for product and vendor information. This is important in that it confirms the claim of this researcher that unlike most studies of risk, this study has truly focused upon an objectively risky purchase decision, one that will not likely be handled routinely or impulsively.

H-16: Perceived risk will be higher among those individuals who claim to be regarded as a good source of advice for the product in question as compared to those individuals who do not.

This hypothesis was tested by constructing a 2x2 crosstabulation and calculating the chi-square statistic. The results of this analysis indicates that the hypothesized relationship cannot be supported.

H-17: Specific self-confidence will be higher among those individuals who claim to be regarded as a good source of advice for the product in question as compared to those individuals who do not.

To test this hypothesis the Mann-Whitney U test was performed on the two groups of indiviuals classified in terms of whether they claimed to be a good source of information and on the composite measure of specific self-confidence. The results of this test do not support the stated hypothesis and as such there is no evidence of a relationship between one's specific self-confidence and whether one claims to be a good source of advice.

H-18: Specific self-confidence will be higher among those individuals who are more likely to provide information on the product in question than those individuals who are not.

This hypothesis was tested using the Mann-Whitney U test in a fashion outlined above. Here the two groups were formed on the basis of whether the respondent claimed to be more or less likely to be asked advice regarding the product in question. The results of the statistical analysis do not support the hypothesized relationship.

It should be noted that this finding is not completely surprising since so few respondents claimed that they are less likely to be asked for advice by others. Hence, the response pattern was similar for all regardless of their (product) specific self-confidence. Moreover, this may be explained again by the preliminary screening of respondents. In other words, if the respondent is supposed to be responsible for such a decision then he should be, quite logically, more likely to consider himself more likely to be asked for advice on this product, and therefore claim such.

H-19: Perceived risk will be inversely related to the number of professional, industry or trade associations, or institutions that the individual maintains membership in.

This hypothesis was tested via the application of the Mann-Whitney U test, the results of which do not indicate support for the hypothesized relationship. Accordingly, there is no association between the number of professional, industry or trade associations that an individual maintains and their perception of risk for the product in question.

4.5 CHARACTERISTICS OF THE ORGANIZATION: SOME FINDINGS

H-20: Perceived "company risk" will be directly related to the individual's perception of risk.

As stated previously, this hypothesis requires an examination of five distinct items. These five items are treated together here since they are thought to present real difficulties and risk to the company considering buying such a product. In this light, an examination of each item will be taken up in turn, and respectively analyzed via a 2x2 crosstabulation. The chi-square statistic was used to determine the "goodness-of-fit," that is, whether or not there is an association between the risks perceived by the individual and the factors identified here as posing serious concerns for the purchaser such that one would approach the purchase of this product with caution.

The first item so tested is the anticipated "capital investment requirement." The chi-square statistic obtained for this factor was not significant, and therefore there is no evidence of an association between perceived buyer risk and "company" risk as measured by this item. (A discussion of this finding will follow in the next section.)

The second item examined is the prospect of "union problems." This was analyzed in the same fashion as the

first item and again no support for the hypothesized relationship is obtained. (A discussion of this finding will follow in the next section.)

The third item examined in this manner was the problem identified as "the lack of a service bureau." (This is especially relevant to the telephone based AMR design under consideration, and would not be a factor if another AMR design had been selected.) This item was subjected to a crosstabulation and again no support for the hypothesis is obtained.

The fourth item, addresses a concern somewhat related to the previous item, in the sense that it reflects the product's installation and design features and their ramifications upon the firm. The item then, "inflexibility of design," was similarly subjected to the chi-square test and again no support for the hypothesis is obtained.

Finally, the fifth item, "threat of AMR performance failure," was analyzed in a fashion consistent with the four preceding items. The resulting chi-square statistic indicates that there is an association between perceived risk and the threat of an AMR performance failure. This is an important finding and merits additional attention.

Since respondents were asked to identify which of all these five items would likely make a purchaser approach the

decision to order AMRs with caution, the fact that only one was found to be associated with "perceived risk" is thought not to be only mildly surprising to this researcher, but this finding is particularly relevant to the future marketing efforts of manufacturers of such equipment. An extended discussion pertaining to this finding and its implications will be presented in the next section.

H-21: Perceived risk of the individual will be directly related to the degree of routinization of decision making.

As specified in the previous section, a factor analysis of the items was required to determine whether a factor reflecting routinization of decision making emerged. Two approaches were pursued. First, since a number of dimensions were supposedly contained in the Spekman and Stern (1979) instrument, one being the degree of decision routinization, another the degree of decision centralization, a factor analysis was performed using varimax rotation and specifying that two factors be generated in the process. The outcome of this procedure was the generation of two factors which judgmentally are a "mixed-bag" of both decision routinization and centralization. Consequently, it is not possible to test the above hypothesis as intended. Another approach taken, utilizing factor analysis, was to let the factor ana-

lysis proceed without specifying the number of factors to be generated. This was done with the hope that one of probably more than two factors would emerge as containing a set of items indicative of the degree of routinization in decision making. The result of this approach proved similarly unrewarding as again a mixture of items were obtained in each of the five factors that were generated. These five factors could not be named with great confidence on the part of this researcher as being indicative of the degree of routinization of decision making. Hence, this tack does not enable the test of this hypothesis as planned.

It should be noted that Spekman and Stern (1979) had constructed their items based upon their own judgment, and this might account for some of the problems encountered here.

H-22: Perceived risk of the individual will be inversely related to the degree of centralization of decision making.

The test of this hypothesis called for a preliminary factor analysis to identify a factor reflecting centralization of decision making contained within the seventeen items adapted from Spekman and Stern's (1979) research instrument. As outlined in discussing the findings pertaining to the re-

lationship between perceived risk and the degree of routinization of decision making, a test of this hypothesis is precluded since no factor emerged from either of the two factor analytic techniques deployed that could be "named" as reflecting the degree of centralization of decision making. Consequently, a Mann-Whitney U test examining the association of perceived risk and a composite variable of the degree of centralization of decision making could not be conducted.

4.6 ADDITIONAL THEORY BASED RESEARCH INVESTIGATION

Aside from the preceding hypothesis testing activity an endeavor to examine other related amd potentially fruitful areas was undertaken. This section relates this researchers attempts to consider a variety of potentially significant relationships between groups of variables. Accordingly, a multiple cross-classification procedure is utilized and applied to develop multi-way contingency tables and examine which variables may be more important to explaining the observed differences in repondents' perceived risk. To accomplish this task log linear and logit models are utilized here.

4.6.1 Variable Selection

The rationale underlying the selection of the variables is as follows: (1) it is questioned as to whether the vara-

bles are related in some fashion to one another and (2) the scale of measurement is consistent across all of the classification variables (that is, only categorical data is considered here).

4.6.2 Advantages of Analyzing Data Via Multi-way Contingency Tables

Such analyses overcome a number of limitations inherent in the analysis of two-way tables. Specifically, multi-way contingency tables facilitate (1) the study of higher order associations between more than two variables at a time; that is, the simultaneous examination of all pairwise associations (which are important since several pairwise pairwise tests are not independent), and (3) the uncovering of "true associations," since relationships that may have been observed from a two-way classification table may differ from the same relationship in the presence of other variables (Berenson, Levine and Goldstein, in press).

Furthermore, log linear models enable the researcher to evaluate a variety of multiple-contingency tables for a group of variables, i.e., a 2x2x2x2 table as well as its three subset 2x2x2 models (and also consider numerous "unsaturated" models). Such examination is of great value. The benefit being that the researcher may be able to identify a parsimonious model, one which fits the data well with the fewest number of parameters. Hence, one can test for independence and for goodness-of-fit.

Once the puported best model is found via a stepwise search procedure, the researcher may then utilize the logit model to determine the nature of the effects the explanatory (independent) variables have upon the response (dependent) variable; the latter of which is perceived risk in this research. A discussion of the variables taken together for analysis follows.

4.6.3 Company Experience and Perceived Company Need

The theoretical foundation for this research has suggested a number of probable factors in the equation of perceived risk. Accordingly, these factors have been subjected to tests of independence or association, the results of which were reported in the preceding section.

As suggested in the preliminary remarks of this section, a number of variables may be examined simultaneously by the application of multidimensional analytic techniques; namely log linear and logit models.

In light of the capabilities of these mathematical models an analysis of one's perceived risk as explained by:

i) whether or not one's firm has considered trying or purchasing the product in question.

ii) whether or not one's firm has ever conducted or participated in a trial of the product in question.

iii) whether or not the individual believes that their company needs such a product.

The first two measures are taken as indicative of company experience with the product and the latter item is taken as indicative of the company's present need for the product.

Such an analysis amounts to a 2x2x2x2 cross-classification. (Note that the evaluation of one's "company's need" has been collapsed according to the convention outlined in the section on "Data Analysis".)

To obtain a good-fitting yet parsimonious log linear model a stepwise search procedure was used here as suggested by Goodman (1971). Assuming no distinction between response and explanatory variables, log linear models with u-terms of a uniform order were first fitted to the data and evaluated by the G^2 goodness-of-fit statistic. The sufficient configurations for these models are:

$C_1 C_2 C_3 C_4$: no first-order interaction
$C_{12} C_{13} C_{14} C_{23} C_{24} C_{34}$: no second-order interaction
$C_{123} C_{124} C_{134} C_{234}$: no third-order interaction

TABLE 7

Sufficient Configuarations for a 2x2x2x2 Analysis

SUFFICIENT CONFIGURATIONS	C^2	D.F.	p
$C_1C_2C_3C_4$	43.68	11	.83x10**-5
$C_{12}C_{13}C_{14}C_{23}C_{24}C_{34}$	.37	2	.83
$C_1C_2C_3C_4C_{23}$ *	10.85	6	.15

Explanation of notation:
- C_1 = perceived risk
- C_2 = whether company has considered trying or purchasing the product
- C_3 = whether company has tried or purchased the product
- C_4 = respondent's perception of the firm's need for the product.

* Model of best fit.

The notation used here is explained in Table 7.

The G^2 likelihood statistics for these models are presented in Table 7. Assuming a .05 or greater probabilty constitutes a reasonably good fitting model than the no first-order interaction model fits the data very poorly. The no second-order interaction model, however fits reasonably well.

Utilizing Goodman's forward selection procedure, first order interaction terms are successively added to the no first-order interaction model such that the goodness-of-fit statistic for the total model is decreased as much as possible at each step. The procedure is terminated when adding u-terms to the model no longer significantly decreases the G^2 statistic. However, a tradeoff is made between goodness-of-fit and parsimony. Therefore, a rule of thumb is used here, that the G^2 should decrease at least by the value of chi-square per one degree of freedom lost. In other words the G^2 should decrease by 3.84 for every unit reduction in the degrees of freedom. This implies that a slight increase in goodness-of-fit is not worth the additional parameters which must be fitted. Accordingly, a model which met these criteria (lowest G^2 possible, without an undue decrement to the degrees of freedom) was settled upon by examination of all models containing some but not all interaction terms found in the no second-order interaction model. This model

incorporating all three explanatory varables considered here is given by $C_1 C_2 C_3 C_4 C_{23}$. The likelihood statistic for this model is significantly better than that obtained from the no first-order interaction model and fits the data quite sufficiently and with fewer parameters than the no second-order interaction configuation (G^2=10.84, D.F.=7, p=.15). The implication of this model is that there is no association between risk and the explanatory variables given that there is an association between (a) whether or not a firm has considered trying or purchasing such a product and (b) whether in fact the firm has conducted or participated in a trial of the product in question. None of the other associations are significant. The result of this finding is consistent with the previous 2-way anaylses conducted, as no association between perceived risk and any of these three explanatory variables has been observed.

Examination of three additional models incorporating subsets of the four variables just referred to was undertaken. This was done since the association (or lack thereof) observed between variables considered in one configuration does not insure such an association will be present when another variable is entered or removed from the original configuration. The results of this effort are summarized in Table 8 where the fitted models are presented along with their respective statistics.

TABLE 8

Fitted Models for Company Experience and Need

$C_1 C_2 C_3 C_4 C_{23}$	G^2=10.84	D.F.=7	p=.15	**
$C_1 C_2 C_3 C_{23}$	G^2= .66	D.F.=2	p=.72	**
$C_1 C_2 C_4 C_{24}$	G^2= 1.04	D.F.=3	p=.79	**
$C_1 C_3 C_4$	G^2= 3.09	D.F.=4	p=.54	*

* only main effects enter the model of best fit
** association, but only among explanatory variables

C_1 = perceived risk (high vs. low)
C_2 = whether firm has considered trying or purchasing AMR.
C_3 = whether firm has participated in a trial or purchased AMR.
C_4 = whether respondent believes company needs AMRs.

Essentially, the findings of this modeling effort indicates that there is no association between the response variable and the explanatory variables, which is consistent with the findings of the earlier 2x2 crosstabulations performed in a test of these three explanatory variables.

As explained in the discussion of the earlier 2x2 analyses performed in testing the research hypotheses, these results may be explained at least in part by the structure of the data. In fact, one of the underlying assumptions of independence is violated; respondents who have tried this product must have already considered purchasing the product!

Hence, there are "structural zeros" that create some difficulties in fitting loglinear models here.

4.6.4 Buyer's Information Needs and Capabilites

An analysis of a number of characteristics of the buyer's behavior relating to their search for information, and their self-reported claims of (a) seeking for, (b) offering, and (c) being sought out for information and advice pertaining to the product has already already been examined in the previous chapter. Here, an attempt is made to examine the relationship between these variables (taken collectively) and perceived risk. Therefore, four explanatory variables are considered and a number of the many other possible model configurations which emerge; namely a 2x2x2x2x2 crosstabulation and a variety of subsets involving four 2x2x2x2 and six 2x2x2 crosstabulations.

The specific variables considered here are: (a) whether or not the respondent would seek additional information before proceeding to make a purchase, (b) whether or not the respondent would seek out additional information after a purchase has been made, (c) whether the respondent claimed that he would be more or less likely to be asked for advice about the product, and (d) whether or not the respondent claimed that he is generally regarding as a good source of advice about the product.

The procedure utilized here follows the same method outlined in the preceding multi-way analyses. The step-wise search procedure in fitting the data, for the no first-order interaction model $C_1C_2C_3C_4C_5$ yielded a likelihood statistic, G^2 of 27.73 with 26 degrees of freedon and a probability of .37. All interactions conceivable, short of the no second-order interaction model were fitted and a model was selected from these efforts according to the criteria previously established which seeks balance between goodness-of-fit and parsimony. The resulting model is as follows: $C_1C_2C_3C_4C_5C_{45}$ with the likelihood statistic, G^2 of 22.04, a probability of .63 and 25 degrees of freedom. The notation for the above models is given below.

- C_1 = perceived risk.
- C_2 = whether the respondent would seek additional information before proceeding to make a purchase.
- C_3 = whether the respondent would seek additional information after a purchase has been made.
- C_4 = whether the respondent claimed he would be more or less likely to be asked for advice about the product.
- C_5 = whether the respondent claimed that he is generally regarded as a good source of advice about the product.

The model fitted above then indicates that there is no association between risk and the four explanatory variables (C_2, C_3, C_4, and C_5) given that there is an association between variables C_4 and C_5, these variables indicating; (a) whether the respondent claims to be more or less likely to be asked for advice about the product and (b) whether the respondent claims to be generally regarded as a good source of information regarding the product. The implication then, as far as this research is concerned, is that as far as risk perception for this product is concerned, there is no relationship with whether the individual beleives he is a good source of information or advice or what their proclivity is toward seeking information about the product.

From a practical standpoint, this would suggest that various marketing efforts such as promotional materials designed to secure inquiries or providing certain product-related information may not reduce perceived risk. Hence, attempts to do so seem to be unwarranted. However, before drawing this conclusion, one should ask whether firms should even bother to alter one's perception of risk. Unfortunately, this research cannot ascertain the economic value (nor the cost) of reducing risk, only that certain risks have been found to be significant and therefore of some importance to marketers and limitedly important to buyers too.

As for the subsets of models that one can develop from the preceding 2x2x2x2x2 model, ten others are considered here. (The notation used here follows that of the immediately preceding multi-way analyses, and whichever remain in the foregoing analyses, will be identified by the "C" terms already used above.)

Before discussing the results of the log linear modeling of $C_1C_2C_3C_4$ which will follow, a few notes are in order about the data. In preparing the data for the loglinear program used, it was observed that there were no respondents who claimed that they would not seek information after purchase had they already claimed that they would be less likely to be asked for advice on AMRs. This may be explained by the notion that those who would be less likely to be asked advice on AMRs were not part of the sample (since the prescreening telephone survey attempted to identify the person who would be most responsible for such a decision, and similarly, such a person might recognize the importance for continuous search for information regarding such equipment, or alternatively, never feel quite confident enough about such a purchase not to do so).

Returning to the log linear analysis of $C_1C_2C_3C_4$, a forward stepwise search procedure is employed. This procedure, in fitting the no first order interaction model of $C_1C_2C_3C_4$, results in a likelihood statistic, G^2, of 18.95

with a propobability of .062 and 11 degrees of freedom. This is not a particularly good fit. A better fit is found with model $C_1C_2C_3C_4C_{34}$ which has a likelihood statistic of 9.51, a probability of .49 and 10 degrees of freedom. This is a significantly better fit and efforts to find a better fit did not meet the previously established criteria.

The implication of this model is that there is no association between perceived risk, the response variable, and the other three variables given the observed association between C_3 and C_4; C_3 being whether the respondent would seek additional information after a purchase has been made and C_4 being whether the respondent claimed that he would be more or less likely to be asked for advice about the product. This finding is quite understandable given the structure of the data as already explained.

Turning attention now to the $C_1C_2C_4C_5$ model, this researcher found that the no first-order interaction model given by $C_1C_2C_4C_5$ results in a likelihood statistic, G^2 of 18.95, with a probability of .062 and 11 degrees of freedom. This model does not fit the data particularly well, and the stepwise search procedure results in no other model that fits the data any better given the previously established criteria. The no second-order interaction model fits the data much better with a G^2 of .26, with a probability of .062 but with only one degree of freedom.

TABLE 9

Summary of Log linear 2x2x2x2x2 Analysis

MODELS CONSIDERED	FITTED MODEL CONFIGURATIONS	G	D.F.	p	Notes
1 2 3 4 5	1/2/3/4/5/4 5	22.04	25	.630	**
1 2 3 4	1/2/3/4	18.95	11	.062	*
1 2 3 5	1/2/3/5	15.46	11	.16	*
1 2 4 5	1/2/4/5/4 5	9.51	10	.49	**
1 3 4 5	1/3/4/5/4 5	13.09	10	.22	**
1 2 3	1/2/3/1 3	5.03	2	.081	***
1 2 4	1/2/4	4.44	4	.35	*
1 3 4	1/3/4/1 3	2.07	2	.35	***
1 2 5	1/2/5	5.66	4	.23	*
1 3 5	1/3/5/1 3/1 5	.02	1	.89	***
1 4 5	1/4/5/4 5	3.69	3	.30	**

NOTES:

Numbers in first two columns "models considered" and"fitted models" are representations of variables entering the model. These variables are given below:

1 = perceived risk (high vs. low)
2 = whether respondent would consult with someone before trying or purchasing AMR
3 = whether respondent would continue to seek information even after purchasing AMR
4 = whether respondent claims to be more likely to be asked for advice
5 = whether respondent claims to be a good source of information

Numbers found below "Model Configurations" are the variables that have entered in the log linear analysis and have survived the established criteria balancing G^2 with the D.F.

Explanations of results of the log linear analysis:

* Only the main effects entered the model of best fit.
** Interaction occurs but not with response variable.
*** Interaction occurs with response variable, but the effects estimates are zeros for variable 3.

The implication of the results obtained is that there is no interaction between any of these four variables and therefore the variables are independent of one another.

Further analysis of the remaining configurations are still worthy of attention even in light of the preceding 2x2x2x2 analysis which found no association between the four variables when taken together via a multi-way contingency table.

The remaining analyses are summarized in Table 9 and a number of important observations related to these fitted models follow.

4.6.5 Model Forms

Essentially the log linear analysis performed here resulted in models fitted of three different "forms."

Reviewing the results presented in Table 9 one observes that the fitted models were either:

i) models where only the main effects are included; that is, no interaction terms are present and therefore an indication that there is no association between the variables.

ii) models where an interaction is present but the interaction does not occur between the response variable (perceived risk) and the explanatory variable.

iii) models where an interaction is present and one that involves the response variable.

Models of the latter form would normally be of great relevance and importance, since they identify an association between the variable of particular interest, perceived risk, and other exaplanatory variables. However, here where such interactions are observed in models ($C_1C_2C_3C_{13}$; $C_1C_3C_4C_{13}$, and $C_1C_3C_5C_{15}$), they are unfortunately plagued by one common problem; the incidence of many cells containing zeros. This problem is exaccerbated and most noticable in the "effects estimates" obtained. Therefore, the results obtained here are rather problematic with respect to their interpretability.

Unfortunately the calculated log-odds effects in each of these configurations contains zero in three of the four cells and an empty fourth cell (the result of having fitted a zero marginal). Accordingly, the ability to calculate a log odds ratio is precluded and the value of the loglinear analysis performed is questionable. The problem identified is substantial since the log odds effects are critically important to the calculation of the log odds ratio. Note that it is the log odds-ratio that enables one to understand how changes in the combined levels of the explanatory variables affect the response variable (perceived risk). Hence, although an interaction is observed between the response variable and an explanatory variable the interpretation of this finding is unclear.

One possible explanation for this problem is that the explanatory variables selected for examination may simply not be independent. This seems to be supported by the preponderance of zeros in the original cell frequencies. Hence, this procedure does not in, in this instance, enable one to explain perceived risk given the observed interactions.

4.6.6 Summary

To sum up then, the log linear analyses conducted indicate interactions between the variables under consideration. However, these interactions are either difficult to interpret due to methodological and/or conceptual limitations of the technique or are not salient, as they do not involve the response variable perceived risk and therefore do not provide this research with the benefits that are attributed to this modeling technique.

Chapter V

DISCUSSION OF THE FINDINGS

5.1 INTRODUCTION

This chapter discusses in greater detail the findings presented in the last chapter. Primary attention is devoted to those specific hypotheses that were significant and also those that would have been supported had a more liberal significance level of .10 been used.

5.2 A POTENTIAL SEGMENTATION VARIABLE: NUMBER OF CUSTOMERS SERVED

As discussed in the previous chapter the hypothesized relationship between perceived risk and the number of non-residential customers served was not supported. However, this particular hypothesis set the ground for additional analyses of differences between firms given their observable difference in size. The measure of company size utilized here is the number of customers served for each of the "rate classifications" already enumerated in the previous chapter. The reason why this characteristic of the firm is so important is that it is most indicative to sellers of such products what level of sales may be forthcoming. Consequently, this is a measure of consumption capacity.

Given the focus of this research, an anlysis was performed upon all of the different groups of clasifications, taking perceived risk as the independent variable. In doing so, one can perform a Median and Mann-Whitney U test that treats the firms as independent groups and looks at the level of risk from another, but defendably useful perspective.

The result of the suggested tests do not suggest any significant differences between the "large" and "small" firms. They were classified as such on the basis of whether the number of customers that they served was either above or equal to the median for all firms, or below the median for each of the customer groups considered in the first three hypotheses enumerated in the previous chapter. However, if one were to accept a .10 level of significance, one finds that there is a significant difference in the risks perceived by "large" and "small firms when analyzing firms on the basis of the number of non-residential customers served.

The practical relevance of this finding is twofold. First, one might endeavor to consider partitioning the data further. In other words, firms might be regrouped not on the basis of the median size (number of customer served) but along some other basis (i.e., the top 25 percent versus the bottom 25 percent of the ranked firms) which may more realistically reflect differences in firms consistent with other market segmentation effort.

This researcher is reminded of the manufacturer of related metering equipment, who was considering only small firms for two reasons: (a) plant capacity, and (b) the experimental nature of the product. Hence, although a marketer may wish to locate firms with the greatest purchasing capacity (given by the number of customers that they serve), a manufacturer of AMR equipment might have a good reason to focus on other than the largest firms as their target market.

Another practical consideration is that the utility firms may be thought of in terms of the type of installations required - residential versus non-residential - and in terms of the different selling tasks involved.

It should be noted that examination of the frequencies generated in the application of the Median test reveals that many more firms having a "smaller" number of non-residential customers indicated having higher perceived risk than firms having a "larger" number of non-residential customers. (Higher risk here being above the median value.) Furthermore, one finds that "larger" firms appear equally distributed in their perception of risk as illustrated in Table 7.

This would suggest that "smaller" firms as compared to "larger" firms would tend to be less likely to proceed with purchasing such a product given their perceptions of risk. Hence, such analyses suggest further efforts at analyzing

TABLE 10

Number of Non-Residential Customers and Perceived Risk

	"SMALLER"	"LARGER"
LOWER RISK	39	48
HIGHER RISK	56	47

"larger" firms for other aspects that might help classify them as more favorable targets for the marketer of such products. Accordlingly, this "finding" (at the .01 level of significance) is useful in the context of market segmentation efforts.

5.3 COMPANY NEEDS AND PERCEIVED RISK

Although test of "H-4" resulted in no support of the relationship between perceived risk and a "company's need" for the product in question, a comment is still in order here.

Early in the discussion of the development of the research instrument it was pointed out in discussions with industry executives and in review of the literature resulted in identifying specific needs that might be addressed in the purchase of such equipment, and these needs have been referred to previously as constituting a "micro" level analysis.

Such an analysis was conducted and only one specific need - the "Need to reduce the cost of meter reading" - was found to be significantly related to the respondent's perceptions of risk. This seems to suggest that economic considerations factor into one's perception of risk for this product, and this quite understandable given the the fact that the economic feasibility of such products remain in question throughout the industry.

This finding is relevant in the sense that it points to a major obstacle to the successful marketing of this product. In other words, the product must offer a reduction in the cost of meter reading, if risks are to be reduced. Again the assumption maintained here is that perceived risk is a determinant to one's ultimate purchasing decision and that the higher the amount of risk perceived the less likely one would be to purchase such a product.

5.4 SALESMAN-RELATED DIMENSIONS AND PERCEIVED RISK

As mentioned in the preceding chapter the hypothesized relationship between perceived risk and components of the supplier referred to as the "salesman-related" dimension was supported (see "H-7"). This finding is relevant to both sellers and buyers of such equipment. First, it points out the need to train salespersons carefully. This is almost self evident since two of the three variables that constitute the measureed dimension relate to the "competency" and

"effectiveness" of the salesman. In addition, the third variable included in this dimension relates to "salesman's honesty," which if ever questioned by the buyer may seriously impede any or all selling efforts for products already presenting (in and of themselves) substantial risks to the purchaser.

Examination of the frequency distribution obtained when conducting the Median test reveals that a significant difference exists between "high" and "low" risk perceivers, and the computed chi-square statistic is significant at the .05 level, (p=.025). Furthermore, one finds that those who are "low" risk perceivers tended to be "very certain" as to the ability of salesmen to perform according to the buyer's expectations, as illustrated in Table 8.

TABLE 11

Certainty of Salesman's Performance and Perceived Risk

	"LOW RISK"	"HIGH RISK"
UNCERTAIN ABOUT SALESMAN	33	43
VERY CERTAIN ABOUT SALESMAN	69	44

Finally, no significant difference in uncertainty regarding the salesman-related dimensions is observed amongst "high" risk perceivers.

The implication of this seems clear for sellers of such products: if you want to reduce the amount of risk perceived by a buyer do something that will bolster his confidence and trust in your salesforce. This may involve retraining and may also call for a change in the promotional programs of the firm, (i.e., paying greater attention to key facts). The change should be such that factors of importance to the buyer are focused upon, such as the ability of the product to reduce meter reading costs, or other factors which may remain unrecognized.

As for the buyers of such equipment,care should be taken in evaluating the product and the vendor on their merits of performance, service and reliability. Similarly, overemphasis on what might amount to as more subjective dimensions may not be in order. Of course, as was indicated in review of the literature, when the "objective" differences between competing products are perceived to be negligible such "subjective" differences may enter into one's evaluation and become the determinant attributes of concern both to buyers and sellers.

5.5 PRODUCT-RELATED DIMENSIONS AND PERCEIVED RISK

As mentioned in the preceding chapter the relationship hypothesized in between risk perception and one's certainty about a vendor's products, as given by the composite "product-related" dimension, is supported (see "H-8"). This result comes as no surprise since it suggests that the product characteristics of total cost, quality, quality consistency and performance are associated with the overall risks in the product by respondents.

5.6 GENERAL-VENDOR DIMENSIONS AND PERCEIVED RISK

The fact that a relationship is observed between various characteristics that vendors are generally thought to be evaluated on (i.e., service, technical capability, emergency assistance,...,etc.) and the prospective buyer's perception of risk is quite understandable. Essentially, this finding suggests something assumed by many marketers - a core product should be augmented with other aspects of value to the buyer. Furthermore, this finding seems to support the contention that the perceived risk of a product may be substantially affected by a variety of objective and subjective features or qualities (i.e., whether the vendor is a local source of supply, and the innovative nature of the vendor). Accordingly, marketers must evaluate their product not in light of what they can produce but what needs to be offered. Such aspects that may reduce risks to the buyer such as of-

fering emergency assistance or maintaining the ability to deliver on schedule are certainly worthy of additional attention.

It should be noted that the analysis conducted here examined "dimensions" or groups of characteristics - following the pattern of McMillan (1972a) rather that individual characteristics taken one at a time. The latter may in fact be a worthwhile endeavor, although not called for in this research.

5.7 CHARACTERISTICS OF THE BUYER: SOME FINDINGS

5.7.1 Self Confidence and Perceived Risk

The hypothesized relationship between perceived risk and specific self- confidence as stated in "H-20" is supported. This finding is quite important for a number of reasons. First, the items used in developing the measure of specific self confidence for this research (derived from Deering and Jacoby's (1972) research) parallel items used in the study of perceived risk by Cunningham (1967). As such, it can be said that there appears to be a good argument for construct validity, and that this research effort does help to extend that which is already known about perceived risk. In addition, it suggests that a meaningful link may be drawn between the body of literature and research focusing on perceived risk in industrial and consumer settings.

On a practical note it seems that examination of the five individual items constituting the measure of specific self confidence is in order, for it is possible that certain items may be more important than others, and if so, fewer items may be used to test this behavioral dimension in the future. Given the generally held view that parsimony is beneficial, an attempt was made to examine the relationships between "perceived risk" and these five individual items.

In light of the above, a Mann-Whitney test was performed on each of the five items and it was found that three of the five items are related to the general, single component measure of perceived risk used in this research, where it has been treated as the dependent variable.

The first of these three items asked, "how certain are you that an AMR will work as well as your company's present meter reading equipment?" This formulation embodies the "certainty" component used by Cunningham (1967) and is the primary item of interest to researchers favoring an operationalization of risk in terms of certainty. It was found that a relationship between this item and this research's operationalization of perceived risk was significant at the .05 level, ($p=.0435$).

In light of the conceptual similarities one might argue that these items measure the very same dimension of human behavior. Perhaps this is so. Nonetheless, this finding

does suggest that there are similarities in (a) the items used to test risk and specific self confidence and (b) there appears to be a foundation for construct validation.

The second of the three "specific self-confidence" items of particular interest was; "How easily can most buyers estimate ahead of time how dependable AMRs will be if they are to be used over and over again?" The relationship between this item and the operationalization of "perceived risk" is also significant at the .05 level, (p=.0021).

Given the nature of the purchase decision under examination, one which requires a major investment by the purchasing firm for a durable good, where new or replacement equipment may be expected to meet if not exceed the approximately 40 year life of present meter equipment, it is not surprising that buyers would be seriously concerned about the long run performance and reliability of such products.

Note however, that the ease with which one can estimate reliability is questioned here and this is what is associated with "perceived risk." Apparently, respondents expect to have great difficulty evaluating reliability given that the median rating of this item is 4. (The behavioral anchors on this scale were; 1=Very Easy to Estimate, and 5=Impossible to Estimate.)

As for the third of the three "specific self-confidence" items of interest, respondents were asked: "How much danger would you say there is in tyring an AMR that you have not tried before?" Again, the relationship between this component of specific self-confidence and the present operationalization of "perceived risk" was significant at the .05 level (p=.0000). It may be that this single item captures the concept of "perceived risk" equally well, given the level of significance observed. Perhaps "danger" is the mental synonym for "risk" amongst buyers. If this were so, sellers may wish to address perceived hazards or "danger" in their design and promotion of the product of concern to them. This seems appropriate in light of findings on the relationship between perceived risk and the "product related" and "general-vendor" characteristics.

Taken together, it seems that the response pattern to these three items (when considering the nature of the product in question), may be interpreted as saying: Why change a good thing, especially since the replacement has not been <u>demonstrated</u> to be better? Assuming this is a reasonable reflection of the buyer's attitudes toward this product, then marketers will simply have to go back to the drawing boards and make their products "better." One justification for this conclusion is simply that this product has so far captured the interest of only 24 firms to the extent that a trial of the product was made.

5.7.2 Information Search and Risk Perception

As was indicated, support for the hypothesized relationship between perceived risk and the certainty one attaches to various information sources is supported (see "H-12"). It is important to comment on some of the procedures used to test this hypothesis. First of all, efforts were made to identify common dimensions through factor analysis. Two factors emerged and were labelled (though judgmentally) quite readily. Two new variables were created based on the factor loadings of the original items on the factors. These new variables were subjected to the Mann-Whitney U test, and it was found that only the second factor, labelled "objective infornation sources" by this researcher, was associated with perceived risk. Further examination of the "low-risk" perceivers revealed (via the Median test) that noticeable (although not significant) differences could be observed, with a greater proportion of the "low-risk" perceivers being more certain that the "objective sources of information" would provide good information relevant to the product of interest.

Note that little differences were observed amongst "high-risk" perceivers' certainty that good information pertaining to the product could be obtained. This suggests that either high risk perceivers (a) do not trust any information, (b) have yet to come into contact with good information related to these products, or (c) simply percieve so

much risk that it does not matter what other sources have to say.

Accordingly, one must ask how marketers can alter the risk perception of these individuals. One possibility would seem to be given by the relationship observed between "objective" sources of information and perceived risk. What is called for are attempts to utilize information (such as industry and trade association data and data provided by regulatory agencies) supportive of the marketer's cause. In practical terms, this might call for submitting the product to one of the industry's associations and/or to a government agency for testing, with the hope that a positive report, or an endorsement may be obtained. Such materials, it is believed, will be used with much greater certainty than other possible information sources at the marketer's disposal. To the extent that a marketer might influence other individuals within the prospective customer firm, who may be influential in the process of making such a purchase decision. This would also seem to follow as a reasoned strategy given the research findings.

5.8 COMPANY RISK: SOME INTERESTING FINDINGS

The results of examining the five distinct factors believed to embody "company risk" in this research found only one factor, the "threat of an AMR performance failure," to be associated with the individual's perception of risk.

This is interesting for the following reasons: First, this researcher must point out that several of these items reflect those constituting the measure of specific self-confidence found to be associated with the individual's perception of risk.

It certainly would seem that (a) one's certainty that the AMR will work as well as their company's present meter reading equipment, (b) belief that buyer's can estimate how dependable AMRs will be if thei are to be used over and over again, and (c) estimate the danger there is in trying an an AMR that they have never used before, all seem to touch on the threat of an AMR performance failure.

Given the fact that these tnree itms were found to underlie the observed relationship between specific self confidence and perceived risk, one might argue that Newall's (1977) comment suggesting that "company risk" is intimately related to "perceived risk" (of the individual) is credible. The question arises however, whether or not one can ever objectively measure "company risk" distinct from the personal perceptions of risk of the decision maker. In essence a "chicken and egg" controversy emerges. Since the source of information used in researching both risks ("company" and "personal") is the very same individual, can a distinction ever be made by the respondent between the two!

One may argue that either the decision maker is incapable of distinguishing between his own personal perceptions of risk from that of their company, or his involvement in their job establishes the framework with which they evaluate the products they purchase and this framework simply becomes integrated into the thinking of the individual.

The implications of this controversy are important to the theoretical test of the two dimensions, and are also practically important to firms who are concerned about the personality of their buyers and the general manner in which buyers evaluate products on behalf of the firm. The same may be said of the buyer's evaluation of vendors and salesmen too. In other words, if risk perceptions get in the way of making good choices or result in placing more, if not undue emphasis on certain subjective factors, the company may wish to either train buyers to suit company needs, or hire buyers on the basis of some personality inventory (which has been suggested), and/or establish a set of rules and procedures governing procurement.

The problem with the above as far as this research is concerned, is the fact that the individuals surveyed were typically executive level individuals who may set the policy for their firms. Therefore, this researcher believes that for purchases of this nature, where top-management presides, "company risk" will likely be founded in the perceived risks

of these top executives. Moreover, the perceived risk will be handled in accordance with the decision process that the decsion maker is personally accustomed to and comfortable with, and may therefore not be handled in accordance with the rules and procedures committed to paper per se.

5.8.C.1 Marketing Implications

The preceding assessment does not result in major difficulties to the marketer of such equipment for it suggests that no distinction can or will be drawn between the two bases of risk ("company" and "personal"). Too, whatever the marketer may do to resolve "company risk" will help resolve the decision maker's perception of risk, and vice versa.

5.9 COMPANY RISK AND SELF CONFIDENCE

Returning to the link between the items contained in the measure of specific self-confidence and the items reflecting "company" risk, is noteworthy that in each instance financial concerns over the amount of money requred to invest in this capital equipment was not associated with the decision maker's perception of risk. Of course, that is not to say that buyers are not concerned about the financial investment involved here. Rather, as examination of the responses reveals, 95 percent of all respondents see the the investment requirement as important. Hence, this item simply cannot discriminate "high" and "low" risk perceivers.

Again, the fact that different items measuring related concerns follow the same pattern - one set being related across a few concerns, and another set consistently unrelated, tells something of the cogency of the data.

Finally, the fact that an AMR performance failure is seen to be associated with the measure of perceived risk used here, suggests that marketers must pay close attention to the dependability and superiority of their product.

Chapter VI

SUMMARY AND CONCLUSIONS

The objective of this research was to extend the understanding of the influence of perceived risk on the buying of a capital good. This research has focused upon one particular product and the manner in which prospective buyers might evaluate the product and the suppliers of such a product prior to purchase. In addition, factors relating to the individual buyer and the buyer's organization were examined.

The theoretical foundation of this research was the generalized hypothesis that the risks perceived by industrial buyers regarding technically complex products involving great financial expenditures on the part of their firm, may vary according to differences that may exist between these buyer's perceptions of the problem at hand, their own self-confidence and experience, and the risks they perceive in dealing with vendors of such products.

The theoretical framework utilized here stems from research conducted by Newall (1975, 1977) McMillan (1972a, 1972b) and Spekman and Stern (1979). Each of these researchers were concerned with industrial buyer's perceptions of risk and the influence that such perceptions might have on their purchasing decisions.

An important departure of this research from previous research is that (a) the focus of attention is upon a product that has yet to achieve market acceptance and (b) the product selected is believed to be objectively risk-laden. That is, not only is the product in question technically complex, but requires the expenditure of many hundreds of thousands of dollars. Furthermore, the economic feasibility of this product remains to be proven. Moreover, no wide scale purchases of this product have been made to date and therefore it is believed that differences in risk may not be attributed to buyer's purchase experience with this product. Hence, this research cannot state that buyers of the product differ from non-buyers in terms of their relative risk perceptions. This is an important limitation, but this research is not unlike other market research techniques often employed in the stages of product development preceding market introduction (i.e., concept testing). In essence, this research simulates the reality of marketing a new product which is both technically complex and requires a major investment on the part of the buying firm. Such a setting is believed to be ideal for determining whether perceived risk may be useful in explaining differences in buyer's perceptions of many factors in the buying equation. Hence, examination of this purchasing problem was undertaken in an effort to ascertain which characteristics of the vendor, and which forms of industrial communication (sources of informa-

tion) are associated with buyer's general perception of risk for the product in question. In addition, the following factors were examined that are believed to influence buyers risk perceptions. These are: (a) the buyer's position as a source of information and advice to others within the firm, and (b) the possible influence of the organizational environment on the buyer's perception of risk.

6.1 THE MEASUREMENT INSTRUMENT

An instrument was developed to measure each of the above concerns. The instrument's design was governed largely by the following theoretical and practical considerations. First, that the measure of perceived risk utilized in this research would be consistent with previous research efforts. This constraint was met by utilizing Newall's (1975) measure of perceived risk. The importance of this concern lies in the intention of this research to build upon the prevailing theoretical foundation, and attempt to expand marketer's working knowledge of industrial buyer behavior.

Second, this researcher sought to integrate a number of related theoretical questions that have not been subjected to thorough examination previously. This, it is believed, is accomplished to the extent that the issues raised by Spekman and Stern (1979) and of McMillan (1972a, 1972b) have been interwoven and incorporated as part of the theoretical framework presented by Newall (1975, 1977).

Third, that the study would focus on a product that met the criteria of interest to this researcher. These criteria were that the product (a) possessed characteristics that would be evaluated as bearing some degree of risk at a minimum, (b) would involve a major expenditure for firms making such a purchase, (c) would constitute a "new" task to buyers, and (d) would be technically complex.

The reasons for having set these criteria initially rests in the fact that so little theory-based research has been conducted on products of this nature. This is not to say that marketers have not engaged in researching markets and/or products that would meet the above criteria. Rather, research related to products that would fall within this profile tend to be either proprietary and/or atheoretical.

6.2 A SYNOPSIS OF THE THEORETICAL FRAMEWORK

Newall (1975, 1977) had syntesized three broad groupings to classify the factors likely to determine the level of perceived risk. He referred to these as:

i) the characteristics of the purchase problem.

ii) the characteristics of the industrial buyer.

iii) the characteristics of the organizational enviroment.

These three categories were examined in this research along with a fourth category, the characteristics of the vendor, which McMillan (1972a, 1972b) had focused attention upon in researching the influence of perceived risk on industrial buying behavior.

Each of these categories contain a number of dimensions all of which have been analyzed in this research in the context of a hypothetical (although not unrealistic) purchase decision. More specifically, the dimensions of these categories were specified and subsequently examined in terms of their influence, and association with the risk levels individual buyers may perceive. Hence, these dimensions were incorporated into twenty-two hypotheses that were posited by this researcher.

6.3 FINDINGS AND IMPLICATIONS

Of the 22 hypotheses, only six were found to obtain support. Of those supported three hypotheses (H-7, H-8, AND H-9) relate to the characteristics of the vendor. It was found that all three dimensions studied were found to be related to buyer's risk perception. These three dimensions ("product-related," "salesman-related," and "general-vendor" dimensions) were formed by combining subsets of eighteen variables that had been identified in previous research to be salient to buyer's evaluations of vendors.

These findings are particularly relevant since they suggest that buyers may perceive specific types of risk in various aspects of the marketer's offering. Furthermore, and especially interesting, is that a stronger association was observed between buyer's perceived risk and the "salesman-related" dimension than either the "product-related" dimension or the "general- vendor" dimension. This finding is important for it directs marketer's attention to one particular area; namely how to make the salesman more credible.

The above conclusion is further supported by the results obtained from testing for the differences observed between "high" and "low" risk perceivers' certainty that good information about the product could be obtained. Specifically, no significant differences were observed amongst "high" risk perceivers' certainty that good information pertaining to the product could be obtained. These "high" risk perceivers indicated greater uncertainty about the "product" aspects of a vendor's offering. This may suggest that those who are "high" risk perceivers may know and understand the risks associated with the product, whereas those who perceive less risk about the product in question may (a) not percieve these risks, (b) not understand the risks involved, or (c) ignore the issue entirely by not seriously considering this product.

In addition, it was found that one's specific self-confidence is related to perceived risk. However, this researcher warns that this finding, although consistent with industrial buyer behavior theory, has limited practical relevance.

Firstly, marketers who wish to capitalize on the knowledge that risk is associated with specific self-confidence, would first have to identify a means of classifying buyers on this dimension. The result of such a classification may provide a means for selecting appropriate promotional tools to bolster or develop prospective buyer's specific self-confidence. This may call for the development of seminars, bulletins or other materials. However, the above presumes such a classification could be made. This researcher, however, doubts whether such efforts are economically justifiable.

In addition, it was found that one's specific self confidence is related to perceived risk, and this may be partially explained by the fact that the elements used to measure self-confidence here reflected upon one's self-reported ability to assess danger, reliability and performance of the product. These measures may actually be tapping the same basic human dimension; fear. Hence, risk and specific self-confidence may not be behaviorally distinct concepts.

The fact that "low" risk perceivers were more certain about the quality of information provided by "objective" as opposed to "subjective" information suggests that marketers ought to utilize information suxh as industry and trade association data as well as data from regulatory agencies that are supportive of their product or company. As suggested, this may call for submitting products to industry associations or government agencies for use testing in the hopes that of obtaining a favorable report that may be used to supplement the firms promotional materials. Such reports, it is believed, will be used with greater certainty than other sources of information. Hence, the firm which can substantiate its product claims in such a manner may obtain a differential advantage of some value. Furthermore, such materials can be of benefit to sales presentations too.

Finally, one over-riding concern identified is the buyer's fear of a performance failure. The fact that a performance failure may affect a firm's cash flow as a result of a performance failure is quite serious, and therefore the observed relationship between risk and this concern is not surprising.

6.4 SUMMARY

All in all, of the six hypotheses that were supported a common thread appears to surface. That is, each of these six hypotheses that deal with factors thought to be related

to perceived risk, were measured in a manner that had incorporated in themselves some aspect of risk. For specific self-confidence, the measurement items included "danger," questions of "reliability," and "product performance." For the information sources, these were measured in terms of uncertainty about the accuracy and quality of information. For the three vendor dimensions, these too were measured in the context of uncertainty. Hence, that this research finds "risk," that is, perceived risk, to be associated with these factors , may be explained by the fact that these six dimensions already capture an aspect of risk in themselves, namely "uncertainty." Thus, the important finding is that no other factors were found to be associated with risk and therefore one should question the value of the concept of perceived risk when applied to industrial buying. Hence, future research efforts in this area may not be warranted, at least with respect to efforts at explaining industrial buying via the concept of perceived risk.

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Appendix A

Baruch College
The City University of New York
17 Lexington Avenue
New York
N.Y. 10010

STUDY OF INDUSTRIAL BUYING for MARTIN T. TOPOL

This questionnaire refers directly to the decision making process that may be encountered by potential customers of automatic meter reading equipment. Specifically, you are asked to focus your attention on telephone-based automatic meter reader (AMR) systems. A telephone-based AMR is essentially a bi-directional system which utilizes existing telephone lines as the medium for transmitting signals. These signals may be used to record and/or control electricity use. Such a system gives the utility potential access to all of the customers serviced by the telephone company's central office. An AMR may be utilized for direct load control, distribution automation, and remote meter reading. With this description in mind would you kindly complete this questionnaire.

1. To your knowledge, has your firm ever considered the trial or purchase of Automatic Meter Readers (AMRs)?

   Yes_____ No_____

2. Has your firm ever conducted or participated in a trial of AMRs?

   Yes_____ No_____ Do not know_____
   If the answer is yes, continue with the following questions, otherwise skip to question #5.

3. Who, within your organization, brought up the subject of a trial/purchase of AMRs?

   Job title _____ Department _____

   Job title _____ Department _____

   Do not know _____

4. Please rate the AMRs which were tested or purchased most recently by your firm on the scale given below. *(Circle one)*

   (1 = Excellent, 2 = Good, 3 = Average, 4 = Poor, 5 = Very Poor)

a.	product quality (performance)	1	2	3	4	5
b.	product reliability	1	2	3	4	5
c.	ease of maintenance	1	2	3	4	5
d.	ease of operation.....	1	2	3	4	5

5. How would you learn that your firm was considering the trial/purchase of AMRs?

   _____ committee meetings
   _____ informal discussions
   _____ company newsletter
   _____ inter-office memo
   _____ other *(please specify)* _____

12. How important are each of the following factors likely to be in your firm's future consideration of AMRs?

Again please circle the value that corresponds most closely with your evaluation of how *important* each factor is to your firm.

(1 = Not At All Important, . . . , 5 = Very Important)

a.	Need for monitoring electricity use	1	2	3	4	5
b.	Need for controlling electricity use	1	2	3	4	5
c.	Need for reducing electricity use	1	2	3	4	5
d.	Need to reduce the costs of meter reading	1	2	3	4	5
e.	Need to increase the speed of billing customers	1	2	3	4	5
f.	Need to increase the accuracy of billing	1	2	3	4	5
g.	Need to eliminate estimated bills	1	2	3	4	5
h.	Need to map power outages	1	2	3	4	5
i.	Need to eliminate turnover of meter reading personnel	1	2	3	4	5
j.	Need to meet regulatory requirements	1	2	3	4	5

13. Information about AMRs may be obtained from a variety of sources. Please indicate below in Column "A" by circling the value that corresponds most closely with your evaluation of how IMPORTANT each of the following sources listed is to the decision to purchase and/or test AMRs. At the same time please indicate in Column "B" how CERTAIN you are that the following sources given below will provide you with good information pertaining to AMRs.

COLUMN 'A' (1 = Not At All Important, . . . , 5 = Very Important)						**COLUMN 'B'** (1 = Not At All Certain, . . . , 5 = Very Certain)					
1	2	3	4	5	a. advertising in trade publications	1	2	3	4	5
1	2	3	4	5	b. news stories in trade publications	1	2	3	4	5
1	2	3	4	5	c. literature (direct mail, brochures)	1	2	3	4	5
1	2	3	4	5	d. salespeople from AMR vendors	1	2	3	4	5
1	2	3	4	5	e. trade shows	1	2	3	4	5
1	2	3	4	5	f. trade association data	1	2	3	4	5
1	2	3	4	5	g. regulatory agency data	1	2	3	4	5
1	2	3	4	5	h. other purchasing professionals	1	2	3	4	5
1	2	3	4	5	i. your firm's engineers	1	2	3	4	5

14. Assuming you are faced with the task of having to buy an AMR, is there anything or anybody you feel that you would have to consult before you decided to go ahead and buy?

Yes_____, No_____. If yes, who and/or what would it be?

Source_____

_____

Name_____Dept. & Title_____

Name_____Dept. & Title_____

15. Do you think it is necessary for purchasers of AMR equipment to continue to seek information on other makes and/or types of AMR equipment once a purchase has been made?

Yes_____ No_____ Do Not Know_____

16. How important to your purchase decision are the opinions of the following groups?

Again, please circle the value that corresponds most closely with how important each group's opinion is to your purchase decision.

(1 = Not At All Important, . . . , 5 = Very Important)

a.	The engineering department	1	2	3	4	5
b.	Your top management	1	2	3	4	5
c.	The department utilizing the AMRs	1	2	3	4	5
d.	The actual AMR equipment operators	1	2	3	4	5
e.	The purchasing department	1	2	3	4	5
f.	The individuals responsible for the maintenance of the AMRs	1	2	3	4	5

16. *(continued)* (1 = Not At All Important, . . . , 5 = Very Important)

g.	Your current meter reader personnel	1	2	3	4	5
h.	Your marketing department	1	2	3	4	5
i.	Your rate and research department	1	2	3	4	5
j.	Your consumer services department	1	2	3	4	5
k.	Outside consultants	1	2	3	4	5
l.	Colleagues in other companies	1	2	3	4	5
m.	Union leadership	1	2	3	4	5
n.	Other groups or individuals in your company not listed above *(please specify)*					
	_____					
	_____	1	2	3	4	5
	_____	1	2	3	4	5

17. How certain are you that an AMR will work as well as your company's present meter reading equipment? *(Circle one)*

Very Certain 1 2 3 4 5 Very Uncertain

18. We all know that not all products work as well as others; compared to other meter-related products, how much danger would you say there is in trying an AMR that you have never used before? *(Circle one)*

Very Great Danger 1 2 3 4 5 No Danger At All

19. How confident would you say you are about judging the quality of an AMR? *(Circle one)*

Absolutely Confident 1 2 3 4 5 Not At All Confident

20. In terms of money required to buy this product (AMRs), how much would you say your firm would have to invest? *(Circle one)*

A Great Deal of Money 1 2 3 4 5 Not Much Money At All

21. How easily can most buyers estimate ahead of time how dependable AMRs will be if they are to be used over and over again? *(Circle one)*

Very Easy to Estimate 1 2 3 4 5 Impossible to Estimate

22. Please indicate on the scale below how ESSENTIAL the following AMR features are to your firm? *(Circle one)*

(1 = Absolutely Essential, . . . , 5 = Not At All Essential, 9 = Do Not Know)

a.	load profiling	1	2	3	4	5	9
b.	positive load control	1	2	3	4	5	9
c.	outage mapping	1	2	3	4	5	9
d.	customer notification of imminent rate change	1	2	3	4	5	9
e.	demand metering	1	2	3	4	5	9
f.	time-of-use metering	1	2	3	4	5	9
g.	time-of-day metering	1	2	3	4	5	9
h.	bi-directional *(vs. one-way)* communication	1	2	3	4	5	9
i.	tamper detection	1	2	3	4	5	9

The following questions are concerned with the FREQUENCY with which you encounter various decision making procedures in your firm for products such as Automatic Meter Readers.

Please circle the appropriate value.
The scale values are as follows: 1 = Never, 2 = Seldom, 3 = *Occasionally*, 4 = *Rather Often*, 5 = Nearly All The Time, 9 = Does Not Apply.

When a new type of purchasing-related decision is to be made, how often do you yield to the recommendations of another member in your organization?	1	2	3	4	5	9
How often are purchasing-related decisions made by you that are handled adequately with existing rules and procedures?	1	2	3	4	5	9

(continued)

(continued)

The scale values are as follows: 1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Rather Often, 5 = Nearly All The Time, 9 = Does Not Apply.

How often do your specific purchasing-related responsibilities change from day to day?	1	2	3	4	5	9
How often do you feel your purchasing-related responsibilities are clearly specified?	1	2	3	4	5	9
How frequently are purchasing-related decisions made without your involvement?	1	2	3	4	5	9
How often do you follow strict operating procedures when making purchasing-related decisions?	1	2	3	4	5	9
When a purchasing-related decision is to be made for which rules and procedures do not exist, how often do you act without referring that matter to another member in your organization?	1	2	3	4	5	9
When a purchasing-related problem arises, how often do you go to another member in your organization for an answer?	1	2	3	4	5	9
How often do you handle purchasing-related problems which arise by following a standard procedure?	1	2	3	4	5	9
How often do you take an active part in purchasing-related decisions?	1	2	3	4	5	9
How often do you feel the purchasing-related decisions for which you are responsible are repetitive in nature?	1	2	3	4	5	9
How often do you handle problems which arise in the buying process by following written and verbal instructions previously established by other members in your organization?	1	2	3	4	5	9
How frequently are you asked by the other members in your organization to participate in decisions that involve your job responsibilities?	1	2	3	4	5	9
How often do other members in your organization make decisions related to your job role without consulting you?	1	2	3	4	5	9
How often are uncommon purchasing-related problems dealt with without regard for existing rules and procedures?	1	2	3	4	5	9
How frequently do other members in your organization perform the same duties as you?	1	2	3	4	5	9
How frequently does another member in your organization issue instructions when existing rules and procedures are not adequate to make purchasing-related decisions?	1	2	3	4	5	9

I would like to ask you a few general questions about how the information about AMRs may come to you. For example, whether it is offered to you or whether you have to ask for it.

23. Was the subject of purchasing AMRs raised in your department?

    Yes_____ No_____. *(If no, then skip to 26)*

24. How often were you personally responsible for raising the subject? Was it,

    Always_____/ Often_____/ Sometimes_____/ Rarely_____/ Never_____/

25. Do you *(Please check one)*

    _____a. usually ask someone else for information?
    _____b. suggest helpful information from your own experience?

26. Compared with other members of your company, do you feel you are less likely or more likely to be asked for advice?

    _____a. Less likely
    _____b. More likely

27. Do you feel that within your company, you are generally regarded as a good source of advice about AMRs?

    Yes_____ No_____.

In this section I would like to ask you a few questions about your company and yourself.

28. Approximately how many customers does your company serve in the following categories?

_____a. Residential _____b. Commercial
_____c. Industrial _____d. Institutional
_____e. Other *(please specify)* _____

29. How long have you been working with this company?

_____a. less than 2 years _____d. 11 — 15 years
_____b. 2 — 5 years _____e. more than 15 years
_____c. 6 — 10 years

30. How long ago *(in years)* was it that you first took part in a decision to purchase a piece of equipment of any sort?

_____a. less than 2 years _____d. 11 — 15 years
_____b. 2 — 5 years _____e. more than 15 years
_____c. 6 — 10 years

31. How long ago *(in years)* was it that you first took part in a decision to purchase a piece of equipment of any sort: (A) on behalf of this company, and (B) on behalf of your current department.

"THIS COMPANY"	**"YOUR CURRENT DEPARTMENT"**
_____a. less than 2 years	_____a. less than 2 years
_____b. 2 — 5 years	_____b. 2 — 5 years
_____c. 6 — 10 years	_____c. 6 — 10 years
_____d. 11 — 15 years	_____d. 11 — 15 years
_____e. more than 15 years	_____e. more than 15 years

32. Can you tell me which, if any, professional, industry or trade associations or institutions that you belong to?

_____

_____

33. Could you please indicate your job title? _____

PLEASE RETURN THIS QUESTIONNAIRE IN THE ENVELOPE PROVIDED AFTER HAVING ANSWERED *ALL* THE QUESTIONS.

Thank you so much for your cooperation.

Sincerely,

MARTIN T. TOPOL
Department of Marketing
Baruch College of the City University of New York
17 Lexington Avenue — Box 275
New York, New York 10010
(212) 725-3295

Baruch College
The City University of New York
17 Lexington Avenue
New York
N.Y. 10010

August 4, 1980

Mr. Ralph P. Nix
Manager Distribution Engineering
Southwestern Electric Power Co.
P.O. Box 21106
Shreveport, LA 71156

Dear Mr. Nix:

Recently I spoke with you on the telephone and requested your participation in my national study of industrial buying. The focus of this study is on the purchasing process for automatic meter reading equipment, a product which is technically complex and may involve significant expenditure of funds by prospective buyers. Your firm has been identified as a buyer or potential buyer of such a product.

Although a number of different automatic meter reading designs are currently available (i.e., power line carrier, radio, and telephone) you are asked to restrict your attention to automatic meter reader systems that utilize telephone lines as the principal communication method. The reason for focusing attention on one communication design is to ensure greater uniformity in the collection of data relating to the purchasing process for such a product.

By studying a product such as automatic meter readers, I hope to obtain insight into the complexities of the industrial buying process. Please, note that confidential information is not requested and your firm only answers questions relating to automatic meter reading equipment. Your answers will be used in combination with those of others in similar positions from all across the country in the form of statistical tables. The number on the bottom of the last page is for control purposes only and enables me to avoid sending a second questionnaire to people who complete and return the first one.

Very honestly, my Ph. D. dissertation depends on you. May I have your assistance in making my research program successful by returning the attached questionnaire by August 18th?

Sincerely,

Martin T. Topol

P.S. If you would like a summary report of the findings of this research please return the enclosed postal card with your name and address.

Baruch College
The City University of New York
17 Lexington Avenue
New York
N.Y. 10010

September 4, 1980

Mr. K. Clinard
Carolina Power & Light Co.
P.O. Box 1551
Raleigh, N.C. 27602

Dear Mr. Clinard:

Recently I mailed you a questionnaire asking for your participation in a survey of electric utility executives which I am conducting for my Ph. D. dissertation. If you have already returned the questionnaire, please consider this letter as only an opportunity for me to say "Thank you" for your valuable help.

If you have not had a chance to complete the questionnaire, would you be so kind as to complete and return the enclosed duplicate questionnaire now? I would like to remind you that your response will remain confidential and that a summary report of my research findings will be made available to you if you simply return the enclosed postal card with your name and address.

Again, your participation is vital to the success of my Ph. D. dissertation research.

Sincerely,

Martin T. Topol