AN EXPLORATORY EMPIRICAL INVESTIGATION OF INFORMATION PROCESSING AMONG INCUBATOR-HOUSED MANUFACTURERS DURING CHANNEL MEMBER SELECTION

Dissertation

Presented to the Graduate Council of the University of North Texas in Partial Fulfillment of the Requirements For the Degree of DOCTOR OF PHILOSOPHY

By

Gwen F. Fontenot, B.S., M.B.A.

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The purpose of this research was to conduct an exploratory study of the information processing utilized by incubator-housed manufacturers during channel member selection. The study included the evaluation of the decision models used by the manufacturers as well as criteria used in the selection process.

The study was specifically designed to achieve the following objectives. First, the research was to identify the evaluation modes used by the manufacturers as either compensatory or noncompensatory. Second, the study was to evaluate the effect of the task on the selection of the evaluation model(s) used during the channel member selection process. Third, the study was to evaluate the effect of the selected decision strategy on the amount of information used during the decision process. Finally, the study was to identify and examine the importance of the criteria used by the manufacturers in the selection process.

The methodology in this study consisted of primary
research using protocol analysis as the main data gathering technique. A ranking instrument was also mailed to the respondents prior to the protocol session. The population for the study was identified as all manufacturers located in publicly-sponsored business incubators. A total of 235 incubators were in existence with approximately 47 percent of them being publicly-sponsored. Approximately 42 percent of the incubators house at least one manufacturing firm. It was estimated that there were approximately 46 manufacturing firms located in public incubators. A sample of six was used in this study. The statistical analysis included frequencies, cross tabulations, correlations, paired comparisons, and measures of association.

The findings of this study suggest that the incubator-housed manufacturers' choice of evaluation models was not affected by the task nor did the selected strategy influence the amount of information used by the manufacturers. The findings indicate a need for further research to evaluate the relationships brought forth in this study. Based on the conclusions and findings of this study, recommendations for further research were given.
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CHAPTER I

INTRODUCTION

A significant portion (98%) of all non-farm businesses in the U.S. are small businesses. Many of these businesses fail within the first five years of operation ("The Economy's Incubator" 1986). The high failure rate among small firms has been attributed to the poor management skills of the owners or managers (The Failure Record 1981). However, through the development of the business incubator, an organization providing shared facilities, shared services, and management assistance to small firms, small manufacturers have been exposed to a new environment and have access to managerial assistance not otherwise provided to young firms.

The business incubator is becoming a well-known phenomenon in the business world today. Since 1985, the number of incubators has grown from 85 to 235 in 1987 with the sizes of incubators ranging between 1 and 554 firms. In 1984, 42 percent of all existing incubators housed at least one manufacturing firm (Temali and Campbell 1984).

Managers of these manufacturing firms are faced with the responsibility of designing channels of distribution for their products just as are managers of large firms.
Channel management is one of the manufacturer's normal responsibilities. In many cases inefficient management is a result of limited management skills, including decision-making skills. Although the incubator-housed manufacturer has the availability of managerial assistance from the incubator-manager, these manufacturers are not exempt from failure or difficulties.

**Problem Statement**

The problem addressed in this study is how the information processing utilized by incubator-housed manufacturers impacts the management of the organization in terms of efficiency and effectiveness and how it influences the determination of criteria to be used in channel member selection. Analysis of the manufacturer's decision-making process rather than mere knowledge of the decision itself will contribute to improved management decisions and allow better forecasts of the channel member selection process. Knowledge of the manufacturer's decision process will also help intermediaries understand how the final selection of channel members is made. This will allow intermediaries to strengthen their operations in areas which are important to manufacturers.

**Purpose of the Study**

The purpose of this study is to evaluate the information processing used by incubator-housed
manufacturers in selecting individual channel members during the channel design process. This will include a study of the decision processes or evaluation models used in selecting specific channel members as well as an evaluation of the criteria used in making that decision.

**Background**

Several models of channel design have been presented with an emphasis on the manufacturer as the channel designer (Balderstron 1964; Mallen 1977; Lambert 1978; Bowersox, Cooper, Lambert, and Taylor 1980; and Rosenbloom; 1987). The channel design process described by these authors was summarized by Stock and Lambert (1987) in a normative model which includes nine stages:

1. establish channel objectives
2. formulate a channel strategy
3. determine channel structure alternatives
4. evaluate channel structure alternatives
5. select channel structure
6. determine alternatives for individual channel members
7. evaluate and select individual channel members
8. measure and evaluate channel performance
9. evaluate channel alternatives when performance objectives are not met.

The focus of this research is on the seventh stage, evaluation and selection of individual channel members.
Lambert (1978) has indicated that in completing this task, the channel designer uses specific qualitative criteria for selecting and evaluating prospective channel members.

The psychological literature reveals that individuals engaging in such problem solving processes utilize cognitive programs to accomplish their goals (Newell and Simon 1972). Such programs or processes where utility is assigned to a multiattribute stimulus are termed evaluation processes (Dawes 1964). Studies in this area have indicated that the problem solver uses a problem solving strategy which will reduce cognitive strain and that the strategy selected is dictated by the complexity of the task at hand (Newell and Simon 1972; Payne 1976).

**Definitions of Major Constructs**

As proposed by Newell and Simon (1972) in their theory of human problem solving, decisions of individuals are influenced by various environments as well as by the task itself. The individual is surrounded by the external environment and also houses an internal environment. When given a task to complete or when seeking to attain a goal, the interaction between that task and the external environment results in the formation of the task environment. The internal environment interacts with the task environment to provide the individual's problem space. Crow's (1975) depiction of these interactions is shown in Figure 1. Whereas Newell and Simon presented the problem
FIGURE 1

Interaction Between Environments and Task

space as being equivalent to the internal environment, Crow depicted the problem space as being the portion of the internal environment that interacts with the task environment.

Task

The task is the objective which the decision maker seeks to accomplish. In this study the task under consideration was predetermined for the manufacturers. The manufacturers were asked to select an individual channel member under specified constraints which will be discussed in the task environment section of this chapter.

External Environment

The external environment includes all factors external to the problem solver which affect the behavior of that individual. In an organizational setting those factors could include legal, social, political, technological, economic, and competitive environments as well as intra-organizational environments. When solving the given task of selecting an individual channel member, the manufacturers' external environment also includes the time constraints placed upon the manufacturers in making the decision, the number of potential intermediaries from which to select, and the daily operations and interruptions which the manufacturers must give attention to.
Internal Environment

As defined by Newell and Simon (1972), the internal environment consists of the space in which the individual's decisions are made. Also known as the problem space, the internal environment contains the individual's information processing system. The individual's information processing system includes elementary information processes which allow the decision maker to make comparisons and discriminate between variables as well as create, read, and write symbols.

Also included in the internal environment is any knowledge of channel design gained by the manufacturers through experience. Any decision rules or evaluation process models the individual may have learned through experience will also be a factor to be considered in the internal environment. The individual's information processing constraints, such as short and long term memory and input and output abilities, are also part of the internal environment.

Evaluation Process Models

Two basic types of evaluation process models, compensatory and non-compensatory, are typically used by decision makers. Each of these processes can be completed through the use of several choice rules.

Compensatory choice rules are linear in nature. Two such rules are the additive model and the additive
difference model. With the additive model the decision maker makes an overall evaluation of each alternative by summing the utilities of individual attributes. The overall evaluations of the alternatives are then compared in order to arrive at a decision. With the additive difference model, alternatives are compared on each attribute independently with a difference between attributes being determined and then summed to obtain an overall evaluation. This choice rule allows only two alternatives to be compared simultaneously.

Noncompensatory processes include, but are not limited to, conjunctive, disjunctive, lexicographic, elimination-by-aspects, and attribute dominance models. The conjunctive rule is being applied when each alternative is evaluated against a pre-established minimum standard for each attribute with elimination of those not surpassing all minimum standards. This rule allows for the acceptance of more than one alternative.

When utilizing the disjunctive model, the decision maker establishes a minimum standard for each attribute but accepts alternatives which surpass the standard on any of the attributes. This model, too, allows for the acceptance of multiple alternatives.

Several versions of the lexicographic model exist. When using lexicographic models, decision makers rank the criteria a priori according to importance. The regular
lexicographic model allows an alternative to be selected if it ranks highest on the attribute considered to be the most important criterion by the decision maker. If more than one alternative remains after application of the regular lexicographic rule, the lexicographic semiorder rule can be applied. This allows the decision maker to continue the evaluation by rating the alternatives based on the second most important criterion, etc., until only one alternative has been selected.

Another version of the lexicographic model, the SATISLEX, is actually a combination of the conjunctive and regular lexicographic models. Alternatives which do not pass the minimum standards on all attributes are eliminated with the remaining alternatives being evaluated according to the regular lexicographic model. The SATISLS model is a combination of the conjunctive and lexicographic semiorder models which allows alternatives passing the minimum standard on all criteria to be considered using the lexicographic semiorder rule. Regardless of the particular lexicographic model used, the decision maker will ultimately select one alternative.

The elimination-by-aspects model is very similar to the lexicographic models. However, the decision maker using the elimination-by-aspects model does not rank the criteria a priori. An attribute is selected and each alternative is evaluated on a minimum standard for each
criteria with those surpassing the minimum being selected. This model, like the conjunctive and disjunctive models, allows a set of alternatives to be selected rather than only one. Consequently, it is most beneficial as a simplification technique.

The attribute dominance model is a comparison of alternatives by attribute with the alternative scoring highest on the most attributes being the one selected. Only two alternatives may be compared at one time. It, too, is a simplification model and is not useful when alternatives are not closely compatible.

Task Environment

The task environment is delimited here in an effort to control for the effect of extraneous variables which may be present in the external environment. The task environment is limited to only manufacturers housed in an incubator setting. By virtue of the definition of incubators, these manufacturing firms are small and have been in existence for short periods of time ranging from newly founded to not more than five years old. The size of the manufacturing operations was limited according to the guidelines provided by the Small Business Administration which allow manufacturing firms with not more than 1500 employees to be defined as small (Steinhoff 1982). The number of prospective channel members from which the channel designer was allowed to choose was defined by the researcher. A set
of criteria or attributes with ratings for each potential channel member was also made available. This set included criteria which were previously identified by the incubator-housed manufacturers as important in making such a selection. As specified, the task environment provided the framework within which the manufacturers operated in making this decision.

Information Processing System

The information processing system of each individual channel designer is unknown as it is not possible to observe the system at work. However, through a content analysis of verbal concurrent protocol transcripts, the inner workings of the individuals' systems can be made known. Data collection through verbal concurrent protocol requires the participants to verbalize or describe their thoughts as they are experienced. The verbalization, or protocols, are recorded and later transcribed to reveal information about the activities taking place in the individual's problem space.

Business Incubator

The new business incubator is both an organization and a physical unit which was developed in an effort to assist entrepreneurs in developing business skills in an environment conducive to company development. The physical unit consists of a building or a group of buildings in
which entrepreneurs are housed together. The facilities are usually provided to the entrepreneurs at below market rates with services such as secretarial/clerical assistance, accounting services, and computer equipment time-sharing being provided for a nominal fee as needed. The organization provides for management assistance through an incubator manager for the entrepreneurs housed within the incubator unit (Smilor and Gill 1986).

**Introduction of the Model**

The model presented in Figure 2 depicts the process utilized by incubator-housed manufacturers in selecting individual channel members operating in the previously described task environment. The focus of the model is the effect the task has on the criteria used and the evaluation model selected in making the decision.

The model indicates that the channel designer, given specific choice alternatives, engages in information processing which leads to the selection of a particular evaluation model to be used in evaluating the prospective channel members. The final decision is achieved through a comparison of the alternatives by utilizing certain evaluative models to sort through characteristics of each alternative based on criteria established by the evaluator.
FIGURE 2
A Model of Channel Member Selection by Incubator-Housed Manufacturers

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**Criteria Used**

**Decision**
**Operationalization of the Model**

The model was operationalized through a laboratory setting. In this setting verbal concurrent protocols of the manufacturers were recorded during contrived sessions as the manufacturers solved the task of selecting individual channel members. The protocols were transcribed and analyzed to reveal the strategies, compensatory and noncompensatory, and criteria utilized by the channel designers.

**Hypotheses**

The following hypotheses and subhypotheses will be tested:

1. The evaluation model utilized by incubator-housed manufacturers in selecting channel members is dependent on the difficulty of the task being performed.
   
   a. In non-multialternative situations (two alternatives), the incubator manufacturer will utilize a compensatory evaluation process.
   
   b. In multialternative situations (three or more alternatives), the incubator manufacturer will utilize a two-staged (combination) noncompensatory process.

2. The amount of information utilized by incubator manufacturers will vary according to the difficulty of the task.
   
   a. The percentage of information searched by incubator manufacturers in nonmultialternative situations will be greater than that searched for multialternative situations.

3. The criteria utilized by incubator manufacturers in selecting channel members will vary according to the evaluation model selected.
a. The use of noncompensatory evaluation process models by incubator-housed manufacturers will result in the use of a smaller number of criteria than will the use of a compensatory evaluation process.

4. Financial criteria are deemed most important by incubator-housed manufacturers in the evaluation of prospective channel members.

Significance of the Study

The findings of this study contribute to the understanding of the incubator-housed manufacturer's decision making process for the channel member selection stage of the channel design process by providing empirical evidence of incubator-housed manufacturers' decision processes. In order to further theory development in the area of channel management, not only must the outcome of decision making be known, but the process by which the decision was reached must be understood. Several normative and empirical models of the channel design process have been developed. However, empirical evidence of the decision process used in channel design and channel management is limited to studies of the overall design process rather than specific areas within the channel design process. The current research was built upon the information which has been presented on decision making in marketing by examining an area which has not been studied extensively in this manner. While consumer decision making, as well as industrial decision making, has been
studied, no literature exists on decision making processes in the specific area of channel design that was examined here—channel member selection.

This study will also be of value to businesses by providing intermediaries with a perspective of channel design from the incubator-manufacturer's point of view. This perspective will enhance the intermediaries' understanding of the factors which are important to these manufacturers in selecting channel members to distribute their products.

Limitations

The limitations of this study are acknowledged here. Manufacturers are not always the channel designer. They may not be the channel leaders and may not have the power to design their own channels. Potential intermediaries may be limited to only one which would prevent the manufacturer from having the opportunity to evaluate various alternatives. By virtue of the Small Business Administration's definition of small manufacturing businesses, this study does not extend to manufacturers with more than 1500 employees nor does it extend to manufacturers not located in incubators. The task environment for this study has been specified; therefore, the study does not extend to task environments other than the one previously described. The small sample is drawn from a centralized geographic location.
Assumptions

In working with the above limitations, the following assumptions were made. The manufacturer is the channel designer. The manufacturer has more than one potential intermediary from which to select and evaluates these alternatives using qualitative criteria in selecting channel members. It is also assumed that participants verbalized all thoughts incurred during the evaluation process.
CHAPTER BIBLIOGRAPHY


CHAPTER II

RELATED LITERATURE

Information Processing Theory

Introduction

The objectives of this chapter are to provide a theoretical framework within which to study the decision making processes used by incubator-housed manufacturers in selecting specific channel members as well as to provide a review of the literature related to channel member selection. In an effort to provide a better understanding of the decision maker being studied here, a review of the literature on incubators is also presented.

In understanding the decision processes used by the decision maker, it is necessary to have some knowledge as to how an individual processes information. Consequently, the theory of information processing as presented by Newell, Shaw, and Simon (1958) provides the theoretical background for this study. The theory was more recently summarized by Newell and Simon (1972) in their study of human problem solving. As explained by Newell and Simon, the theory purports to explain behavior as well as describe it. The theory proclaims that man becomes an
information processing system when solving problems. The theory also states that man utilizes a program which is stored in memory to arrive at a solution to the problem being solved. Description of this program or problem-solving routine for manufacturers in a channel design situation (channel member selection) is one of the objectives of this study.

In their studies, Newell and Simon have used information processing models in an effort to represent the individual at work on a particular task. In order to understand the behavior of an individual, the following elements must be studied: the information processing system, the task or goal, the external environment, and the problem space (internal environment).

The Information Processing System

The information processing system (IPS), as conceptualized by Newell and Simon, consists of a memory containing symbol structures, a processor, effectors, and receptors. Newell and Simon were primarily concerned with the memory and processor components rather than the receptors and effectors.

Memory is defined as the component capable of storing and retaining symbol structures (programs). According to Newell and Simon (1972) the human long term memory is limitless as to the number of distinguishable symbols it can store. Newell and Simon explained that external memory
available to the problem solver via pencil and paper, for example, is also infinite in capacity and is as important to the problem solver as is long term memory. Because external memory is limitless, it contains more information than the problem solver can hold in immediate attention. Thus, scanning behavior is an integral part of the problem solving process. Prediction of problem solving by an information processing system can only be made after characterizing the external, short term, and long term memories available in the system.

The processor is the component which contains the set of elementary information processes, short term memory, and the interpreter. The elementary information processes contained in the processor operate upon symbol structures and behavior is derived from sequences of the elementary information processes. As described by Newell and Simon, the basic set of elementary information processes include:

1. Discrimination—ability of the system to behave in alternative ways depending upon the symbol input
2. Test and comparisons—ability to determine whether or not two symbols belong to the same symbol type
3. Symbol creation—ability to create new symbols as needed
4. Writing symbol structures—ability to create a new symbol structure, copy or modify an existing
symbol structure, by changing or deleting symbols belonging to the structure

5. Reading and writing externally—ability to designate external stimuli and produce external responses to internal symbol structures

6. Designating symbol structures—ability to access all symbol structures

7. Storing symbol structures—ability to remember a symbol structure for later use

A set of rules called a program determines the sequence in which the elementary information processes are performed. According to Newell and Simon, this program must be discovered in order to describe a human solving a problem. The short term memory (STM) stores the inputs and outputs generated from the elementary information processes. The interpreter then integrates this information to interpret the program which is stored in memory.

**The Task**

Newell and Simon were primarily concerned with the behaviors of adaptive or rational individuals. They proclaimed that the economic man is always motivated to maximize his utility and, therefore, is goal-oriented. Accordingly, the study of goal-oriented, motivated individuals leads to two kinds of knowledge:
1. To the extent that the behavior is precisely what is called for by the situation, it will give us information about the task environment.

2. To the extent that the behavior departs from perfect rationality, we gain information about the psychology of the subject, about the nature of the internal mechanisms that are limiting his performance (Newell and Simon 1972).

The first type of knowledge leads us to an understanding of the task while the second leads us to an understanding of psychology. It is the first of these types of knowledge that is the focus of this study.

The goal or task is the objective toward which the subject directs problem solving efforts. Goals are viewed by Newell and Simon as being invariant over people and tasks. They postulate that goals carry a test to determine when some state of affairs has been satisfied and are able to control behavior under appropriate conditions. The control is exercised in the determination of the patterns of behavior or methods for attaining the goal. If goals do exist, the program must contain processes for creating, testing, and updating them, selecting methods for attempting, evoking, and discarding them.

Since problem solving is goal directed, goal behavior must be distinguished from other forms of directed behavior. Goal-directed behavior was described by Newell
and Simon using the following characteristics:

1. Interruptibility—if the IPS is removed or distraeted from a situation, it later returns to directed activity at the same point.

2. Subgoaling—the IPS itself interrupts its activity toward a goal to engage in an activity that is a means to that goal, and then returns to the activity directed toward the original goal, making use of the means produced by the subgoal.

3. Depth—first subgoaling—when the subgoaling behavior indicated above occurs to a depth of several goals, the evidence is particularly conclusive.

4. Equifinality—if one method for attaining a goal is attempted and fails, another method toward the same goal, often involving quite different overt behavior, is then attempted.

5. Avoidance of repetition—more generally, the system operates with memory of its history of attempts on goals, so as to avoid repetition of behavior.

6. Consummation—if the goal situation is attained, effort is terminated with respect to that goal (Newell and Simon 1972, p. 808).

According to Newell and Simon, when solving a problem, the subject may develop subgoals. However, these subgoals
will be used by the subject in accomplishing the original goal. Upon satisfaction of the subgoals, the subject will return to behavior directed at satisfying the initial goal.

In the studies conducted by Newell and Simon explicit goals were provided to the subjects. The goals used in the Newell and Simon studies included (1) obtain a checkmate in chess, (2) solve a particular cryptarithmetic problem, and (3) prove a particular logic theorem. The hypothetical task in this study, to select a channel member, is similar to that of obtaining a checkmate in chess in that the decision maker uses logic to integrate the results of a search for consequences in a fairly well structured situation and there are no overt negative rewards with perceived failure.

External Environment

The external environment, as described by Newell and Simon, is the environment in which the subject seeks to perform the task at hand. The external environment may contain many elements which are not directly related to the goal or task but which may affect the decision process used in achieving the goal. For example, when the task is to select a channel member, the manufacturer may be operating in an environment which includes matters related to production, promotion, personnel, and other activities which may impact the channel design process.
The Problem Space

The task environment was presented by Newell and Simon as the interaction between the task and the external environment. It has been identified in an effort to delimit the internal environment, or the problem space, which is the internal representation of the task environment. Newell and Simon proposed that it is in this space that problem solving activities take place within the subject. The problem space is not limited to the actual behavior of the subject but also represents possibilities for changes and transformation of the situation. It is in the internal environment that the task environment is encoded by the problem solver.

In developing the theory of human problem solving, Newell and Simon noted that the problem space contains a set of elements (symbol structures), a set of operators (information processes), an initial state of knowledge, a problem, and the total knowledge available to the problem solver. The initial state of knowledge is that information about the task that the subject has at the beginning of the problem solving process. The problem is the task the subject is trying to achieve. The total knowledge available to the problem solver includes all information the subject is able to access from long term, short term, and external memory.

Newell and Simon purport that once the task has been
internally represented, the information processing system selects a problem solving method. This method is expressed as being dictated by the nature of the internal representation. Since one objective of this study is to examine the method used by the problem solver in selecting a specific channel member, various methods are discussed in the following section.

**Evaluation Process Models**

**Introduction**

Wright (1975) has suggested that choice strategies used in the evaluation process are comprised of two components, a process by which single multiattribute alternatives are evaluated and a rule by which one alternative is discriminated from others. The former of these has been labeled the data combination process and the latter, the choice rule.

Wright (1975) identified compensatory and noncompensatory data integration as the two basic assumptions of the data combination process. With compensatory processes, data is averaged (or added) in such a manner that positive and negative data are balanced in terms of impact on the overall decision. Noncompensatory data are combined so that the presence or absence of one dimension may not compensate for the absence or presence of other dimensions.
Several choice rules have been evaluated in conjunction with both the compensatory and the noncompensatory process. According to Wright (1975), individuals utilizing the compensatory process implement an averaging rule which may include equal weightings or differential weightings among the dimensions. The noncompensatory rules identified by Wright include lexicographic, conjunctive, disjunctive, elimination-by-aspects, maximax, and minimax models.

Compensatory Models

Linear Models

Dawes and Corrigan (1974) stated that linear models, which can be normative or descriptive, can range from those in which weights for the dimensions are obtained using linear regression to those in which intuitive weights or values are applied and then added together. They point out that the key to using linear models is deciding which variables to look at. Decision makers typically use less complicated compensatory models such as the additive or additive difference models.

Additive Model. Coombs (1964), Rapaport and Wallsten (1972), and Payne (1976) described the additive model as one in which the overall worth of each alternative is first assessed. A final ordinal comparison of the overall values is then made to determine the alternative of choice. Crow
(1975) explained the model as the sum of the utilities of individual attributes.

**Additive Difference Model.** Tversky (1969) proposed the additive difference model to account for consistent intransitivities. Tversky's model is described as a product set $A = A_1 \times A_2 \times \ldots \times A_n$ of multidimensional alternatives with elements of the form $x=(x_1 \ldots x_n)$ and $y=(y_1 \ldots y_n)$, where $x_i$, $i=1, \ldots, n$, is the value of alternative $x$ on dimension $i$. In simpler terms, the decision maker, when using this model, compares alternatives directly on each dimension. A difference between alternatives is determined based on the comparison and, finally, the results are summed to obtain a selected alternative. Tversky suggested that in multialternative situations (more than two alternatives), comparison of each alternative could be made to the best of the previously evaluated alternatives, and so on until one is selected. Rapaport and Wallsten (1972) explained two fundamental assumptions which underlie the additive difference model. First is intradimensional subtractivity and second, interdimensional additivity where the dimension-wise contribution is the value of the utility difference and the binary preference is a function of the sum of dimension-wise contributions, respectively.
Noncompensatory Models

Conjunctive Model

Einhorn (1970) mathematically stated the conjunctive model as any stimulus or standard \( Y = (y_1, y_2, \ldots, y_n) \) depends on \( X_i \) being \( > y_i \) for all \( i \). As translated by Hawkins, Coney, and Best (1986), a minimum standard is established for each evaluative criterion. Each alternative is then evaluated with regard to the minimum standard. Alternatives which surpass the minimum standard on each criteria are selected as viable alternatives. A set of acceptable alternatives rather than one alternative is generated from the evaluation. Dawes (1964) calls this a minimum evaluation function because the alternatives are evaluated on their minimum ability.

Hawkins, Coney, and Best (1986) identified the conjunctive model as being particularly useful in reducing the size of the information processing task by eliminating the options which do not meet a minimum required standard. This model is also known as the satisficing model.

Disjunctive Model

Einhorn (1970) stated that if \( E(X) \) is the evaluative function of \( X \) and \( E(Y) \) is the evaluative function on some standard \( Y \), then \( E(X) > E(Y) \) if \( x_i > y_i \) regardless of \( y_j > x_j \) where \( i \) is not equal to \( j \).

Wright (1975) explained that the disjunctive model...
allows for each alternative to be judged on its best attribute regardless of the ratings of other attributes. As does the conjunctive model, disjunctive models produce a set of acceptable alternatives rather than one best alternative. Decision makers utilizing this model establish a minimum standard for each criteria or dimension and select alternatives that pass the minimum cutoff for any dimension. Dawes (1964) has termed this model the maximum evaluation function because each option is judged on its best ability or attribute regardless of others.

Lexicographic Model

Einhorn (1970) described the lexicographic model as one where decision makers seek maximum performance on criteria with only one option being selected rather than a set of alternatives being identified. Criteria are ranked a priori according to importance. The alternative scoring the highest on the most important criterion is selected.

Russ (1971) has identified four versions of the lexicographic model. They include the regular lexicographic model (LEX), the lexicographic semiorder (LS), the SATISLEX, and the SATISLS. The LEX model allows for selection of the alternative which ranks highest on the most important criterion. The LS model is used if more than one alternative remains after evaluation of the most important criterion or if the value of the most important attribute is not significant or noticeably different.
between alternatives. Evaluation then continues using the second most important criterion, etc. until one option has been selected. The SATISLEX combines the satisficing model (conjunctive) with the LEX model. Initially, any alternative which fails to meet the minimum standards are excluded and those remaining are ranked lexicographically. The SATISLS model combines the LS model with the satisficing model. Again alternatives which do not pass the minimum cutoff level are rejected and the remaining alternatives are evaluated using the LS model.

Elimination-by-Aspects Model

Tversky (1972) presented this model based on a covert elimination process. Each alternative is viewed as a set of aspects. An aspect is selected and each alternative which does not possess the minimum standard for that aspect is eliminated. The process continues until a choice is made. This model is closely related to the lexicographic model; however, in this model, the attributes are not ranked a priori as they are in the LEX model. Elimination may be made by either positive or negative aspects. Due to the uncritical application, the decision maker may make a poor decision. This model does not ensure that the alternative which is retained is superior to those eliminated only that it is satisfactory. This model allows the decision maker, by design, to come up with any alternative s/he wants. The usefulness of this model is in
the simplification of the task by providing a smaller set of alternatives from which to make the ultimate decision. This model was termed the sequential elimination model by Wright (1975).

**Attribute Dominance Model**

Olshavsky (1979) indicated that the decision maker using the attribute dominance model conducts pairwise comparisons between alternatives on an ordinal basis on several attributes. Preference for an alternative is based on counting the number of attributes on which one alternative dominates another. The alternative with the greatest number of dominant attributes is selected. Coombs (1964) and Wright and Barbour (1977) purport that this model is beneficial for simplification purposes but could be insufficient when alternatives are significantly inferior or superior to one another on specific attributes.

**Combination Models and Others**

Several other models exist but are infrequently mentioned in the literature. Wright (1975) described two such models, the MINIMAX and the MAXIMAX models. The MINIMAX seeks to minimize maximum losses by comparing options on their worst attributes rejecting one if another's worst attribute is less offensive or if another alternative has fewer worst attributes which are equally offensive. The MAXIMAX model compares options on their
best attributes opting for the alternative whose best attribute is more desirable than the other or the one that possesses the greatest number of best attributes of equal desirability.

Payne (1976) and Olshavsky (1979) found that the decision maker may change choice strategies during the decision process. The decision maker may use one strategy, such as the conjunctive model, to eliminate from a large number of alternatives, then turn to a more specific strategy, such as lexicographic, to make the final decision. Newell and Simon (1972) and Olshavsky (1979) observed that such a change is dependent on the task environment and human information processing constraints.

Channel Member Selection

The evaluation of prospective channel members is based on the symbol structures which are available to the decision maker either through internal or external memory. The basis for studying qualitative criteria is discussed here.

Introduction

McVey (1960) posited that channels are not designed, but rather, simply evolve over time. Lambert (1978), in response to the issue of channel design raised by McVey, developed a normative model of the distribution channels decision. Lambert and Cook (1979) also derived an
empirical model of the distribution channels decision. In both the normative and the empirical models, individual channel member selection is included in the channel decision process. The models also allow for specific criteria to be used in making the channel member selection.

Although suppliers acknowledge the importance of the use of specific criteria in selecting individual channel members, they assert that there is no substitute for common sense and personal judgment. Impressions, opinions, and facts are normally weighed against pre-established standards as a basis for selecting distributors and rejecting others.

Research Findings

Welch (1975), in his review of channel design literature, summarized both qualitative criteria and quantitative techniques for selecting individual channel members. Qualitative criteria rather than quantitative techniques are the focus of this study.

Only a few empirical studies have been conducted to determine the criteria which are used in channel member selection. These include studies by Pegram 1965, Hakansson and Wootz 1975, Lambert 1978, Hlavacek and McCuistion 1983, Shipley 1984. According to Shipley (1984), intermediaries are selected on the basis of their performance on factors such as sales, delivery, product and customer servicing, storage, credit provision, information gathering, and
quality of relationships with other middlemen. In general, it was found that marketing, and financial factors are the most commonly used criteria in making the selections.

Findings vary as to the most often used criteria in the selection process. Pegram (1965) found that credit and financial position was the most widely accepted criterion while Shipley (1984) found sales and market factors to be the most widely acknowledged. The findings of the previously mentioned empirical investigations can be categorized according to the classifications used by Shipley. Shipley divided the criteria into four major categories: sales and market factors, product and service factors, risk and uncertainty factors, and other factors.

Overall, sales and market factors were considered to be used most often. Included in sales and market factors are knowledge of the market, geographic market coverage, the number and quality of sales personnel, and frequency of sales calls. Of the sales and market factors, knowledge of the market and market coverage were considered the primary criteria in studies by Pegram 1965, Hlavacek and McCuistion 1983, Shipley 1984. Hlavacek and McCuistion (1983) stressed the importance of the distributors' knowledge of the industry and customers rather than a focus on geographic coverage alone. They also urged producers to utilize the services of different distributors when trying to serve different or specialized market segments. Pegram
expressed concern for the use of distributors with very large territories as their coverage could possibly overlap the coverage of existing intermediaries. This problem could be significant particularly when dealing with selectively or exclusively distributed products. However, adequacy in covering the targeted geographic territory is desired. Call frequency by the sales force was also evaluated as a market coverage factor.

Performance of the sales force was also considered to be important by channel designers as reported by Pegram 1965, Lambert 1978, Sibley and Teas 1979. The size of the sales force as well as the technical competence of the salespeople were often evaluated. Sibley and Teas (1979) found that even small sales forces are able to generate a high sales volume per employee.

Product and service factors which were most often considered include the intermediaries' knowledge of the product and product lines carried by the intermediaries. Hlavacek and McCuistion (1983) found that distributors with more limited product lines are usually able to provide more concentrated technical assistance for products which require demonstrations. This is not to say that distributors with broad product lines are not knowledgeable of their products. Although these distributors may be very successful, they are often deemed as overloaded and are therefore overlooked. Pegram (1965) asserts that
distributors with competitive products are avoided while those with compatible products are preferred. Distributors carrying complementary products are favorable and are seen as having the ability to provide a better product mix to customers. The channel designer seeks a distributor with products of equal or better value than their own lines and avoids any association with distributors handling lines which are felt to be inferior.

Risk and uncertainty factors assess the distributors' commitment and abilities as well as the investment required by the manufacturer. Pegram (1965) found that the Dun and Bradstreet credit rating was the most commonly applied credit standard used by manufacturers. Distributors were rated either satisfactory or nonsatisfactory. An additional three to four credit references were often required, and financial statements were sometimes evaluated. Shipley (1984) found that manufacturers often evaluated the distributors' enthusiasm for the product as a selection criterion.

Further findings by Stiles (1972) and Crow (1975) are discussed in the following section.

Decision Making in Marketing

Slovic, Fischhoff, and Lichenstein (1977) observed that a trend to study decision behavior has begun to develop in both consumer and organizational literature. Previous literature has focused on the final decision or
outcome while the latest body of literature has had as its focus the method used in decision making. Much of this research has centered around Newell, Shaw, and Simon's (1958) and Newell and Simon's (1972) theories of information processing and human problem solving with an emphasis on the evaluation of choice rules used in processing information. Newell and Simon proposed that as the complexity of a task increases, the decision maker resorts to a choice strategy that reduces cognitive strain. Several studies including Crow 1975, Park 1976, Payne 1976, Wright and Barbour 1977, Lussier and Olshavsky 1979, Olshavsky 1979, Crow, Olshavsky, and Summers 1980, have confirmed this hypothesis.

Through the use of protocol analysis, the effects of various factors on the decision process have been evaluated. Studies by Lussier and Olshavsky 1974, Wright 1975, Olshavsky 1976, Payne 1976, Bettman and Park 1980, Park and Lessig 1981 have focused on the effects of the number of alternatives, number of attributes per alternative, prior knowledge, task or product familiarity, time pressure, product complexity, and experience on the decision process, among others.

Alexis, Haines, and Simon (1958) transcribed protocols collected from a group of women shopping for clothing into a shopping model. King (1969) studied the behavior of a supermarket shopper and the decision processes utilized in
the purchase of goods. Neither of these models were tested for predictive ability. In a continuation of King's work, Bettman (1970) constructed decision models for two of his subjects in the supermarket situation. Bettman extended the model into a predictive situation and simulated the decision process with an 87.5 percent degree of accuracy.

Decision processes have also been studied in organizational settings. Moore (1969) provided a conceptual framework for analyzing the decision process used in selecting vendors. In an extension of Moore's work, Vyas and Woodside (1984) evaluated the decision processes used in selecting industrial suppliers at six plants. Vyas and Woodside (1984) found that the decision makers used a combination of decision rules at various stages of the choice process. It was also found, as indicated in studies by Cyert, Simon, and Trow 1956, and Vyas and Woodside 1984, that the decision maker seeks a satisfying alternative rather than the best alternative.

Stiles (1972) and Crow (1975) studied information processing from an industrial buyer behavior perspective. Stiles suggested a model of vendor selection where quality, service, delivery and price were utilized in the decision process. Dickson (1966) and Wind, Green, and Robinson (1968) empirically evaluated the importance of vendor attributes in the choice process. The top six attributes which resulted from Dickson's study in order of importance
are quality, delivery, performance history, warranties and claims policies, production facilities, and price. Wind, Green, and Robinson's finding support those of Dickson with the top three attributes being quality-price ratio, delivery reliability, and technical ability and knowledge. However, neither of these studies provided indications as to the decision processes used.

Crow's (1975) study provided suggestions as to the choice processes utilized by the industrial buyers. Price and delivery were identified as the most important criteria in Crow's study. The buyers used a two-stage choice process beginning with a conjunctive strategy and basing the final decision upon a lexicographic approach.

**Business Incubators**

Since the sample for this study will be drawn from manufacturers located in incubators, it is important to understand the concept of the business incubator. Such an understanding is necessary in understanding the environment in which these decision makers function.

**Description of The Business Incubator**

Netton (1984) described business incubators as facilities designed to help start-up businesses survive the critical stages of development and grow into sound businesses. Not only do incubators help new businesses
develop, but they also provide a means of local economic development.

The Incubator Concept

The incubator concept is not a new one. Netton (1984) noted that incubators have been around for approximately 20 years, but have only become popular in the last decade. Plosila and Allen (1985) revealed that the incubator concept was derived from two business development approaches, the "mother firm" approach and the multi-tenant buildings approach. Under the "mother firm" approach, new firms emerge with financial and management support of the mother firm. By supporting the new firms, the mother firm hopes to pursue cooperative activities with the new ventures. Plosila and Allen explained that multi-tenant buildings emerged as industrial park developers experienced difficulty in filling space. When changes in tax laws spurred rural and urban areas to rehabilitate older buildings and as economic development in many areas began to increase, multi-tenant buildings began to surface. These facilities are now known as incubators.

Incubator Characteristics

Pryde (1985) indicated that in order to be classified as an incubator, the facility must meet the following minimum requirements: (1) provide space in flexible units at affordable prices and on favorable terms, and (2)
provide equipment and services on a shared-cost basis. Shared services such as clerical services must be made available as part of the basic package offered to tenants. Lease terms, however, may vary from tenant to tenant and are usually stated on a per-square-foot basis.

Types of Incubators

In a 1984 national survey, Temali and Campbell profiled 31 business incubators by size, tenant capacity, sponsorship, orientation, and purpose. These incubators ranged in size from 15,000 - 1,200,000 square feet. The number of firms housed in the incubators ranged from 1 - 554. Rental fees ranged from $1.25 - $15 per square foot.

Plosila and Allen (1985) identified three types of incubator facilities on the basis of orientation: product development, manufacturing, and mixed use. Product development facilities are usually located near universities to take advantage of the university facilities and skilled technical personnel. Manufacturing incubators are sometimes descendants of industrial parks or large manufacturing facilities. Locations of manufacturing facilities are only limited by costs of operations, availability of services, and a ready market for tenants. Mixed use incubators contain product development, manufacturing, and other types of organizations.

Gumpert (1985) noted that incubators typically have not been appropriate for retail businesses or businesses
with extensive warehousing needs. Early-stage light manufacturing, service, assembly, and high-technology businesses are most likely to be found in incubators. However, exceptions do exist. Mississippi Action for Community Education's (MACE) South Street Square Business Incubator in Greenville, Mississippi, is primarily comprised of women-owned retail businesses. The Temali and Campbell (1984) profile revealed that retail establishments were housed in only 9.7 percent of the incubators profiled.

Three types of incubator facilities, based on sponsorship, have been identified by Allen and Rahman (1985). They include private sector sponsors, public sector sponsors, and education sector sponsors. Public officials and private companies have different views of incubators' reasons for existing. Public officials see them as a source of creating new jobs in the community and private companies see them as a means of gain from real estate appreciation as well as a means of investment in ventures that start in the incubator. Private sector sponsors are usually interested in property development, investment opportunities in tenant firms, and transferring innovative technology. The primary interests of public sponsors, on the other hand, are to create jobs and economic diversification. Studies by Allen and Rahman 1985 and Gumpert 1985 indicate that university/vocational-technical school sponsors are most interested in the
training opportunities available for students and the development of a commercial outlet for faculty research.

Nyrop (1985) noted that ownership or sponsorship of incubators is usually through the public sector or through private nonprofit or for-profit enterprises. He revealed that size and tenant capacity of the incubators were the major differences among the types of incubators. Private incubators were approximately twice the size of public incubators and had a larger average tenant capacity than public incubators did.

Nyrop (1985) observed that entrance requirements varied also. Since many private sector sponsors provide venture capital to their tenants, profit potential of prospective tenants is a major entrance criterion. Otherwise, full occupancy is a primary objective thus preventing private sector sponsors from being too selective.

Nyrop (1985) found that since public sector incubators are primarily concerned with job creation, their entrance criteria center around job creation abilities of the business. He also noted that public incubator facilities are more likely to have exit requirements than private ones. Rent is usually higher in private incubators by approximately two to three times per square foot. Nyrop attributed this to the fact that many public incubators receive government subsidies.
Allen and Rahman (1985) point out that regardless of who the sponsor of the incubator is, the universal purpose is to better the opportunity of survival for firms in their formative years.

Assistance Available to Incubator Tenants

Allen and Rahman's (1985) study of 56 tenant firms in Pennsylvania facilities in 1984 revealed that services provided by incubator facilities could be grouped into five categories: (1) financial consulting assistance, (2) management assistance, (3) general business assistance, (4) professional business assistance, and (5) physical services.

Temali and Campbell (1984) identified four major areas of shared services often provided by incubators. These include office and communication, business services, facilities and equipment, and utilities. These services were sometimes included in the rental fees paid by the firms. Otherwise, they were most often priced at cost but sometimes at market value. The study also indicated that the social atmosphere created by incubators encouraged trading relationships among the tenants.

Peterson (1985) indicated that the services provided by public, private, and university incubators vary. Public incubators most often provide management assistance, particularly assistance with government grants and loans. Physical/logistical services and shared office services are
provided regularly by private incubators. In many cases, private facilities have pre-arranged channels from which their tenants can benefit. University incubator tenants benefit from a large amount of research and development assistance.

In "Cultivating New Business" (1983) the environment offered by incubators is stressed as having a greater appeal. Netton (1984) claims that the synergy gained by combining the skills and talents of tenant companies is seen by tenants as more valuable than all other services provided. Networking develops in the incubators due to the physical proximity of firms and the need for various skills in different types of businesses. For example, a secretarial services firm may be able to assist a consulting firm with clerical work while the consultant may be able to provide insight into problems the secretarial firm is having. A type of barter arrangement then evolves from such dealings.

Key Research Findings

Research on incubators and incubator-housed firms has been limited to descriptive studies. The Temali-Campbell (1984) study discussed earlier was the first major survey of incubators. David Allen (1985) conducted a study for the Economic Development Administration Research Evaluation Division of the U.S. Department of Commerce. This study, too, was descriptive of the existing incubators. It also
described the incubator concept and identified the organization types of incubators and services provided to tenants. A third major study prepared for the National Science Foundation reported on the programmatic activities and viability of nine federally funded centers (Scheirer, Nieva, Gaertner, Newman, Ramsey 1985).

Since only a small number of firms have "graduated" from incubators at this point, it is still too early to examine the success of incubators. It is anticipated that research on incubators will move in that direction in the future. Likewise, no research has been reported as of yet which examines the management or marketing aspects of the individual incubator-housed firms.
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CHAPTER III

RESEARCH METHODOLOGY AND DESIGN

An experimental design was used to evaluate the information processing undertaken by incubator-housed manufacturers during the channel member selection phase of the channel design process. The experimental design, issues of validity, data collection, and data analysis are discussed in this chapter.

Research Design

A laboratory experiment was conducted in this study using a repeated measures 2 x 2 x 6 factorial experimental design. The dependent variable under study was the percentage of information (criteria) used in solving the task of selecting a channel member. The independent variables included the number of alternatives (number of firms), the amount of information (number of criteria) available, and the subjects. The number of alternatives was set at two and six, while the amount of information available was set at five and ten criteria.

Each company was given a rating of either excellent, good, or poor for each criteria. No one alternative was dominant in these ratings. The ratings were systematically assigned such that each of the criteria had a different
rating in at least three of the four situations. It is expected that such a balancing of ratings would eliminate the effect of the ratings upon the dependent variable. To assure that no effect existed from the ratings, a cross tabulation of the companies and the number of times each company was selected was established and tested to examine the relationship between the two variables.

Validity

Since the experiment was set in a laboratory setting, threats to internal validity were minimized. The primary threat was the pretesting effect which was present due to the questionnaire being administered prior to the protocol session. Questionnaire completion required participants to rank criteria according to the perceived importance of each in evaluation and selection of a channel member. This prior measurement may result in the usage of certain criteria during the evaluation phase which otherwise would not have ordinarily been used. However, the effect of the prior measurement may have been lessened as it was administered several weeks prior to the protocol session.

As is often the case, a high level of external validity will be sacrificed in obtaining a higher internal validity. Several threats to external validity are recognized in this study. Reactive bias, pretest-manipulation interaction bias, main testing effect, and nonrepresentative-sample bias may be present here.
Reactive bias may occur as participants might alter their behavior due to participating in and being studied through the experiment. An attempt may be made to behave in a manner which the participant feels the researcher deems appropriate. The presence of the pretest may increase or decrease the participant's sensitivity to the experimental manipulation. The respondents may give more thought to evaluation criteria than they would have had the pretest not been taken. Since participants were asked to complete four tasks, earlier test situations may have an effect on the participants' behavior in later problem-solving efforts. The participants may attempt to be consistent in their problem solving thereby creating a main testing effect. The nonrepresentative-sample bias threat is seen as the primary limiting factor to external validity in this study. Due to the size and nature of the sample used, the results of the study cannot be generalized to other manufacturers in different settings or with different characteristics than the ones studied.

Population

The population under study is comprised of the manufacturers who are located in the public incubators in the United States. An updated list of incubators is available through the National Business Incubation Association (NBIA). However, neither the number nor the names of the individual manufacturing firms located in the
incubators is available through NBIA and must be acquired from the individual incubator offices. There are a total of 235 private, public, and educationally sponsored incubators in the United States. Approximately 42 percent of these have manufacturing firms as tenants. It is estimated that there are at least 98 manufacturers located in the 235 incubators. However, only 47 percent of these are housed in public incubators. The remainder of the incubators are either private or academic.

Sample Selection

A convenience sample of six (6) manufacturers was drawn from public incubators located in the northeast region of the United States. Alreck and Settle (1985) suggest that a sample which is ten percent of the population is sufficient to obtain adequate confidence. They also recommend the use of small samples when the range or volume of information required from each respondent is relatively large and/or when total project costs increase drastically with sample size as is the case in this study. In an effort to reduce time and costs in collecting the data, an attempt was made to sample as many manufacturers as possible from the same city.

The sample for this study was limited to owners or managers of manufacturing firms located in publicly owned incubators. Traditionally, publicly owned incubators have provided a better balance of assistance to businesses in
terms of shared facilities, shared services, and management assistance than university and privately owned incubators do (Temali and Campbell 1984).

The following screening process was used in the selection of the sample. Once the manufacturers were identified, a sample of 28 was contacted by letter informing them of the project. The manufacturers were asked to complete and return a screening questionnaire. The mailing resulted in a 46 percent response rate. The criteria used in the study were determined from these questionnaire results. The letters were followed up with phone calls to the 13 manufacturers who did not return the questionnaire with screening of these manufacturers being completed by phone.

Proposals for participation were then sent to the 28 manufacturers. In order to participate in the study, the manufacturer had to be in a position to select channel members for distribution of the company's products. (The aforementioned documents are shown in Appendix A). If the manufacturer had no power in the channel and no say in such decisions, that manufacturer was eliminated from the sampling frame. The proposal outlined the study more specifically and requested participation in the study.

A brief questionnaire which called for a ranking of several evaluation criteria by the participant was included with the proposal. The criteria used on the ranking
instrument were obtained from the initial pretest questionnaire that is discussed later. Another phone call was made to each manufacturer to set the date and appointment time for the study. This procedure was followed until a sample size of six was obtained.

Procedure for Data Collection

Verbal concurrent protocol was used in collecting data for this study. Protocol analysis is a small sample methodology used in the exploratory investigation of thought processes as a means of generating theory (Wilson 1985). Newell and Simon (1972) proposed the use of protocols in the analysis of thought processes involving the specific decision steps that lead to overt behavior. Since the purpose of this study was to evaluate the information processing used by the manufacturers and the effects of different variables on this process, it was necessary to capture the data through verbal concurrent protocols. Other techniques do not capture the thought processes as they are occurring (Ericsson and Simon 1984).

Ericsson and Simon (1984) identified protocols as either concurrent or retrospective. The verbalization of thought during the thought process is concurrent, whereas the verbalization of thoughts after a decision has been made is retrospective. Concurrent protocol is preferred by Ericsson and Simon, because retrospective protocol allows the respondent to rationalize previous behaviors and
possibly report thoughts inaccurately due to the time lapse between the thoughts and the verbalization of those thoughts.

This exploratory research using verbal concurrent protocols was conducted in a laboratory setting. A room was set up with an audio tape recorder to record the verbalizations of the participants. Each participant was allowed two hours to complete the specified tasks. They were not told of the time limitations. The time pressure, if known, might have unnecessarily affected the behavior of the participant. Participants were instructed to verbalize all thoughts while making their decisions. The researcher was available to prompt the participant in periods of hesitation.

Participants were given instructions individually and went through the decision making process with no one else present other than the researcher. The participants were given instructions regarding the procedure to be used in solving the tasks. A brief training session was given during which the participant was be asked to select a carbonated drink from two alternatives given a set of characteristics for each product. This session was to help the participants adjust to verbalizing all thoughts.

For the study of channel member selection, four work stations were set up for the various combinations of tasks which were studied. Each work station contained criteria
with a different set of pre-established ratings for each company on each of the available criteria. The tasks involved the selection of one company in each of four different situations. The situations were designed by varying the number of companies and criteria available. The four alternatives included situations with two companies and five criteria, two companies and ten criteria, six companies and five criteria, and six companies and ten criteria. Each participant completed four tasks so that each task was solved by six respondents. Examples of the companies, criteria, and ratings which were used are summarized in Appendix B.

**Data Analysis**

The protocols were transcribed verbatim for each participant. (A sample of the transcriptions is included in Appendix C.) A content analysis was then conducted by coding the individual protocols into short phrases. These were used in preparing individual tabulations of strategies used, the percentage of information used, criteria used, and the order in which criteria were used in the decision making process. This information was used to determine the relationships between the task and the decision strategy used and to provide an overall understanding of the decision process used by incubator manufacturers in channel member selection.
Hypotheses

In an effort to evaluate the research hypotheses presented in chapter one, the following statistical hypotheses were tested. A discussion of this analysis follows.

Hypotheses one (I) through three (III) was tested to determine if the task, defined by the number of alternatives and the amount of information available, and the variation in subjects affect the percentage of information used in the evaluation. The independent variables in the design are the number of alternatives, the percentage of information available for use, and the subjects. The dependent variable is the percentage of information actually used by the participants in solving the problem.

Hypothesis I: There is no association between the number of alternatives and the decision strategy used.

Hypothesis II: There is no association between the selected strategy and the percentage of information used.

Hypothesis III: The population median for all subjects is equal for all variations of information available.

A two-way tabulation of the decision strategies used, compensatory and noncompensatory, and the number of
alternatives available, two or six, was compiled. A second two-way tabulation of the decision strategies used and the number of criteria available, five or ten, was also compiled. The Phi coefficient at an alpha level of .05 was used to test these two hypotheses (Siegel and Castellan 1988). The result of these tests indicated whether the two variables, the number of alternatives and the strategy used, and the number of criteria and the strategy used, are independent of one another. Of particular interest here is whether the strategy used is dependent upon the difficulty or ease of the task with task difficulty defined in terms of the amount of information available to the respondent.

The Page test for ordered alternatives was used to test the effect of the variation in subjects on the percentage of information used (Siegel and Castellan 1988).

Hypothesis IV: There is no association between the selected strategy and the percentage of information used.

A two-way tabulation of the decision strategies used and the percentage of information used was constructed and tested using Cramer's coefficient C to determine whether or not a relationship exists between these two variables. The Lambda statistic was also used to determine the predictive ability of the decision strategy in forecasting the amount of information which will be used (Siegal and Castellan 1988)
Hypothesis V: There is no difference between the observed and expected distribution of evaluation criteria.

The ordinal information obtained from the participants' rankings was tested using the Wilcoxon Matched-Pairs Signed-Ranks test (Siegel and Castellan 1988). A rejection of this hypothesis would indicate that the criteria selected by this sample as being important is not necessarily the same criteria which would be selected by the total population.

Hypothesis VI: There is no difference in the means of the assigned rankings for each criteria.

Hypothesis VII: There is no difference in the mean rankings of the criteria used in evaluating alternatives.

A rejection of Hypothesis VI would indicate that subjects perceive some criteria to be more important than others. A rejection of Hypothesis VII would indicate that respondents discriminated in their perceptions of the importance of the various criteria during the evaluation process.
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CHAPTER IV

ANALYSIS OF RESEARCH FINDINGS

The results of the primary research are discussed in this chapter. The research hypotheses set forth earlier are also analyzed for statistical significance. Finally, an overview of the findings is presented.

Introduction

An overview of the data analysis and statistical techniques is presented here. First, the effect of the ratings assigned to each company is evaluated. This section also includes a presentation of the summary information derived from the protocol transcriptions as well as the prior criteria rankings survey. A discussion of the appropriate frequency distributions, cross tabulations, correlations, and paired comparisons is then presented. Following this discussion, an analysis of each research hypothesis and its statistical significance is presented.

Data Analysis

The transcriptions of the protocol analyses were used to identify variables which could be coded and used in computer analysis. The transcripts were coded and
interpreted by the researcher. Since one individual coded all transcripts, the codings were consistent throughout. However, the reliability of the codings was not examined.

Through the use of the Statistical Package for the Social Sciences\(^X\) (SPSS\(^X\)), these variables were analyzed in terms of frequencies, cross tabulations, correlations, and paired comparisons of rankings. Statistical analysis of the findings was computed using subprograms in the SPSS\(^X\) package as well as by hand calculations using formulas for nonparametric statistics provided by Siegel and Castellan (1988).

The data analysis was conducted on responses from six manufacturers from manufacturing firms located in incubators in a northeastern city. The sample size was limited to six due to the fact that manufacturers in larger incubators were unwilling to participate and these were the only firms willing to participate in this study.

**Statistical Analysis**

The statistical analysis section of the chapter reports the findings and relevant statistics associated with the data analysis. The findings of the frequency distributions are discussed first followed by cross tabulations and correlations where applicable. The findings of the paired comparisons are then discussed.
Effect of Assigned Ratings

Based on the information received from manufacturers during the screening process, ten criteria were selected to be used in the study. Ratings of excellent, good, or poor were randomly assigned to each company for each criteria used in evaluation of the companies as potential distributors. Total ratings for each company were calculated by assigning a value of three (3) for an excellent rating, two (2) for a good rating, and one (1) for a poor rating and multiplying the assigned value by the number of each type of rating for each company. In situations where companies were evaluated based on five (5) criteria, ratings ranged from a total of eight (8) to eighteen (18) with a mean rating of 13.4 and a standard deviation of 3.3. There was no significant difference (p = .29) between the number of times each company was selected. When companies were evaluated on ten (10) criteria, the company ratings ranged from 26 to 38 with a mean of 31 and a standard deviation of 3.9. No significant differences were observed in the number of times these companies were selected (p = .27). Consequently, it can be assumed that the assigned ratings did not have a significant impact on the number of times any one company was selected.

Analysis by Frequency Distribution

Of the six respondents in this study, 33.3 percent were female and 66.7 percent were male. The experience
base of each of the respondents in their respective businesses was no more than one year.

Six subjects performed four tasks each, resulting in a total of 24 tasks. In solving the 24 tasks, a compensatory decision strategy was used nine times and a noncompensatory strategy was used 15 times, 37.5 and 62.5 percent, respectively. Respondents using a compensatory strategy made overall evaluations of each alternative then compared the overall evaluations to arrive at a decision. Those who used a noncompensatory strategy did not allow negative attributes to be balanced out by positive ones. They either established a minimum standard which companies must surpass or selected the company that had the best rating on the criteria they had determined was the most important one.

Respondents were asked to rank ten criteria as to their importance in selecting a distributor. Table I presents the frequencies of a priori rankings for each of the ten criteria. These rankings were obtained from the respondents several weeks prior to the protocol session. The average rankings for each of the ten criteria are also presented in the table.

The frequencies of the order in which the criteria were actually used during the sessions are shown in Table II. The respondents only ranked the criteria one time in the survey ranking. Therefore, the total number of
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**TABLE 1**

**FREQUENCY OF A PRIORI RANKING FOR EACH CRITERIA**

**NOTE:** Refer to ranking form in Appendix A for abbreviation key.
TABLE II
FREQUENCY OF ORDER OF ACTUAL USE OF EACH CRITERIA

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</tbody>
</table>

Mean: 7.09 6.07 6.0 4.1 4.35 3.02 5.4 5.37 6.35 6.73

NOTE: Refer to ranking form in Appendix A for abbreviation key.
responses per rank in Table I is six. However, since respondents did not always use the same order of selecting criteria, the order of ranks in Table II was calculated for all occasions resulting in a total of 24 responses per rank. When respondents did not use all ten criteria, or when only five criteria were available, the ranks for the unused criteria were averaged for the remaining ranks. Because the five-criteria situation was included in the analysis, some criteria may show a higher rank than would have been shown if those observations had been excluded.

On the a priori rankings, the Kendall Coefficient of Concordance ($W = .44$) at the .05 level indicated that there were no significant differences in the standard used by the subjects in ranking the criteria. Although these criteria were ranked the same overall by all respondents, this is not an indication of the usefulness or effectiveness of the criteria in selecting distributors.

The Kendall Coefficient of Concordance showed that there was a significant difference ($W = .22$) in the order in which the subjects used the criteria during evaluation. Assuming the criteria were used in their perceived order of importance, no agreement existed among respondents as to the importance of the criteria as indicated by the order in which they were used.

Analysis by Cross Tabulation

The data were analyzed by cross tabulating variables
identified through the protocol transcriptions. Due to the small sample size, nonparametric statistics were used in analyzing the data. Therefore, it was not necessary to collapse any variable categories for the analysis.

The individual subjects were cross tabulated with the type strategy used and the percentage of information used in order to gain insight into the decision processes utilized by each. The strategies used by each individual are presented in Table III. Only one respondent changed strategies during the performance of the four tasks. Respondent number six utilized a noncompensatory strategy in three of the four situations while other respondents remained consistent in the use of their selected strategies. Respondent six utilized a compensatory strategy when the least amount of information was available. This respondent indicated that when the total amount of information increased, it became necessary for him to change his way of thinking in order to process the larger amounts of information. However, the relationship between the subjects and the selected strategies was not statistically significant (p = .93).

The percentage of information used by each respondent is presented in Table IV. When presented with varying amounts of information, respondents on occasion used less information than in other situations. The percentage of information used was calculated using the number of
### TABLE III

**TYPE DECISION STRATEGY USED BY RESPONDENT**

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<th>NONCOMPENSATORY</th>
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<td>4 (26.7)</td>
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<td>----</td>
<td>4 (26.7)</td>
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<tr>
<td></td>
<td>----</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4 (44.4)</td>
<td>----</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4 (44.4)</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td>----</td>
<td>4 (26.7)</td>
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<tr>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>1 (11.1)</td>
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Total 9 (37.5) 15 (62.5)

\( p = .93 \)
### TABLE IV

PERCENTAGE OF INFORMATION USED BY RESPONDENT

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<td>(16.7)</td>
<td>(8.3)</td>
<td>(12.5)</td>
<td>(12.5)</td>
<td>(33.3)</td>
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$p = .70$
criteria available as a base. The amount of information used by participants ranged between 20 and 100 percent. Two respondents used 100 percent of the information on all occasions which accounts for one-third of the respondents. The relationship between the subjects and the amount of information used by each was not statistically significant ($p = .70$).

In an effort to determine whether or not a relationship existed between the decision strategy used and the other variables, cross tabulations were constructed with criteria available, companies available, the percentage of information available, and the total amount of information available. These four factors provide measures of the difficulty of the task. The total amount of information available is a product of the number of companies and the number of criteria available. Consequently, the four values for this variable are 10, 20, 30, and 60. All relationships were tested at the .05 level.

Table V indicates that when five criteria were available 55.6 percent of the respondents used a compensatory strategy while 46.7 percent used the same strategy when ten criteria were presented. Likewise, a noncompensatory strategy was utilized by 44.4 percent and 53.3 percent with five and ten criteria, respectively. However, with a $p$ value of .09, these differences were not
TABLE V

TYPE STRATEGY USED WITH VARIOUS LEVELS OF CRITERIA

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<td>(44.4)</td>
<td>(37.5)</td>
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<td>(53.3)</td>
<td>(62.5)</td>
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</table>

p = .09
TABLE VI

TYPE STRATEGY USED WITH VARIOUS ALTERNATIVES

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<td>(55.6)</td>
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<td>Noncompensatory</td>
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<td>(44.4)</td>
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<td>TOTAL</td>
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<td>(50)</td>
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\[ p = .94 \]
\[ p = .09 \]
found to be statistically significant.

A similar cross tabulation was constructed to examine the relationship between the decision strategy used and the number of companies available. The results are shown in Table VI. When two companies were presented, 55.6 percent of the respondents utilized a compensatory strategy while 44.4 percent used a noncompensatory strategy. When the number of companies increased, 46.7 percent used a compensatory strategy while 53.3 percent used a noncompensatory strategy. Although it appears that the type strategy changes as the number of companies available changes, this relationship was not found to be statistically significant ($p = .09$).

The relationship between the selected strategy and the amount of information used is depicted in Table VII. A Lambda statistic of .25 indicated that the selected strategy is not a good predictor of the amount of information which would be used. Cramer's coefficient $C$ resulted in a $p$ value of .94 indicating that the relationship between the selected strategy and the amount of information used is not statistically significant.

Another method of depicting the relationship between the decision strategy used and the difficulty of the task is shown in Table VIII. When the number of criteria and the number of companies available are combined as a measure of degree of task difficulty, the relationship between the
TABLE VII

ASSOCIATION BETWEEN SELECTED STRATEGY AND
THE AMOUNT OF INFORMATION USED

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<td>(16.7)</td>
<td>(8.3)</td>
<td>(12.5)</td>
<td>(12.5)</td>
<td>(33.3)</td>
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\( \rho = .94 \)
TABLE VIII

ASSOCIATION BETWEEN SELECTED STRATEGY AND TOTAL INFORMATION AVAILABLE

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<td></td>
<td>(22.2)</td>
<td>(26.7)</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>2</td>
<td>4</td>
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<tr>
<td></td>
<td>(22.2)</td>
<td>(26.7)</td>
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<td>TOTAL</td>
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<td>15</td>
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<tr>
<td></td>
<td>(37.5)</td>
<td>(62.5)</td>
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</table>

$p = .44$
task difficulty and strategy is still not statistically significant ($p = .44$).

A two-way tabulation of the percentage of information used and the number of companies available, the number of criteria available, and the total amount of information available were constructed and the relationships were tested to determine the effects of these variables on the percentage of information used. These tabulations are shown in Tables IX - XI, respectively. Again, none of these relationships was statistically significant.

The findings of a correlation analysis between the same factors are shown in Table XII. None of them are statistically significant at the .05 level ($p = .30$, $p = .11$, $p = .41$, respectively).

Analysis by Paired Comparisons

The paired comparison analysis consisted of an evaluation of the criteria rankings provided by the subjects prior to the laboratory study in relation to the order of usage of each of the criteria during the protocol sessions.

Since the respondents were forced to rank all ten criteria, a difference might be expected between the earlier rankings and the order in which the criteria were actually used due to the fact that the respondents may not utilize all ten criteria in their evaluation. In such situations the unused criteria were assigned an average
TABLE IX

PERCENTAGE OF INFORMATION USED WITH VARIOUS ALTERNATIVES

<table>
<thead>
<tr>
<th>PERCENTAGE OF INFORMATION USED</th>
<th>NUMBER OF COMPANIES AVAILABLE</th>
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<th>6</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td>2</td>
<td>-----</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(16.7)</td>
<td>-----</td>
<td>(8.3)</td>
</tr>
<tr>
<td>30</td>
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<td>1</td>
<td>1</td>
<td>2</td>
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<tr>
<td></td>
<td></td>
<td>(8.3)</td>
<td>(8.3)</td>
<td>(8.3)</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(16.7)</td>
<td>(16.7)</td>
<td>(16.7)</td>
</tr>
<tr>
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<td></td>
<td>-----</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-----</td>
<td>(16.7)</td>
<td>(8.3)</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(16.7)</td>
<td>(8.3)</td>
<td>(12.5)</td>
</tr>
<tr>
<td>80</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8.3)</td>
<td>(16.7)</td>
<td>(12.5)</td>
</tr>
<tr>
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<td></td>
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<td>(33.3)</td>
<td>(33.3)</td>
<td>(33.3)</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>12</td>
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<td>24</td>
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<td></td>
<td></td>
<td>(50.0)</td>
<td>(50.0)</td>
<td>(100)</td>
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</table>

p = .68
TABLE X

PERCENTAGE OF INFORMATION USED WITH VARIOUS CRITERIA LEVELS

<table>
<thead>
<tr>
<th>PERCENTAGE OF INFORMATION USED</th>
<th>NUMBER OF CRITERIA AVAILABLE</th>
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<th>TOTAL</th>
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<td></td>
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<td>(8.3)</td>
</tr>
<tr>
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<td></td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8.3)</td>
<td>(25.0)</td>
<td>(16.7)</td>
</tr>
<tr>
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<td>----</td>
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<td>(8.3)</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>3</td>
<td>----</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(25.0)</td>
<td>----</td>
<td>(12.5)</td>
</tr>
<tr>
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<td></td>
<td>3</td>
<td>----</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(25.0)</td>
<td>----</td>
<td>(12.5)</td>
</tr>
<tr>
<td>100</td>
<td></td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(50.0)</td>
<td>(50.0)</td>
<td>(33.3)</td>
</tr>
<tr>
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</tr>
<tr>
<td></td>
<td></td>
<td>(50.0)</td>
<td>(50.0)</td>
<td>(100)</td>
</tr>
</tbody>
</table>

p = .52
### Table XI

**Association Between Percentage of Information Used and Total Information Available**

<table>
<thead>
<tr>
<th>Percentage of Information Used</th>
<th>Total Information Available</th>
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<tbody>
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<td>(16.7)</td>
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<td>----</td>
</tr>
<tr>
<td></td>
<td>----</td>
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<td>40</td>
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<td>2</td>
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<td>1</td>
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<tr>
<td></td>
<td>(16.7)</td>
</tr>
<tr>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>(33.3)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>(25.0)</td>
</tr>
</tbody>
</table>

\[ p = .52 \]
TABLE XII

CORRELATION OF PERCENTAGE OF INFORMATION USED
WITH CRITERIA AVAILABLE, COMPANIES AVAILABLE,
AND TOTAL INFORMATION AVAILABLE

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>P-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Companies Available</td>
<td>.30</td>
</tr>
<tr>
<td>Criteria Available</td>
<td>.11</td>
</tr>
<tr>
<td>Total Information Available</td>
<td>.41</td>
</tr>
</tbody>
</table>
ranking of the unassigned ranks. Four of the criteria were shown to have a significantly different ranking in the laboratory study than in the earlier ranking. The Wilcoxon Matched-Pairs Signed-Ranks test revealed significant differences for rankings of the incubator manager's opinion ($p = .0033$), the industry reputation ($p = .0382$), quality of products ($p = .0329$), and geographic location of distributors ($p = .0051$) (Siegel and Castellan 1988).

Table XIII shows the order of importance of the ten criteria as indicated by the respondents in the survey ranking. The order in which the criteria were actually utilized in the study is shown in Table XIV.

As noted in an earlier section, a significant difference was found in the order in which the criteria were used by the respondents. Consequently, the criteria were compared as ordered with one another to determine if the difference between each of them was significant. Table XV shows the comparisons. The differences were tested using the Wilcoxon Matched-Pairs Signed-Ranks test. No difference was found between consecutive levels; i.e. size of market and geographic coverage, geographic coverage and financial stability, etc. Nor were significant differences found between the top criteria, size of the market, and criteria two through eight. A significant difference was found between size of market and support personnel and the incubator manager's opinion.
TABLE XIII

PRIOR RANKING OF SELECTION CRITERIA

<table>
<thead>
<tr>
<th></th>
<th>1. Geographic Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Industry Reputation</td>
</tr>
<tr>
<td></td>
<td>3. Size of Market</td>
</tr>
<tr>
<td></td>
<td>4. Product Mix</td>
</tr>
<tr>
<td></td>
<td>5. Financial Stability</td>
</tr>
<tr>
<td></td>
<td>6. Quality Products</td>
</tr>
<tr>
<td></td>
<td>7. Sales Force</td>
</tr>
<tr>
<td></td>
<td>8. Support Personnel</td>
</tr>
<tr>
<td></td>
<td>9. Geographic Location</td>
</tr>
<tr>
<td></td>
<td>10. Incubator Manager's Opinion</td>
</tr>
</tbody>
</table>
1. Size of Market  
2. Geographic Coverage  
3. Financial Stability  
4. Product Mix  
5. Sales Force  
6. Industry Reputation  
7. Quality Products  
8. Geographic Location  
9. Support Personnel  
10. Incubator Manager's Opinion
<table>
<thead>
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<th>CRITERIA</th>
<th>P-VALUE</th>
</tr>
</thead>
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<td>Geographic Coverage</td>
<td></td>
</tr>
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<td>.52</td>
</tr>
<tr>
<td>Financial Stability</td>
<td>.74</td>
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<td>Financial Stability</td>
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<tr>
<td>Product Mix</td>
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<td>Sales Force</td>
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<tr>
<td>Industry Reputation</td>
<td>.67</td>
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<td>Industry Reputation</td>
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<td>Quality of Products</td>
<td>.31</td>
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<td>Quality of Products</td>
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<td>Geographic Location</td>
<td>.83</td>
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<td>Geographic Location</td>
<td></td>
</tr>
<tr>
<td>Support Personnel</td>
<td>.47</td>
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</tr>
<tr>
<td>Incubator Manager's Opinion</td>
<td>.17</td>
</tr>
</tbody>
</table>
Analysis of Research Hypotheses

An analysis of each of the research hypotheses is presented in the following section. Conclusions regarding the findings will be reserved for later discussion.

Analysis of Research Hypothesis I. Hypothesis I examined the relationship between the number of companies available for evaluation and the strategy selected by the respondents. Hypothesis I stated, "There is no association between the number of alternatives and the decision strategy used." It was expected that as the number of companies increased, a noncompensatory strategy would be utilized (Olshavsky 1979). Hypothesis I was not rejected which indicates that no relationship existed between the number of alternatives and the decision strategy selected.

Analysis of Research Hypothesis II. Hypothesis II stated, "There is no association between the number of criteria and the decision strategy used." Again, the null hypothesis was not rejected indicating that no relationship existed between the number of criteria available for use and the decision strategy used.

Analysis of Research Hypothesis III. The effect of the subjects on the amount of information used was tested in this hypothesis. Hypothesis III stated, "The population medians for all subjects is equal for all variations of information available." It was expected that the subjects' use of information would be inversely related to the amount
of information available (Payne 1976). The hypothesis was not significant at an alpha level of .05. Consequently, the hypothesis was not rejected and the amount of information used was not shown to vary as the amount of information available changed.

Analysis of Research Hypothesis IV. Hypothesis IV focused on the association between the strategy utilized and the percentage of information used by each respondent. Hypothesis IV was stated as "There is no association between the selected strategy and the percentage of information used." Consequently, Hypothesis IV was not rejected and no association was found between the selected strategy and the percentage of information used.

Analysis of Research Hypothesis V. Hypothesis V stated that "There is no difference between the observed and expected distribution of evaluation criteria." This hypothesis was tested by comparing the a priori rankings to the actual rankings used during the problem solving situations. This hypothesis was not rejected indicating that, overall, the respondents utilized the criteria they were expected to use based on their preliminary criteria rankings.

Analysis of Research Hypothesis VI. The focus of Hypothesis VI was an evaluation of the order in which the criteria were ranked by the respondents prior to the laboratory study. Hypothesis VI stated, "There is no
difference in the means of the assigned rankings for each criteria." Hypothesis VI was not rejected. Therefore, the order of importance assigned to each of the criteria by the respondents was similar for the entire group.

Analysis of Research Hypothesis VII. Hypothesis VII stated, "There is no difference in the mean rankings of the criteria used in evaluating alternatives." Hypothesis VII was rejected indicating that there was no consistency in the order of usage of the criteria during the evaluation process. Consequently, there was no agreement as to which criteria was most important in the decision process. It was expected that financial position would be deemed the most important criterion (Pegram 1965). However, in an earlier study conducted by Shipley (1984), market factors such as the size of the market and geographic coverage were viewed by respondents as more important overall than financial stability.

Summary of Findings

The findings of earlier studies (Newell and Simon 1972, Wright 1975, Payne 1976, and Olshavsky 1979) indicated that the decision maker normally selects a decision strategy based on the difficulty of the task at hand. When presented with greater amounts of information, the decision maker selects a noncompensatory strategy in order to lessen the difficulty of the task. The decision maker also tends
to utilize less of the available information when greater amounts of information are available.

The results of the primary research in this study revealed that the earlier findings did not hold true in this decision making situation. Relationships between the difficulty of the task and the strategy selected were not upheld. Likewise, the selected strategy was not an indicator of the amount of information one could be expected to use in making a decision.

Based on earlier findings (Pegram 1965), it was expected that financial data would be viewed as the most important factor in selecting channel members. However, market factors were examined before financial data and weighed more heavily in the decision making process by these six manufacturers.

When forced into evaluating the importance of ten criteria as to their usefulness in selecting distributors, the manufacturers were in agreement as to the rankings of the criteria. When asked to utilize those ten criteria in making a decision, the factors which were stated as important earlier were similar to the ones used in making the decision with the exception of the incubator manager's opinion, the industry reputation, quality of products carried, and geographic location of the distributors. Overall, the rankings were similar to the order in which the criteria were used indicating that the manufacturers
were consistent over time in the values they assigned to the various criteria.

It appeared that the manufacturers sometimes used information which they did not feel was very important simply because that information was available to them. This could have contributed to the differences between the prior rankings and the order in which the criteria were actually used. Likewise, it is possible that some information which was important to the manufacturers was not available; therefore, respondents may have been forced to use less information than they might have used under different circumstances.

The findings of this study do not support the model presented in Chapter I. From this research it cannot be determined whether the evaluation model selected affects the amount of information used or whether the difficulty of the task affects the selection of a decision strategy. The differences in findings in this study and earlier studies may be due to the size of the firms interviewed. Prior studies focused primarily on large companies while small companies were studied here. The differences may be attributed to the high amount of risk involved for the owners of the small manufacturing firms as opposed to the risk felt by managers of firms owned by another party.

Based on the examination of qualitative data from this study, another model is proposed which depicts the process
used by the incubator manufacturers studied here. The model is exhibited in Figure III.

The manufacturers' selection of the criteria to be used in the decision process was based primarily on the availability of specific types of information about the companies. The incubator-housed manufacturers examined the type of data that was available to them prior to beginning the selection process. The amount of information did not appear to be as important as the type of information available. Unlike the respondents in previous studies, these respondents did not reduce the amount of information they used in the decision process as the amount of information available increased. Based on the type of information which was presented, the manufacturers then selected the criteria to be used in making the decision. The number of criteria selected appeared to determine the type of decision strategy to be used. Those respondents who used a greater number of criteria in their evaluations tended to select a compensatory strategy while those using less criteria were more apt to use a noncompensatory strategy. Regardless of the strategy selected, the respondents then proceeded to evaluate the alternatives based on the selected criteria and strategy in order to arrive at a decision.

Although the findings of this exploratory study varied from those of previous studies, it is unrealistic to
FIGURE III

PROPOSED DECISION MAKING MODEL FOR INCUBATOR MANUFACTURERS

EXTERNAL ENVIRONMENT

- Examination of Type of Information Available
  - Selection of Criteria
  - Selection of Decision Strategy
  - Evaluation of Alternatives Based on Selected Criteria and Strategy
  - Decision

INTERNAL ENVIRONMENT
challenge previously developed theories at this point. However, the findings noted here do provide a basis for future research which may eventually challenge the prior theories.
CHAPTER BIBLIOGRAPHY


CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The focus of this study was on examining the decision making processes utilized by small manufacturers located in business incubators as they select distributors for their finished products. The type of decision strategy used by the manufacturers in making this decision was of particular interest. The amount of information used by the manufacturers was also of prime concern.

Conclusions

The findings of this study do not support earlier findings as to the relationship between the strategy selected and the difficulty of the problem being solved. Likewise, this study failed to support earlier findings as to the effect of the selected strategy on the amount of information available in making the decision.

When the difficulty of the task was varied either by changing the number of alternatives from which to select a distributor or by varying the amount of information available on each company, no significant changes were found in the strategy used in making the decision. The respondents who had used a compensatory strategy when less
information was available used the same type of strategy as the amount of information increased. The only respondent who was inconsistent in strategy choice selected a compensatory strategy when the least amount of information was available and a noncompensatory strategy for all other situations. Otherwise, the amount of information did not affect any of the respondents' choices of strategy.

Also, the variations in the task did not affect the amount of information used by the respondents in the decision making process. It was not possible to forecast the amount of information the respondents would use based on a given strategy.

However, the respondents did indicate that they utilized an organized decision process with specific evaluation models being used when selecting distributors. The process utilized here indicated that the type of information which was available was more important to the manufacturers than the amount of information available. The type of information appeared to have an effect on the choice of criteria, as well as the decision strategy, used.

The contrived situation may have accounted for the unexpected behavior of the respondents. In some situations, respondents indicated that they would not ordinarily know where to find information that was presented to them or would not have sought that information but used it, because it was available to them in the
laboratory setting. Consequently, different results may have resulted if the study had been conducted in a natural setting.

The respondents showed agreement in their rankings of the importance of the various criteria. However, it should be noted that these rankings were assigned by the respondents without necessity of using the criteria in a decision at that time. When faced with making an actual decision based on the same criteria, the respondents did not agree on the values placed on each of the criteria. The prior perceived order of importance did not stand in the actual decision making process. This indicates that the respondents either changed their valuation of the criteria between the time they completed the survey and the time when they participated in the laboratory study, or perhaps the respondents did not take the task of ranking the criteria seriously. They may have provided rankings without giving much thought to the process. This difference could also be due to the difficulty associated with rank order questions where respondents are forced to assign a rank to factors which do not have significant relative differences between them. The differences exhibited by these respondents are consistent with Ericsson and Simon's (1980) theory that the strategies and cues the respondents say they will use are not the ones they actually use during the decision process.
Although differences existed between the perceived order of usage and the actual order of usage, the differences between the value of each of the criteria was not significant. In other words, even though size of the market was used first and seen as more important than geographic coverage or financial stability, the differences between these criteria were not significant. Consequently, the importance of each of these criteria was seen by the respondents as being equal.

In summary, the decision making processes utilized by the manufacturers in this study varied from those used by manufacturers in earlier studies. The information obtained in this study did not support or strengthen the findings of other studies in terms of understanding the overall decision process. The lack of agreement in the importance of specific criteria that was experienced in earlier studies was also witnessed in this study.

Recommendations for Further Study

The findings of this study suggest the need for further research in this area. The exploratory nature of this study necessitates the collection of more extensive data.

Further research is needed to test the relationships proposed in the model of the incubator manufacturers' decision making process (Figure III). The relationship between the type of information presented or made available
and the criteria selected for use should be examined further. The effect of the number of criteria used rather than the number of criteria available and the strategy used should also be examined.

A larger sample would provide more strength to the conclusions presented here. Private incubators should also be considered in future samples as they tend to house larger numbers of manufacturers than public incubators. These firms should be screened to determine whether or not they have access to pre-established channels or whether they actually engage in a distributor selection process.

A more extensive demographic evaluation of the manufacturers could provide insight into variations based on sex, age, experience, industry type, etc. Differences between various groups should be examined to determine group variations. For example, manufacturers with previous business experience may have more expertise in selecting channel members thereby requiring less information in making a selection.

A more thorough evaluation should be undertaken to examine the differences between prior rankings or values placed on selection criteria and the values placed on the criteria when actually used in a decision making situation. The reliability of the manufacturers' responses is important in determining a hierarchy of selection criteria.
The variations in the task presented in this study may not have been viewed as significant by the subjects. Future studies should attempt to examine the hypothesized relationships presented here with a greater difference in the levels of difficulty.

A comparison of incubator and non-incubator firms of various sizes should be made to determine if the manufacturers who are located in incubators vary in their decision processes from those who are located outside of incubators as well as to determine if variations in company size results in differences among the groups of manufacturers. If differences do exist, it would be beneficial to know the reasons for these differences.

Consequently, there may be a need for research in this area as well.

The type of research undertaken in this study may have been premature for these decision makers. Their lack of experience as well as the risks associated with private ownership may have produced effects which would not be found otherwise. Therefore, more exploratory research should be conducted using more experienced subjects. However, several case analyses may be more appropriate at this stage. This would provide insight into the manufacturers' actual decision processes rather than using a hypothetical situation.
If research is to advance in this area, the manufacturers must be made aware of the benefits of research and must be encouraged to participate in such studies. It is the responsibility of the researchers to create methods of gathering data which would encourage the manufacturers to share their experiences and knowledge with others. Otherwise, it will be virtually impossible to gain insight into the thought processes and behaviors of this group of manufacturers.
CHAPTER BIBLIOGRAPHY

APPENDIX A
Dear Manufacturer:

As a marketing doctoral student at North Texas State University, I am studying the decision processes of incubator-housed manufacturers as they design their channels of distribution. I would appreciate it if you would complete and return the brief questionnaire I have enclosed. A business reply envelope is provided for your use in returning the questionnaire.

This questionnaire will be used to determine which manufacturers would be appropriate for study in my research. If you are selected, I will send you a detailed proposal of my study and will ask that you give me two hours of your time at a scheduled date and time that would be convenient for you to participate in the study in your city.

I would appreciate your immediate response as well as your willingness to participate if selected.

Sincerely,

Gwen Fontenot

Enclosures
Survey #__________

Please answer the following questions to the best of your ability and return it to me as soon as possible.

Please briefly describe the type of products you manufacture?

__________________________________________________________________________

How long has your manufacturing firm been in existence?

__________________________________________________________________________

How many years (or months) of experience do you have as the manager of a manufacturing firm?

__________________________________________________________________________

Are you the person responsible for selecting distributors for the products manufactured by your firm?

Yes__________  No__________

Briefly describe the distributor selection process used by your firm.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

Please list the criteria you use in evaluating prospective distributors for your products. (Write on the back if you need more space.)

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
Which of the following types of services does your incubator make available for your business?

_____ Shared facility  _____ Shared services  
  _____ Management assistance

Please complete the information on the back of this sheet.

Name_________________________________________

Address_________________________________________

City________________________State_________Zip_____

Phone (___)_______________________________________
Participants in this research project will be asked to donate two hours of time to the study. The study will be conducted in a laboratory which will be set up in the participant's city.

Participants will be asked to make two unrelated decisions. The participant will be instructed to verbalize all thoughts while making the decision. A brief practice session will be given in order to help the participant get used to verbalizing thoughts. The session will be recorded both by video and audio tape for use in the analysis of data.

The following is an example of a problem solving situation. You are presented with information on two long distance telephone companies which service your area. You are given information regarding such factors as rates, quality of service, and available discounts. Your instructions are to select one long-distance company for your use. You would then proceed to verbalize all thoughts as shown in the following example.

"Well my company doesn't make very many long distance calls so I'm not really, well I don't care much about price. But it is important to me to have good connections. Let's see, Company A has low prices and Company B has high prices. But I don't care about price. Company A has average quality connections and offers discounts. Well Company B isn't bad either. They have discounts too. But Company B has below average quality connections. I guess I'm going to go with Company A cause of the connections."

If you would be willing to donate two hours of your time to my research efforts, please sign and return the enclosed form by (date). I will contact you soon to set the date and time for the study. Please give this serious consideration as the completion of my degree depends on your willingness to participate in the study. Feel free to call me if you have further questions regarding this project.

Sincerely,

Gwen Fontenot
817-566-0807 (Home)
817-565-3139 (Office)
Participation Acknowledgment Form

I would be willing to participate in your laboratory study. Please contact me regarding the date and time.

__________________________________________  Signature

Name_____________________________________

Address____________________________________

City_________________________ State___________ Zip____

Phone(____)______________________________

Return to:  Gwen Fontenot
            Department of Marketing
            University of North Texas
            Denton, TX  76203
Participant Number

Distributor Rating Sheet

Please rate the following factors from 1 to 10 in order of their importance to you in selecting a channel member to distribute the products you manufacture. Give the most important factor a ranking of "1" and the least important factor a ranking of "10". A brief statement has been provided beside each factor to insure a uniform understanding of the terms between the participants and the researcher.

____ Incubator Manager's Rating of the Firm---the incubator manager's opinion or judgment of the Distributor(s) being evaluated

____ Industry Reputation---the reputation of the distributor among other firms in the same industry

____ Type of Sales Force---the type of sales force used by the distributor; for example, in-house salespeople, agents or representatives, etc.

____ Product Mix Compatibility---assortment of products carried by distributors is similar to and/or not competitive with the products you produce

____ Financial Stability---the distributor's financial position is stable and enables them to pay for purchases; the financial outlook of the distributor is favorable

____ Size of Market---the number of outlets served by the distributor

____ Geographic Coverage---the geographic area which is covered by the distributor

____ Quality Products---the quality of other products handled by the distributor

____ Geographic Location---location of the distributor in relation to your firm

____ Availability of Support Personnel---availability of support staff to install equipment or provide assistance to customers once the merchandise has been sold by the distributor
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APPENDIX C
COMPANY 4--10 CRITERIA, 6 COMPANIES

I think probably realistically this is too many companies to do what I was doing before. So if I look at the ratings that I used before there were four that weren't that important. The last four were just 5% of the decision. So I think to just simplify the decision in this big of a matrix I would probably eliminate those last four aspects of my decision. So size of market is important, geographic coverage, sales force, product mix, support personnel and financial stability. I would eliminate reputation, location, quality of products carried and the manager's opinion. That gives me 20 percentage points to allocate to the other six criteria. So I think I would give size of market 5 more points, geographic coverage 5 more, sales force 5 more and product mix 5 more. So that gives me 25 20 20 15 10 and 10. Let me check and make sure that adds up. Yes. The next step would be to look at the ratings on these factors. We have size of market and for the first criteria size we have two three three two one one. For the second which is geographic coverage we have three one one three two two. For the third which is sales force we have three one three two two. For the fourth which is product mix we have two three three two one one. For support personnel we have one two two one three three. And finally for financial stability we have three one one three two two. Let me take a minute to do these calculations. Well finishing the calculations up I have a tie again between the first company and the fourth company so I guess I would use both distributors since they are equally good on each of the criteria that I think are important. (10 and 13)
REFERENCES


Demuth, Jerry (1984); "What Can Incubators Offer?," *Venture*, (November), 78-84.


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Stiles, Gerald (1972), *An Information Processing Model of Industrial Buyer Behavior*. Ann Arbor, MI: Xerox University Microfilms.


