THE RELATIONSHIP BETWEEN IDENTIFIABLE ATTRIBUTES AND DECISION-MAKING ABILITY OF PURCHASING PERSONNEL AS MEASURED BY THE RESULTS OF A MANAGEMENT GAME

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This study investigated the relationship between certain biographical and personality characteristics and decision-making ability of purchasing personnel as measured by the results achieved in a complex management game. The population studied was a group of eighty purchasing personnel from six local chapters of the National Association of Purchasing Management. The six local chapters selected were located in Dallas, Fort Worth, Houston, Beaumont, Amarillo, and Oklahoma City. All participants in the study played eight decisions of a financial management simulation entitled "Finansim." In addition, each participant provided biographical information in questionnaire form and completed a Myers-Briggs Type Indicator (MBTI) personality test. The biographical characteristics studied were academic background, purchasing experience, company size, and age. The personality factors studied evolved around the four dichotomous personality scales of
Two hypotheses were explored in this study. Hypothesis I stated that there is a direct relationship between achieved success in purchasing management and identifiable characteristics such as academic background, purchasing experience, age, and firm size represented. In addition, Hypothesis I states that success in purchasing management is characterized by certain dominant personality traits that are identifiable through personality tests. It is further hypothesized that there is a direct relationship between achieved success in purchasing and decision-making ability. Hypothesis II states that there are identifiable personal characteristics that are directly related to decision-making ability. This hypothesis was tested by dividing the game results into quartiles and statistically comparing the biographical and personality characteristics of the participants.

Hypothesis I was only partially accepted in this study. Significant differences were noted at the .05 level of significance between the executive group and the remaining group in the biographical areas of academic background and firm size represented. Only one personality trait studied was identified as a significant determinant of success in purchasing management. Even though extroversion was the dominant trait on the extroversion-introversion scale, the
executive group expressed a preference for introversion. No significant difference was noted between the executive group and the remaining group at the .10 level of significance with regard to decision-making ability.

Likewise, Hypothesis II was only partially accepted. Significant differences were noted at the .10 level of significance in the areas of educational background and introversion. In addition, the analysis of firm sizes represented by the participants revealed a significant difference at the .05 level of significance. However, contrary to the belief of many, the firm size represented by the participants was inversely related to the success achieved in the decision-making exercise. The least effective decision makers tended to be representatives of larger firms. It was found that a college degree in a technical field was an important determinant of success in purchasing management, but participants who indicated that they held a college degree in a non-technical field achieved significantly better results in the decision-making exercise. The data concerning personality traits reveal that participants who indicated a preference for introversion were significantly more successful in the decision-making exercise than those preferring extroversion. Significant interaction was noted between introversion and perception as well as between intuition and thinking. The primary conclusion of this research was that,
even though certain attributes were directly related to decision-making ability, insufficient justification exists to claim undeniable predictive factors of success.
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AS MEASURED BY THE RESULTS OF A
MANAGEMENT GAME

DISsertation

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CHAPTER I

PRESENTATION OF PROBLEM AND HYPOTHESES

Introduction

The purchasing profession has undergone a marked change during the past decade and a half. A review of purchasing literature of fifteen years ago indicates that most emphasis was placed on the technical and clerical aspects, with very little emphasis on the managerial decision-making aspect. The purchasing department in a typical manufacturing firm is responsible for spending over 50 percent of the firm's sales dollar.\(^1\) Realization of this fact has prompted top management to look at the purchasing department in a considerably different light. The purchasing manager is, as never before, an important member of the top management team.

This research is intended to determine what identifiable attributes, if any, are closely associated with successful decision-making ability as measured by the results achieved from a complex management game. Decision-making ability is a somewhat abstract quality

that is difficult to measure, yet there is general agreement that the ability to make good decisions is an important ingredient of the successful manager. One of the major problems associated with successful decision making is the fact that the results from specific decisions are often distorted due to the time lag between the time the decision is made and the time the results from the decision become measurable. In addition, other actions and decisions during the time elapsed between the decision and results will usually affect the outcome of the original decision.

The use of a management game to measure decision-making ability was selected as a vehicle for research for three reasons:

1. Management games provide the ability to compress an entire year's decisions into a very short period of time.

2. The game method provides the purchasing manager with rapid feedback in terms of decision results.

3. It was felt that a different approach to data collection would generate better participation from the purchasing personnel. This position was verified by the participants through their enthusiastic acceptance of the management game.
Use of a Management Game for Research

The selection of a management game for purposes of data collection is a difficult task. The *Business Games Handbook* lists over one hundred different management games, and this is only a partial listing of those available. It was decided that the game used be one that individuals, rather than groups, could play in order that the results could be measured on an individual basis. One game that meets the aforementioned criteria is Greenlaw and Frey's *Financial Management Simulation* entitled *Finansim*. This game incorporates decision making in the areas of

1. Production scheduling,
2. Sale and purchase of marketable securities,
3. Issuing of common stocks and ten-year debentures,
4. Plant capacity,
5. Capital improvements,
6. Payment of dividends.¹

The "Finansim" game player is requested to make individual decisions concerning an unnamed, unidentified product. For each period

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⁴Graham and Gray, *op. cit.*, p. 298.
of play, which represents one year, the game player makes several interrelated decisions which directly affect the earnings per share of his company. Each period a hypothetical level of demand is generated for the firm's product. These demand levels are not affected by the decisions of other game players, and they fluctuate from period to period depending upon business conditions, and are beyond the control of the "Finansim" manager. Decisions made during the simulation do not affect demand in any way.

The instruction book for the "Finansim" game is a two-hundred-page book. The instructions for the participants in this study were condensed to approximately eleven pages in order to maintain the interest of the participants. The condensed instructions were presented verbally by the researcher to the participants.

The use of a management game in research is not an original idea. Babb and Eisgruber published a book in 1966 entitled Management Games for Teaching and Research. In addition, a

5 Greenlaw and Frey, op. cit., p. 6.

search of the Dissertation Abstract revealed several dissertations that have used management games as a vehicle for data collection. 7

Purpose

The purpose of this research is to determine the relationships between identifiable attributes of purchasing executives, and their proficiency in decision making. Is there a direct relationship between decision-making ability and achieved success in the field of purchasing? In order to answer this question, decision-making ability was measured by the quality of decisions made in the management game. Measures of decision quality were earnings per share, ability

to identify good capital equipment investments, and ability to maintain a balanced production schedule. All of these factors lead ultimately to one key factor--profitability of the simulated firm.

Achieved success was measured by position attained in the firm, salary range, size of company, size of industry, and other related criteria.

In addition, this research is intended to provide insights as to the characteristics of effective purchasing people. Is educational background an important determinant of success? If so, what kind of educational background is most desirable--Engineering, Business Administration, Liberal Arts, or others? The debate continues in purchasing professional organizations on this point, and the findings seek to add to the limited body of knowledge that now exists. Another area of major concern centers around the experience background of purchasing people. Is experience a key variable in predicting success of purchasing executives? If so, what functional areas, such as production, engineering, marketing, or other areas, provide the major input for successful purchasing executives. Other identifiable characteristics, such as age, type of industry, size of company, and type of purchasing assignment, are analyzed in an attempt to develop a profile of a typical successful purchasing person.
The application of these findings to the selection of purchasing personnel could prove to be invaluable to the purchasing profession. The implications of this study concerning the predictive ability of the characteristics of successful purchasing executives are far-reaching.

**Scope and Limitations**

Decision-making ability is a single aspect of the broad area of purchasing efficiency. But its importance, heretofore virtually unnoticed in purchasing literature, cannot be denied. This research includes an analysis of the identifiable individualistic and personality characteristics that are important determinants of success in the purchasing profession.

The study is limited geographically to selected local purchasing associations in Texas and Oklahoma. However, the data in Chapter III indicate that the characteristics of the participants were very similar to the characteristics of the membership of the National Association of Purchasing Agents as reported in a 1966 survey by that organization.  

The decision inputs were coordinated by mail. This technique appeared to be the most desirable method due to the fact that

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participants could make their decisions on an individual basis, rather than in groups. However, the participants were cautioned about the importance of prompt response once decision results were received and a new decision was to be made.

The limitations to this study are as follows:

1. The research does not contend that findings and conclusions in the Texas-Oklahoma area are statistically significant for the nation as a whole.

2. The nature of the data collection technique with regard to time and financial constraints made it impractical to play a management game in its entirety. Eight decisions were played in order to take the participants through one entire business cycle.

3. Due to the fact that decisions are made by mail, all bias could not be totally eliminated. Participants were free to seek advice from outside sources. If the participant was more concerned with making a favorable impression on the researcher than actually determining how his decision-making ability compared to other purchasing people, then this type of bias could exist. However, it is felt that the involvement that was generated through playing the game kept this element of bias to a minimum.

4. An a priori assumption is made that the ability to play a management game is directly related with decision-making ability.
5. Due to the fact that the population of the universe that
was tested is virtually unknown, a judgment sample is used in this
study. Therefore, no claims of statistical reliability are made.

Hypotheses

**Hypothesis I.** -- There is a direct relationship between
achieved success in purchasing management and certain identifiable
characteristics. This hypothesis will be tested by establishing a
comparison group of successful purchasing executives and comparing
selected variables with those of the remaining participants.

A. Success in purchasing management is directly related
to identifiable characteristics such as academic background, work
experience, age, and size of company.

B. Success in purchasing management is characterized by
certain dominant personality traits that are identifiable through per-
sonality tests.

C. Success in purchasing management is directly related
to decision-making ability as measured by the scores achieved in the
decision-making exercise.

**Hypothesis II.** -- There are identifiable personal character-
istics that are directly related to decision-making ability. This
hypothesis will be tested by dividing the game results into quartiles and
statistically comparing the individual personal history characteristics of the participants.

A. Academic background is a major determinant of successful decision making as measured by the ability to play the "Finansim" game. The dimensions of the participants' academic background studied are whether the individual's education is in a technical or non-technical field and extent of education. Results achieved in the game will differ according to these dimensions.

B. Occupational experience in purchasing-related activities is a major factor in results achieved in the game. However, functional areas of occupational experience prior to entering the purchasing profession will not affect the game results significantly.

C. Other identifiable characteristics, such as age, size of company, and personality traits are important variables in decision-making ability.

**Methodology**

The research in this study is both primary and secondary in nature. Secondary data were collected on the historical background of decision theory with particular emphasis on its application to the purchasing profession. In addition, secondary sources were used in an attempt to trace the evolution of the purchasing profession from
basic clerical responsibilities to its present-day role as a major
decision-making function in business. Primary data were gathered
from the game decisions, questionnaires, and personality tests
administered to the participants. A more complete description of
the methodology used in this study is presented in Chapter III.

Primary Data Collection

This research was conducted under a doctoral dissertation
grant by the National Association of Purchasing Management. Each
local purchasing management association has a professional develop-
ment committee that the researcher worked with in securing partici-
pants for the research. Local associations that were asked to partici-
pare in this project were selected on proximity to the area and
recommendations of the District Director of Professional Development
for the National Association of Purchasing Management. The local
associations that were asked to participate were: Dallas, Fort
Worth, Houston, Texas Panhandle, Sabine-Neches, and Oklahoma
City. Initial contacts with the associations mentioned above resulted
in enthusiastic response from the Professional Development Chairmen.
Eighty participants from the six associations played eight decisions
each. This participation provided the data from which conclusions
concerning the decision-making ability of purchasing executives were
drawn.
The results of the game as measured by earnings per share, ability to make capital equipment investments properly, sales forecasting, and other measurable factors are compared with the identifiable attributes collected from a questionnaire completed by the participant at the beginning of the game. In addition, during game play the participants were given a personality test in order to determine whether or not specific personality traits are related to the ability to make profitable decisions.

Significance of the Study

The measurement of characteristics of effective purchasing personnel has long been a major concern of the National Association of Purchasing Management. The growth in importance of the purchasing function in industrial organizations has provided the impetus for the same concern among corporate executives. The emphasis on decision-making ability of purchasing executives is directly related to the enlarged role of the purchasing executive in most industrial firms.

A search of purchasing literature in the form of books, articles, and unpublished dissertations reveals that this area of investigation has been virtually overlooked. It is felt that this study will add to and complement the body of knowledge that now exists.
implications of the predictive ability of probable success in purchasing management are far-reaching. In the past, purchasing managers have been selected almost entirely based on their success in other functional areas or their success in clerical-type purchasing jobs. The criteria for purchasing promotions has been, to say the least, limited.

Another significant aspect of this study centers around the inquiry into the need for a purchasing curriculum in colleges and universities. If this research reveals that academic background is an important variable in decision-making ability, it should bring to bear increased emphasis on higher education by the purchasing profession. This added interest could, in turn, prompt more active interest by the academic community in offering both basic and advanced courses in purchasing and related areas.

**Definition of Terms**

**Business Game.** Unfortunately use of the term "game" often connotes that the primary purpose of business games is entertainment of the participants rather than the more serious and valuable approach to executive development, education, and research. As used in this study this term refers to " . . . a sequential decision-making exercise structured around a model of a business
operation in which participants assume the role of managing the simulated operation."^9

Simulation. This term involves three basic components: an abstraction of an economic environment, a series of guidelines for manipulation of the economic environment, and a set of rules which govern the activity of the participants. 10 The literature dealing with business games is inconsistent in the use of the terms "simulation" and "games." Some authors use "simulation" in their writings to mean only the formal mathematical models which have been generated from real situations. Others use the two terms interchangeably. For purposes of this study, the terms "Business game," "Management game," and "Simulation" are synonymous.

General management game. This term refers to a game that is directed at the top management level of decision making where all functional areas of the firm are interrelated toward the achievement of basic organizational objectives. 11

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11 Graham and Gray, op. cit., p. 40.
**Functional game.** This term refers to a game that is aimed at the lower and middle-management levels of decision making where skills in one particular functional area are emphasized. However, a functional game may involve other functional areas.

**Interactive game.** If the decisions of one player or group of players affect the results achieved by other players, the game is said to be interactive.

**Non-interactive game.** When the game is designed so that the players' decisions do not affect the results of their opponents, the game is referred to as non-interactive. In non-interactive games the players make decisions based on a hypothetical demand for their product which is controlled by economic conditions rather than player strategy.

**Organization of the Study**

This study is organized into five chapters:

Chapter I develops the rationale for the study, states the hypotheses, gives the methodology, and defines some of the special terms associated with business games.

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12 Ibid., pp. 40-41.

13 Ibid., p. 41.
Chapter II contains a review of the literature concerning the development of business games for education and research, a review of the development of decision-making theory, and a brief analysis of research concerning the relationship between personality traits and decision-making ability. In addition, Chapter II traces the development of the purchasing profession from its beginnings as a mundane, clerical task to its position of importance in the top echelons of management in many firms today. Finally, this chapter presents, in summary form, the findings of some related studies.

Chapter III presents a detailed description of the research design and methodology. In addition, it presents profiles of the membership of the National Association of Purchasing Agents and the participants in this study respectively.

Chapter IV presents an analysis of the primary data collected in tabular and verbal form.

Chapter V presents the summary of findings, conclusions, and implications of the study.

**Summary**

The purchasing profession has undergone a major change during the past fifteen years. Major emphasis was placed on mundane clerical tasks in the early developmental stages of the
profession, but current emphasis is on the managerial decision-making aspect of the task. This study is intended to identify some of the attributes that are closely associated with successful decision-making ability of purchasing personnel. In order to accomplish this objective, purchasing personnel from a variety of industrial firms and backgrounds were asked to participate in a management game. Successful purchasing executives were identified from biographical data, and their results in the management game were compared to the results achieved by other purchasing personnel.

Chapter I presents the purpose, scope, and limitations of the present study. In addition, the hypotheses are stated. The hypotheses center around the idea that achieved success in purchasing is directly related to certain identifiable biographical and personality characteristics. The biographical questionnaires along with the results of a self-report personality inventory are the basis for comparison with the results achieved in the eight periods of play of the management game.

Chapter I also presents some definitions of terms employed in this research along with a brief description of the organization of the study. It is within this framework that the present study is developed.
CHAPTER II

BACKGROUND INVESTIGATION AND JUSTIFICATION OF THE STUDY

Introduction

Chapter II contains an overview of the literature concerning the development of business games for education and research, the development of management thought, and theory concerning the relationship between personality characteristics and managerial effectiveness. Other areas covered in Chapter II are the evolutionary move of the purchasing function from the bottom rung of the managerial hierarchy to near the top, and the findings of some related studies.

Origin of Business Games

Even though the use of games in business education and research is a fairly recent development, they are not new on the American scene. One of the early uses of simulation can be found in the use of war games during World War I. In these war games battle conditions were simulated and divisions of men were pitted against each other in an attempt to train soldiers how to react in real
war situations. In addition, strategies were tested in these games in order to secure experience that would have been extremely costly in terms of money and the lives of the soldiers engaged in conflict.

The 1940's and early 1950's saw the development of a game that was more than a game. It was an exercise in decision making. Should the players sell or not sell? Should they buy or not buy? The name of the game was "Monopoly." Not only did this game provide entertainment for its players, but it also provided valuable experience in dealing with money, real estate, and bartering techniques. Furthermore, this type of simulation laid the groundwork for more sophisticated applications of games for teaching as well as research.

The demand for realistic simulated exercises in management led the American Management Association (AMA) to introduce "Top Management Decision Simulation" in 1956. This business game was first used at Saranac Lake, New York, in 1957 with a group of business executives. Bellman notes that within a year of this introductory

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2 Franc M. Ricciardi and others, Top Management Decision Simulation (New York, 1957).
presentation a number of business games developed around the AMA model were used in various colleges and universities around the nation. 3 Less than a decade after the introduction of the AMA simulation, Klasson reported that more than two-thirds of the ninety responding major collegiate schools of business that he surveyed were experimenting with gaming techniques. 4 In a 1969 survey by Graham and Gray, 125 deans of schools of business were queried as to the use of business games in their schools. Of ninety-two respondents, over 91 per cent replied that they were using at least one game in their curricula and the majority indicated that they were using more than one game. 5

Another move toward the widespread use of business games has been the emergence of related fields such as operations research and the mathematical and statistical techniques surrounding game theory as developed by Von Neumann and Morgenstern. The history of game theory dates back to 1928, but Von Neumann's work went


The relationship between business gaming, game theory, and operations research is readily apparent. All three conceptual fields of theory are designed to aid the effective manager in his primary responsibility--decision making. However, these concepts serve only as tools to effective decision making. They are merely a means to an end rather than an end in itself.

**Development of Management Thought**

The field of decision-making theory has been the focal point for the study of business management during recent years. Simon views decision-making and management as synonymous terms.\footnote{Herbert Simon, \textit{The New Science of Management Decision} (New York, 1960), p. 1.}
Richards and Greenlaw elaborate on this point further in the following quotation.

Although we do not claim all management to be decision making, decision making does prove to be a highly useful focus for the analysis and study of management. Further, if one considers the entire decision-making process of gathering and processing information, making choices from among alternatives, and effectively communicating decisions made to other members of the organization, there is little managerial activity which could not be considered within a decision-making framework. 10

The Scientific Management School

Frederick W. Taylor, the father of scientific management, was one of the first and most significant contributors to the scientific management school of thought. Taylor showed through the application of his writings 11 that the work of management could be scientifically analyzed in order to arrive at better managerial decisions. 12 Since Taylor's initial work in the early 1900's, many academicians have followed, but the body of knowledge in the field of management is generally considered to be a twentieth-century phenomenon.


11 Taylor's most complete work is his Principles of Management (New York, 1911).

12 Harwood F. Merrill, Classics in Management (New York, 1960), pp. 82-113.
The Functional School

Taylor, as noted above, centered his attention upon managerial problems at the lower echelons of supervisory management. However, on the European front, Henri Fayol was busy developing management thought by concentrating on the upper-management levels. Fayol visualized the task of management as consisting of several distinct functions: planning, organizing, commanding, coordinating, and controlling. Richards and Greenlaw note that Fayol's work was based more upon generalizing from his experience as an industrial manager rather than upon the detailed research that characterized Taylor's work. Fayol's work gave rise to the functional or classical approach to management thought. Many contemporary management theorists have contributed and expanded on Fayol's functional approach. Some of the leading authors of management texts using this approach are Terry, Koontz and O'Donnell, and

14 Richards and Greenlaw, op. cit., p. 6.
15 George Terry, Principles of Management (Homewood, Illinois, 1953).
Sisk develops the idea that the functional approach is the logical step toward the systems approach to management, as illustrated in Figure 1.

The Human Relations School

The human relations school of management thought had its genesis in a number of experiments that were carried out at the Hawthorne Plant of the Western Electric Company in the 1920's. These experiments centered around determining, under controlled conditions, the effect of various physical conditions upon worker productivity. An example of one of these experiments is the now famous illumination experiment. This experiment revealed that productivity increased in direct relation to increased illumination. But the researchers were dismayed when they attempted to verify their findings by decreasing the illumination level. They discovered that the output continued to increase in spite of decreased illumination. This discovery led the researchers to the conclusion that social and human factors influence productivity, in many instances, to a greater degree than physical factors. ¹⁸


¹⁸ A detailed description of this experiment and others may be found in F. J. Roethlisberger and W. J. Dickson, Management and the Worker (Cambridge, 1950).
The findings of Elton Mayo and his research group in the 1920's added a new dimension to the study of management. A new wave of theorists began to direct their efforts in the area of behavioral sciences. Drucker expanded on the ideas of the Behaviorists in his classic work, *The Practice of Management*. In this book he introduced the concept of "management by objectives," in which involvement of the subordinate in decision making is an effective management tool. Some of the other major contributors to the school of human relations and behavioral science are Maslow, McGregor, Geller-mann, and many others.

**The Management Science School**

It is difficult to identify the precise beginning of the quantitative approach to management, but most writers agree that significant

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20 Ibid., p. 121.


inroads were made in this field prior to World War II. Sir Robert Watson-Watt, a British scientist, claims to have launched the first two Operations Research (OR) studies in 1937, when he recommended the use of OR to the United States Navy in 1942 for the purpose of minimizing losses from enemy submarines. Immediately after World War II the methods and techniques that were successfully applied by the military were adapted to business and industry on a wide front. Richards and Greenlaw observed that "many problems and sub-problems that theretofore have been subjected only to intuitive experience-based analysis came under mathematical probing and scrutiny" as a result of the management science era.

The Systems Approach to Management

Systems theory was first developed by a biologist, von Bertalanffy in 1951. His work developed into a general theory of systems, which he believed provided an integrating approach to the

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26 Richards and Greenlaw, op. cit., p. 8.

study and development of a wide range of disciplines. His feeling on this topic is shown when he wrote, "The notion of a system being defined as any arrangement or combination, as of parts or elements, in a whole applies to a cell, a human being, a society, as well as to an atom, a planet, or a galaxy." Boulding developed the general systems theory a step further by defining nine levels of systems, beginning with the simplest and most static and ending with the most complex and dynamic.

The systems approach represents a convergence of the previous schools of management thought discussed. Various definitions of the word "system" illustrate this point even further. For instance, Brown defines a system as "a group or complex of parts (such as people, machines, etc.) interrelated in their actions towards some goal." Johnson, Kast, and Rosenzweig state that a system is "an organized or complex whole; an assemblage or combination of things or parts forming a complex or unitary whole." It is

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28 Ibid., p. 303.


apparent that these systems theorists view the systems approach as a convergence of the previously discussed schools of management thought. This idea is developed in Figure 1, which illustrates the chronological development of the body of management knowledge.

Fig. 1. --Chronological Development of Management Thought.
In this section it was observed that the basic task of management is making decisions. Therefore, this brief review of the development of management thought is intended to expand on the idea that management and decision making are, in fact, synonymous terms.

**Personality Variables in Managerial Effectiveness**

Very little research was accomplished in the area of personality variables and their effect on decision-making ability prior to World War II. In the early 1940's, Lewin and his colleagues developed a theory of levels of aspiration in which they asserted that an individual's choice between alternatives was a function of that individual's aspirations. A more recent view of this Lewin-influenced point of view is echoed in Atkinson's model for risky decision making. He suggests that there are basically two types of people, those in whom motivation to achieve success is greater than that to avoid failure, and those in whom the reverse is true. He proposes on the basis of his findings that the relative

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strength of a motive influences the subjective probability of the
consequence consistent with that motive—i.e., biases it upwards.\textsuperscript{34}

Jung's theory of personality type was another attempt to rationalize human behavior.\textsuperscript{35}

According to Myers,

The gist of the theory is that much apparently random behavior is actually quite orderly and consistent, being due to certain basic differences in the way people prefer to use perception and judgment.

"Perception" is here understood to include the processes of becoming aware, of things or people or occurrences or ideas. "Judgment" is understood to include the processes of coming-to-conclusions about what has been perceived.\textsuperscript{36}

Based on this working hypothesis, Myers developed the \textbf{Myers-Briggs Type Indicator} (MBTI) in an attempt to ascertain people's basic preferences in regard to perception and judgment. She postulates that "the basic preferences relating to perception and judgment tend to affect people's interests, values and needs and consequently their motivations."\textsuperscript{37}

\begin{itemize}
  \item \textsuperscript{34} \textit{Ibid.}, p. 367.
  \item \textsuperscript{35} C. G. Jung, \textit{Psychological Types} (London, 1923).
  \item \textsuperscript{37} \textit{Ibid.}, p. 21.
\end{itemize}
Additional information concerning the Myers-Briggs Type Indicator and its relevance to the present study is presented in Chapter III under the heading "Selection of Personality Instrument."

**Personality Defined**

Even though it has received widespread treatment in the literature, the concept of personality is elusive. One reason for the evasive character of the term is that there appears to be as many definitions of the term as there are writers in the field. According to Hall and Lindzey, there are so many different conceptions of personality that "... personality is defined by the particular empirical concepts which are a part of the theory of personality employed by the observer."³⁸ Kleinmuntz observes that psychologists generally agree that "... the term 'personality' refers to the unique organization of factors which characterizes an individual and determines his pattern of interaction with the environment."³⁹

It is within this general framework that the present study is undertaken.


Although there are many definitions of personality, there appears to be a common thread running through all of them. Kimble and Garmezy have summarized the points most often included in definitions of personality. They state,

1. Personality is almost always defined in a way that includes a variety of traits, capacities, and abilities.

2. There is usually the suggestion that these traits are organized or integrated in some way.

3. Personality is commonly regarded as unique to the individual.

4. Personality is often regarded as affecting the relationship of the individual to others.

5. Personality is usually considered as fairly permanent and characteristic of the individual over an extended period of time.\(^{40}\)

The aforementioned points are embodied in the definition offered by these authors. They define personality as "... the unique organization of fairly permanent characteristics that set the individual apart from other individuals and, at the same time, determine how others respond to him."\(^{41}\)


\(^{41}\) Ibid., p. 89.
Allport defines personality as "... the dynamic organization within the individual of those psychophysical systems that determine his characteristic behavior and thought." The implication of this definition is that personality is changeable, yet sufficiently stable that it can be described and measured.

**Evolution of the Purchasing Function**

A brief review of the evolutionary development of management thought since 1900 closely parallels the development of the purchasing function in most industrial organizations. Heinritz and Farrell observe a four-stage developmental process in the purchasing function. Ammer traces the development of purchasing in a similar vein. In the embryonic stage of development purchasing is done by line foremen, department heads, or anyone who happens to need materials and supplies. Figure 2 illustrates the level in the management hierarchy where purchasing was accomplished.

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45 Heinritz and Farrell, op. cit., p. 16.
In this initial stage each foreman or department head was pretty much left to his own devices on matters of buying, inventory control, scheduling and other activities related to the purchasing function. There was no control of quality, quantity, or price as long as the foreman was doing a reasonably good job. Top management assumed that expertise in purchasing automatically accompanied the skills required to accomplish the other tasks of the foreman. This assumption was widely accepted at the turn of the century. However, modern
managers know that professional buyers trained in negotiating and skilled in determining the capabilities of potential suppliers, can do a far better job of buying than a foreman whose training and skills have been developed in the direction of using the raw materials or supplies once they have been acquired. 46

The second stage of development evolved as a result of rapid industrial expansion. Foremen were no longer able to handle the myriad of details. Therefore, functional assistants in the form of purchasing clerks were hired in order to shift some of the clerical responsibilities from the foreman to clerks who were typically young and untrained. 47 Figure 3 depicts the shifting of the clerical aspect of purchasing, but not the responsibility for its accomplishment. This movement of the mundane clerical activities of purchasing from the foreman to the purchasing assistant succeeded in relieving the foreman's time, but did little toward developing standardized purchasing procedures or allowing quantity discounts through grouping small orders.

Continued growth of industrial organizations gave rise to the third stage of development. It became increasingly apparent that

46 Ibid., p. 16.
47 Ibid., p. 17.
Purchasing remains at low level, but performed by an assistant.

Fig. 3. --Purchasing Function Moved to Assistants Under the Supervision of Foreman.

Economies could be realized through the use of staff specialists who were trained in the skills of negotiating, quality control, selecting the right source of supply, and securing the right price. Therefore, the purchasing function was moved up the organizational hierarchy to a position of relatively greater importance. Figure 4

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48 Ibid., p. 17.
illustrates the dramatic rise in the importance of purchasing in its third stage of development. This approach was so successful that it was adopted by a majority of the firms that were large enough to justify it. Heinritz and Farrell describe the advantages to this approach in the following quotation:

Fig. 4. --Purchasing Department Formed as a Staff Function under the Supervision of the Manufacturing Department.

With slightly more independence and authority, when purchasing is set up as a separate department, though still under the direction of the production manager and subject to his final decisions, the buying is
systematized for greater efficiency. Records are developed from the purchase orders as a guide to buying practice. Some elementary market studies may be implemented to take advantage of seasonal trends and market fluctuations. Requirements are consolidated for quantity purchase, and standardization may be introduced on a limited scale. A start is made toward the conscious development of more satisfactory vendor relationships. Competition may be stimulated by inviting competitive bids, and alternative sources of supply are established. Emergency requirements are less frequent.49

The fourth, and final, stage is characterized by truly centralized purchasing as a separate responsibility, independent of manufacturing jurisdiction. Figure 5 illustrates the purchasing function in its most developed stage. Mass production operations, large-scale corporate organization, and the increasing complexities of modern industrial and distribution techniques account largely for the growth in importance of the purchasing function.50

In addition to the advantages listed in the third stage of development, purchasing has policy-making authority and interdepartmental communications are improved. In this new role as a major functional area, purchasing is usually responsible for all of the functions related to the acquisition and movement of materials

49 Heinritz and Farrell, op. cit., p. 17.

50 Ibid., p. 18.
Fig. 5. -- Purchasing as a Major Functional Area in the Organization.

including inventory control, receiving and warehousing, inbound and outbound transportation, and other related areas.\textsuperscript{51}

The evolution of purchasing, like the evolution of management thought, has not occurred rapidly. The purchasing profession has evolved from mundane clerical work accomplished by untrained, unskilled purchasing assistants to a major functional responsibility of

\textsuperscript{51}Lee and Dobler, \textit{op. cit.}, p. 13.
many industrial concerns accomplished by responsible, decision-making executives. The graphic illustrations in Figures 2 through 5 show a dramatic rise in the importance of the purchasing function in many industrial organizations. But it should be emphasized that the movement from the lowest level of management to the top has taken place over a period of over seventy years. Furthermore, this illustration is not intended to imply that all industrial concerns have placed such a high degree of importance on the purchasing function.

Much of the purchasing literature has appeared on the contemporary scene in the past fifteen years. It was not until 1958 that the first complete reference work was published in the form of the *Purchasing Handbook*. 52 This book was revised and updated in 1966, 53 and is in the process of its second revision at the present time. Further proof of the proliferation of literature is evidenced by the "Bibliography of Purchasing Literature" released in 1965. 54 This twenty-six-page bibliography is replete with "How to" articles, such as "How to Analyze Capital Goods Purchase," "How to Figure

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Equipment Replacement," and "How to Buy and Sell Used Machinery. Conspicuous in its absence is any reference to articles or books that are directed at top management personnel. On the other hand, the 1969 Addendum to this publication lists an additional forty-eight pages of current articles, books, and reports that were not included in the preceding bibliography. In contrast to its predecessor, the updated bibliography lists twenty-three books, five reports, and twenty-one articles dealing with the subject of decision making alone.

This virtual explosion of current literature represents another indication that the purchasing function has become a major managerial responsibility in industrial concerns of virtually every size. It was the recognition of this importance that led to the present study.

55Ibid., p. 6.1.5.


57Ibid., pp. 6.1A-6.1A.9.
Related Studies

Studies Using Gaming Techniques

A search of the available literature in business gaming revealed several uses of business games to study the decision-making process. One such experiment is reported by Fife.\(^{58}\) This study dealt primarily with the effects of long-range planning on profitability. An important finding in this experiment was that the behavior patterns of the participants were "... surprisingly similar to real life patterns often observed."\(^{59}\) Another study using the Gordon Personal Profile and the Gordon Personal Inventory in conjunction with the Purdue Farm Supply Business Game revealed that it is "... feasible to select managers with some reasonable degree of success on the basis of a combination of tests and ratings by a panel on the basis of an interview."\(^{60}\)

Symonds found in his study that results of competitive business games were measurable and that variables could be controlled

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\(^{59}\) Ibid., p. 134.

\(^{60}\) E. M. Babb and L. M. Eisgruber, Management Games for Teaching and Research (Chicago, 1966), p. 150.
by the game administrator. Thorelli and Graves concluded that
business gaming is well suited to the study of market structure,
psychological attributes, and other variables affecting managerial
behavior.

Shubik reported in 1961 that the use of business games for
research purposes presented great possibilities, but that little
research had been reported at that time. Since 1961 literally
dozens of studies have been reported. One of the earliest psycholo-
gical studies using this technique is Phelan's study concerning risk-
taking behavior and its relationship to personality correlates.
Hoffman's study is an excellent example of the use of business games
in an attempt to develop strategy and the simplification of otherwise
limitless problems.

61 G. H. Symonds, "A Study of Management Behavior by Use
of Competitive Business Games," Management Science, XI, No. 1


63 M. Shubik, "Approaches to the Study of Decision-Making
Relevant to the Firm," Journal of Business, XXXIV, No. 2 (1961),
116.

64 J. G. Phelan, "An Exploration of Some Personality Corre-
lates to Business Risk-Taking Behavior," Journal of Psychology,
LIII, No. 2 (March, 1962), 281-287.

65 T. R. Hoffmann, "Programmed Heuristics and the Concept
of Par in Business Games," Behavioral Science, X, No. 3 (1965),
169-172.
A review of the Dissertation Abstract reveals that most of the unpublished doctoral dissertations dealing with business games as a research tool have appeared since 1962. Kurke's investigation in 1963 dealt with the effect of game environment and psychological variables in risk-taking situations. In addition, Des Jardins, Braasch, Haseley, Gray, and Keys among others, have each made contributions to the study of managerial behavior through use of the management game as a research vehicle for data collection.

Studies of Managerial Effectiveness

The literature is replete with books and articles dealing with identification of potential managerial talent through the use of many types of tests. These tests are designed to measure intelligence, aptitude, motor skills, personality traits, and many other variables. The idea of using tests as a management selection device is not a new

66 M.I. Kurke, op. cit.
68 J.M. Braasch, op. cit.
69 A.F. Haseley, op. cit.
70 C.F. Gray, op. cit.
71 J.B. Keys, op. cit.
one. Almost one-half century ago Beckman and Levine conducted an experiment in an attempt to evaluate the predictive ability of three tests: the Allport Ascendancy-Submission Test, the Laird Introversion-Extroversion Test, and a following directions test. They found that "... comparative scores for a group of supervisors and a group of employees without supervisory responsibility indicate that the Allport study may have considerable prognostic value but that extroversion as measured by means of the Laird inventory is not a factor in executive ability for non-selling positions." 

Ghiselli reviewed the literature in this area between 1920 and 1955. In this review he reports on over 150 studies that dealt with the use of tests as a selection criterion. One of the early studies by Henry deals with executive personality and probable business success. This study led Henry to conclude that

1. There is a personality configuration, a personality type, that makes the best executive.

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73 Ibid., p. 415.


75 W.E. Henry, Executive Personality and Job Success, American Management Association Personnel Service (1948), No. 120, pp. 3-13.
2. Where failure has occurred, it can be traced directly to certain personality characteristics.

3. The presence of certain personality characteristics is of as vital importance as the presence of certain intellectual characteristics.

4. The role of the executive in modern business has both its own rewards and its own punishments.

5. This personality configuration is a matter of long-time development. Parts of it have been in progress since childhood and in fact may depend upon what happened to them during their early years.

6. The successful utilization of this personality type depends to a large extent upon the nature of the social situation in which the executive finds himself.

This study revealed some of the more general personality traits of successful executives. In summary, these characteristics were (1) a desire for achievement, (2) an upward mobility drive, (3) a social mobility drive, (4) an inherent reliance upon himself as ultimate authority, and (5) extreme decisiveness. Henry used the projective technique in his study and relied primarily upon the Rorschach and Thematic Apperception Test.

Other studies have concentrated on more specific personality traits in their attempts to identify potential executive material. One such study was conducted by Rosen when he attempted to identify

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76 Ibid., p. 4.

77 Ibid., pp. 10-12.

78 Ibid., p. 13.
the executive personality. This study utilized projective as well as non-projective tests. The non-projective tests used were the Minnesota Multiphasic Personality Inventory, the Strong Vocational Interest Blank, and the Bernreuter Personality Inventory. Specific personality traits of successful executives revealed in the Rosen study were that the typical successful executive is "enormously" extroverted, he is characterized as a dichotomous thinker in that he visualizes situations as either good or bad, he has a strong dependence on the group, he is extremely optimistic and self-confident, he is practical as opposed to theoretical, and his responses are usually predictable. It is interesting to note the sharp contrast between the Rosen study and the Ghiselli study. Rosen found that the successful executive had a strong reliance upon the group, while Ghiselli found a strong tendency toward self-reliance.

A follow-up study to the aforementioned research by Huttner, Levy, Rosen, and Stopol revealed that an executive's effectiveness in a given situation can be predicted from test scores coupled with biographical information such as age. In addition, they found that

79 Ephraim H. Rosen, "The Executive Personality," Personnel, XXXVI (January-February, 1959), 8-20
80 Ibid., p. 10.
81 Ibid., pp. 10-14.
larger companies tend to have a distinct advantage over smaller
cOMPANIES in the selection of high-caliber executive potentials. 82

These findings are tested in the present research

Campbell, Dunnette, Lawler, and Weick reviewed the litera-
ture for the twenty-year period between 1950 and 1970. 83 Throughout
this treatise they argue that

... effective managerial behavior develops out of complex interactions between managers' personal traits, demands placed upon them by different job situa-
tions, and the educational feedback and reward systems developed by their organizations' policies and practices. 84

Lopez's recent work considers the impending shortage of managers and observes that outmoded methods of managerial identifi-
cation are inadequate. He encourages alternative methods such as assessment centers and simulations to meet the challenge of the present decade. 85


84 Ibid., p. 127.

There exists little unanimity among the behaviorists on the reliability of predictive devices concerning managerial performance. Korman's review led him to the conclusion that judgmental predictions seem to be more effective than psychometric predictors.  

On the other hand, Milner's study revealed that there was little correlation between recommendations by several consulting firms based on judgments and successful managerial behavior. He argues that judgmental approaches must be based on behavior which is, to a large degree, both predictable and measurable.  

An excellent review of the literature on personnel selection in general and specifically managerial selection appeared in the Annual Review of Psychology in 1972. This review covers the three-year period between 1968 and 1972. The reviewers expect

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89 Ibid., pp. 564-568.
... the emphasis on simple selection models to decrease in favor of a systems approach which will include, on a conceptual level at least, not only the subject's aptitudes, the nature of the organization's reward system, quality of supervision, etc. 90

During this search of the literature there was no study found that used purchasing personnel as the subjects for investigation. It is this discovery that provides the basis for the present study.

Summary

The present chapter consists of an overview of current literature concerning the development of business games for education and research. A brief review of the development of management thought from 1900 to the present is presented in an attempt to illustrate the point that "decision-making" and "management" are conceptually synonymous terms. In addition, theory concerning the relationship between personality characteristics and managerial effectiveness is presented. The concept of personality is vague due to the fact that there are differing opinions among psychologists as to the definition of personality.

Chapter II also presents a review of the literature concerning the evolution of purchasing from basic clerical tasks to a major functional responsibility in many industrial concerns.

90 Ibid., pp. 568-569.
Related studies are reviewed in this chapter according to two classifications. First, studies related to the use of gaming techniques are presented in an effort to demonstrate the idea that business and other gaming techniques represent a research technique that has received rather widespread acceptance during the past decade. The second group of related studies deals with the application of various psychological instruments that measure aptitude intelligence, and personal characteristics of managerial effectiveness.

Behaviorists appear to be divided on the question of predictive ability of psychological tests. One school of thought centers around the idea that judgmental predictors of success are more effective than psychometric predictors. On the other hand, there are those who believe that psychometric predictors are an essential complement to judgment concerning selecting potentially effective managers. It is hoped that the present study will shed some additional light on this controversy.
CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

Introduction

Chapter III explains the general way in which the present experimentation is developed and discusses the research tools and procedures utilized in the study. The initial section presents a detailed description of the method of securing participants and the results of the solicitation. In addition, a biographical profile of the membership of the National Association of Purchasing Agents (NAPA) is presented in comparison with a profile of the participants in this study. These profiles are presented in order to illustrate the degree of similarity between the two groups.

The next section describes the data collection method in detail. In addition, reviews of various types of management games and personality tests are presented in order to develop the rationale for selecting the principal research tools for this study.

The design and structure of the experimentation of this study involved four phases: (1) The securing of volunteers to participate in a management game and provide biographical and personality
information, (2) the identifying of a group of successful purchasing managers within the group of volunteers in an attempt to compare their decision inputs with the remainder of the participants, (3) the administration of a management game that was suitable for measurement of individual decision-making ability, and (4) the selection of a personality test that would identify various personality traits.

Selection of Volunteers

Because of the fact that the population of purchasing personnel is virtually unknown, it was felt that a professional development opportunity provided to purchasing personnel through their local professional organizations would generate sufficient interest to secure an adequate number of participants in the experiment. The enthusiastic reception of the management game by the Purchasing Association members verified this position. Table I indicates that 116 purchasing people volunteered to participate in the experiment. Of the 116 volunteers beginning the experiment, eighty completed the entire cycle including eight periods of play, furnishing biographical information, and taking a personality test. This completion rate represents 69 per cent of the participants who started. Some of the reasons given for failure to complete the exercise were illness, vacation, business pressures, and too much time required to play.
However, several of the participants simply "dropped out" without giving any explanation. It was not expected that there would be a 100 per cent completion rate among the participants. In fact, the completion rate of 69 per cent was surprisingly high considering the time required to participate actively in an experiment of this type.

Results of Solicitation

In an attempt to determine whether there were certain biographical traits that distinguished the participants who completed the game and those who withdrew, the analyses in Tables I through III were developed.

Table I indicates that volunteers in the under-thirty age group were considerably more prone to "dropping out" than those in the other age groups. However, it is interesting to note that the participants completing the exercise were more similar in age to the NAPA membership as a whole than the non-completing group.

There appears to be a slight bias toward the thirty to forty-nine year age groups, but this represents a tendency toward the median age of the participants as well as the membership of the NAPA.

Table II illustrates a marked tendency toward participants from larger firms being more likely to complete the entire data collection cycle than those from smaller companies. This finding is
### Table 1

**Comparison of Age Group of All Volunteers, Participants Completing, and Participants Withdrawing from Game**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>All Volunteers</th>
<th>Participants Completing</th>
<th>Participants Withdrawing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
<td>Number</td>
</tr>
<tr>
<td>Under 30</td>
<td>13</td>
<td>11.3</td>
<td>7</td>
</tr>
<tr>
<td>30-39</td>
<td>35</td>
<td>30.2</td>
<td>23</td>
</tr>
<tr>
<td>40-49</td>
<td>47</td>
<td>40.5</td>
<td>36</td>
</tr>
<tr>
<td>50 and over</td>
<td>21</td>
<td>18.0</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>116</td>
<td>100.0</td>
<td>80</td>
</tr>
</tbody>
</table>

especially significant in the light of the fact that some theorists believe that large companies are in a better position to attract good decision makers than their smaller competitors. However, the data presented in Table VI indicates that the participants who completed the exercise are very similar to the NAPA membership. Therefore, it is likely that the rigorous demands on the time of the participants caused the completing participants to be more similar
TABLE II

COMPARISON OF COMPANY SIZE OF ALL VOLUNTEERS, PARTICIPANTS COMPLETING, AND PARTICIPANTS WITHDRAWING FROM GAME

<table>
<thead>
<tr>
<th>Company Size Annual Sales (Dollars)</th>
<th>All Volunteers</th>
<th>Participants Completing</th>
<th>Participants Withdrawing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
<td>Number</td>
</tr>
<tr>
<td>Over 500 Million</td>
<td>8</td>
<td>6.9</td>
<td>7</td>
</tr>
<tr>
<td>100 to 500 Million</td>
<td>14</td>
<td>12.1</td>
<td>13</td>
</tr>
<tr>
<td>50 to 100 Million</td>
<td>11</td>
<td>9.5</td>
<td>9</td>
</tr>
<tr>
<td>10 to 50 Million</td>
<td>12</td>
<td>10.3</td>
<td>9</td>
</tr>
<tr>
<td>5 to 10 Million</td>
<td>8</td>
<td>6.9</td>
<td>3</td>
</tr>
<tr>
<td>Under 5 Million</td>
<td>26</td>
<td>22.4</td>
<td>13</td>
</tr>
<tr>
<td>No data Reported*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>116</td>
<td>100.0</td>
<td>80</td>
</tr>
</tbody>
</table>

*Note: No data was reported by 31.9 per cent of all volunteers on this question due to the fact that many represented governmental institutions and other organizations in which sales data are not appropriate or were not known.
in terms of the size of companies represented rather than more
dissimilar.

Table III indicates that higher levels of education among
the participants were directly related with higher completion rates.
However, the differences indicated in this Table would not appear
to be sufficiently significant to bias the results disproportionately.

TABLE III

COMPARISON OF EDUCATIONAL BACKGROUND OF ALL
VOLUNTEERS, PARTICIPANTS COMPLETING, AND
PARTICIPANTS WITHDRAWING FROM GAME

<table>
<thead>
<tr>
<th>Educational Background</th>
<th>All Volunteers</th>
<th>Participants Completing</th>
<th>Participants Withdrawing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
<td>Number</td>
</tr>
<tr>
<td>High School or Less</td>
<td>48</td>
<td>41.4</td>
<td>31</td>
</tr>
<tr>
<td>College Degree--Technical</td>
<td>15</td>
<td>12.9</td>
<td>11</td>
</tr>
<tr>
<td>College Degree--Non Technical</td>
<td>49</td>
<td>42.2</td>
<td>34</td>
</tr>
<tr>
<td>Graduate Degree</td>
<td>4</td>
<td>3.5</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>116</td>
<td>100.0</td>
<td>80</td>
</tr>
</tbody>
</table>
Profile of the NAPA Membership Compared with Profile of Game Participants

The present study utilizes a non-probability sample for two reasons. First, the population of purchasing personnel does not consist of a well-defined group. In fact, a diligent search of the purchasing literature revealed that there are no studies available that define this population. The second reason for using a non-probability sample is that the data collection method relied on volunteers from the six associations studied. The researcher had little control over the selection of volunteers. Non-probability samples, sometimes referred to as "judgment samples," "... may indeed yield good estimates and/or correct decisions, but with this type of sampling technique the investigator has no objective method for evaluating the accuracy of the sample." ¹

Freund and Williams state that "... there are many situations where, for practical reasons, investigators use judgment samples to gain needed information." ² They further point out that "... whenever elements of judgment enter in the selection of a sample, the evaluation of the 'goodness'

---


of estimates or decisions based on the sample is again largely a
matter of personal judgment."

Therefore, the profiles presented in Tables IV through VII
are developed in an attempt to illustrate that the participants in this
study represent a relatively good cross section of the purchasing
profession. As was pointed out in Chapter I, no claim is made that
the sample taken is statistically representative of the population.
However, the data in the accompanying tables demonstrate that there
is good reason to believe that the eighty participants do, in fact,
represent fairly the membership of the NAPA.

The information concerning the profile of membership of
the NAPA was taken from the most recent report of that organiza-
tion, and the profile of the participants is extrapolated from the
data provided by the individuals concerned.

Table IV indicates that 73.7 per cent of the participants
were between thirty and forty-nine years old. By comparison,
only 59.5 per cent of the NAPA survey respondents were in this age
range. Purchasing personnel under thirty years of age were twice
as prevalent in the study as they were among the membership. Only

\[3\] Ibid.

TABLE IV

COMPARISON OF AGE GROUP OF NAPA MEMBERS AND PARTICIPANTS

<table>
<thead>
<tr>
<th>Age Group</th>
<th>NAPA Members</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
</tr>
<tr>
<td>Under 30</td>
<td>414</td>
<td>4.4</td>
</tr>
<tr>
<td>30-39</td>
<td>2,148</td>
<td>22.7</td>
</tr>
<tr>
<td>40-49</td>
<td>3,483</td>
<td>36.8</td>
</tr>
<tr>
<td>Over 50</td>
<td>3,411</td>
<td>36.1</td>
</tr>
<tr>
<td>Total</td>
<td>9,456</td>
<td>100.0</td>
</tr>
</tbody>
</table>

17.5 per cent of the participants were over fifty years old, while 36.1 per cent of the membership were over the half-century mark. The average age of the participants was 42.1 years as opposed to an estimated average age of forty-six years for the membership. These data reflect the idea that the sample in the present study may have a slight bias toward somewhat younger purchasing personnel. However, the distribution by age group also indicates that a relatively good cross-section of different age groups is represented in the present study.

It is interesting to note that the participants represented in the study
are considerably more similar in age than the 116 volunteers described in Table I.

Table V illustrates that the study participants are considerably less experienced in purchasing than the membership. However,

**TABLE V**

**COMPARISON OF YEARS IN PURCHASING OF NAPA MEMBERSHIP AND PARTICIPANTS**

<table>
<thead>
<tr>
<th>Years of Experience</th>
<th>NAPA Members</th>
<th></th>
<th>Participants</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
<td>Number</td>
<td>Per Cent</td>
</tr>
<tr>
<td>5 or less</td>
<td>1,507</td>
<td>16.0</td>
<td>29</td>
<td>36.3</td>
</tr>
<tr>
<td>6 to 10</td>
<td>1,774</td>
<td>18.8</td>
<td>11</td>
<td>13.7</td>
</tr>
<tr>
<td>Over 10</td>
<td>6,157</td>
<td>65.2</td>
<td>40</td>
<td>50.0</td>
</tr>
<tr>
<td>Total</td>
<td>9,438</td>
<td>100.00</td>
<td>80</td>
<td>100.0</td>
</tr>
</tbody>
</table>

the participants indicated a total of 894 years' experience in purchasing for an average of over eleven years' experience per person.

Even though the participants indicated less experience than the NAPA membership, they appear to have sufficient experience to eliminate bias in the sample because of lack of experience in purchasing.
Table VI illustrates that the participants represent a wide cross-section of industry sizes. The percentages shown in Table VI indicate a surprising similarity between the membership and the study group. It may be noted that only fifty-four of the eighty participants provided information concerning sales volume for their firms. No data were reported by the remainder of the group because of the fact that many represented governmental institutions and other organizations in which sales data are not appropriate.

**TABLE VI**

**COMPARISON OF COMPANY SIZE OF NAPA MEMBERSHIP AND PARTICIPANTS**

| Company Size Annual Sales (Dollars) | NAPA Members | | Participants |
|-------------------------------------|--------------|--------------|
|                                     | Number | Per Cent | Number | Per Cent |
| Over 500 Million                    | 1,389  | 15.7      | 7      | 13.0      |
| 100 to 500 Million                 | 1,820  | 20.6      | 13     | 24.0      |
| 50 to 100 Million                  | 1,553  | 17.6      | 9      | 16.7      |
| 10 to 50 Million                   | 1,107  | 12.5      | 9      | 16.7      |
| 5 to 10 Million                    | 892    | 10.1      | 3      | 5.6       |
| Under 5 Million                    | 2,067  | 23.5      | 13     | 24.0      |
| **Total**                          | 8,828  | 100.0     | 54     | 100.0     |
The data provided in Table VII indicate that a considerably higher percentage of the participants hold bachelor's degrees in both technical and non-technical fields. On the other hand, 13.4 per cent of the membership compared to only 5 per cent of the study group stated that they held graduate degrees. Two possibilities are apparent concerning the discrepancy between the two groups. Either the study tended to attract a somewhat higher educated individual, or during the five-year interval between the two sources a shift to preference for college degrees among employers has taken place. The
latter alternative seems highly likely. Nevertheless, the study reflects sufficient mixture of academic backgrounds to theorize that little, if any, bias is present with regard to educational background of the study group.

Over twenty-five different industries were represented by the participants. Chemical and Petroleum firms were represented by 12.5 per cent of the group. Other industries represented were the following:

<table>
<thead>
<tr>
<th>Industry</th>
<th>Number</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilities</td>
<td>7</td>
<td>8.8</td>
</tr>
<tr>
<td>Metal Fabricators</td>
<td>7</td>
<td>8.8</td>
</tr>
<tr>
<td>Electronics</td>
<td>5</td>
<td>6.3</td>
</tr>
<tr>
<td>Federal and Local Governments</td>
<td>5</td>
<td>6.3</td>
</tr>
<tr>
<td>Paper</td>
<td>5</td>
<td>6.3</td>
</tr>
<tr>
<td>Aircraft</td>
<td>4</td>
<td>5.0</td>
</tr>
<tr>
<td>Miscellaneous Manufacturers</td>
<td>4</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Industries represented by fewer than four persons included Medical and Health Services, Insurance, Food Processors and Distributors, Rubber and Plastic Products, Wholesale and Retail Distributors, Printers and Publishers, Construction, Commercial Fasteners, Public Wharves, and Education.
In summary, the study participants represent a relatively good cross-section of purchasing personnel with regard to age, experience in purchasing, company size, educational background, and type of industry. Therefore, based on the profile presented in this section, the sample is judged to be reasonably free of bias for the purpose of drawing conclusions concerning the decision-making ability of the participants as measured by the results achieved in the business game.

**Data Collection Method**

In order to introduce the idea of a management game to the local purchasing associations, the researcher contacted the District Professional Development Chairman, Mr. Jay Hughes, and requested his recommendations concerning local Professional Development Chairmen who might be interested in cooperating in a study of this nature. Mr. Hughes provided the names of all Professional Development Chairmen in his district and recommended six associations which had chairmen who were extremely interested in unique professional development activities. The six associations recommended were Dallas, Fort Worth, Oklahoma City, the Texas Panhandle (Amarillo), Houston, and Sabine-Neches (Beaumont).
Each of the aforementioned associations were contacted by letter, an example of which may be seen in Appendix A. In turn, follow-up telephone and personal contact was made with the Professional Development Chairmen of the organizations. In each case the Chairman was both receptive and enthusiastic about his association's participation in this study. Appointments were made to present the membership of the associations an outline of the experiment at a regular meeting. Members were requested to meet with the researcher following the meeting for a more detailed explanation of the management game that they were to play.

At the meeting of the participants each volunteer was provided with a packet of materials which included the following items:

1. Condensed operating instructions on the details of game play consisting of twelve pages which were condensed from Greenlaw and Frey's 200-page manual.\(^5\) (Appendix B.)

2. A personal and professional data questionnaire which provided the basis for the biographical information presented in this study. (Appendix C.)

3. A computer printout of an income statement showing the results of the first period decision. (Appendix D.)

\(^5\) Greenlaw and Frey, op. cit.
4. A computer printout of a position statement indicating the financial position of the hypothetical firm at the end of period one. (Appendix E.)

5. Supplemental information which provided the participant with information needed for making subsequent decisions. (Appendix F.)

6. A blank decision form for making the period two decision. (Appendix G.)

7. A self-addressed envelope for returning the decision once it was made.

The participants were given verbal instructions concerning the use of the packets issued to them. In addition, all participants were given the opportunity to discuss any facet of the game that they wished, and they were encouraged to ask questions concerning the game. After this initial personal contact with the participants, all subsequent communication was by mail with occasional telephone contact when decisions were late or when additional information was sought.

In addition to the participant's results from period eight, a letter was mailed explaining the Myers-Briggs Type Indicator along with the test booklet and answer sheet. Each participant was asked to read the instructions and complete the answer sheet and to return
it with their period-nine decision. A sample of this letter is included in Appendix H. Of the eighty-four personality test booklets issued, a surprising response of eighty answer sheets were completed and returned.

Following the personality test return, two additional communiques were sent to the participants. An acknowledgement letter was sent to the eighty participants thanking them for their participation and advising them of their ranking based on adjusted equity per share. A sample of this communication is included in Appendix I. The last written communication was sent to the participants after all six groups had completed the entire data collection cycle. This letter was written response to many requests for the individual results on the personality test. A sample of this letter is included in Appendix J.

Identification of Most Successful Purchasing Managers

The term "successful," like the term "personality," is virtually impossible to define. Success is not an absolute in the sense that an individual is either successful or not successful. There are, however, degrees of success. The purpose of this section is to describe the criteria used to identify the twenty most successful purchasing managers among the eighty volunteers who completed all
phases of the experiment. The following criteria were used to identify the twenty most successful purchasing managers.

1. Only those participants who indicated that they were the top purchasing person in their organization were considered. However, there were fifty-one respondents who qualified under this requirement.

2. Among the fifty-one top purchasing managers considered, thirty-one were in the salary range of $14,000 per year or more. Therefore, salary was considered in the process of identifying the twenty most successful managers. There were six top managers in the $20,000 to $25,000 salary range, seven in the $17,000 to $20,000 range, and twenty-two in the $14,000 to $17,000 range. The thirteen managers in the two top salary ranges were accepted in the group of twenty most successful participants.

3. The remaining seven managers were selected from the twenty-two managers in the $14,000 to $17,000 salary range based on the size of the firm they represented. There were five participants representing firms with sales in excess of $100 million per year, and two top purchasing men with Federal governmental agencies. Therefore, these seven managers were accepted to complete the identification of the twenty most successful purchasing managers.
Data concerning the results achieved by this group of members are analyzed in Chapter IV in an attempt to compare the characteristics of these managers with the remaining purchasing personnel who completed the game. This step in the study was undertaken in an attempt either to prove or disprove Hypothesis I which states that there is a direct relationship between achieved success in purchasing management and certain identifiable characteristics.

Selection of a Management Game

The list of available business games is so long that it becomes an ominous task to select a game for an experiment of this nature. Greenlaw, Herron, and Rawdon summarized eighty-nine different games that were in use in 1962. McGraith and Goldner presented a survey of marketing games that were in use at about the same time. A more recent survey in the Business Games Handbook describes over one hundred examples of the various types of games available. This section reviews the various types of business games

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8 Graham and Gray, op. cit., pp. 9-16.
and develops the rationale for selecting the game that was ultimately used in this study.

**General Management vs. Functional Games**

The general management games, often referred to as "total enterprise" games, are directed at the top management level. These games require that the participant interrelate all functional areas of the firm toward the achievement of the fundamental objectives of the total enterprise. On the other hand, the functional game is directed toward the lower and middle-management levels and involves the participant in a decision-making exercise aimed at the measurement of specific skills in a limited number of functional areas.

It was decided that the functional game would be more appropriate than the general management game because of the fact that most of the participants were from the lower and middle echelons of management. It was further decided that a game designed specifically for purchasing people such as "The Buying Game," ⁹ or "The Materials Inventory Management Game" ¹⁰ would not be suitable for this study since these games would tend to measure only those purchasing skills that are a function of experience in the specific area

⁹Ibid., p. 271.

¹⁰Ibid., p. 325.
mentioned. Instead, it was felt that a functional game that incorporated decision-making skills in areas other than purchasing would yield more realistic data.

Identification of Product

Some games are so specific as to attempt to simulate the environment in which a particular firm markets specific products. Others are more general and do not identify the products sold nor the industry in which the products are marketed. It was felt that the management game selected should be one in which the participants were basing their operating decisions on an unnamed, unidentified product. This precaution was taken in order to prevent bias of the data resulting from some participants drawing upon their previous purchasing experience in a particular market or industry.

Interactive vs. Non-interactive Games

An interactive business game is designed so that the decisions of one player or group of players affect the results achieved by the other players. For example, if one player prices his product lower than another, he receives a larger share of the market than the decision maker who prices his product higher. The non-interactive

Babb and Eisgruber, op. cit., p. 18.
game, however, involves each player or team of players basing their decisions on a hypothetical demand for the product with each participant selling at the same price. Because of the nature of this study, it was impossible to employ the use of an interactive game. The problems arising from players withdrawing from the game after making one or more decisions would have operated to the detriment of the remaining players. Therefore, a non-interactive game was used in order to cope with this problem.

**Group vs. Individual Players**

Many games involve the organization of management teams to prepare decision inputs for the periods of play. Although this approach is logical for the study of leadership ability, it does not lend itself to studying individual decision-making ability. The team-management approach creates the problem of isolating the contribution of individual members of the team. An attempt was made to overcome this problem by administering a game so that each participant was responsible for his own firm.

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Scoring Methods

Business games are designed to that decisions may be processed on computers or hand scored. Because of the large number of players it was felt that a game designed for computer processed results would enable faster return of decision results and help to maintain the interest of the participants throughout the entire cycle of the game.

Game Selection Criteria

For the reasons cited above, it was decided that the management game used in this study should be a functional game using unnamed and unidentified products. Furthermore, the game should be non-interactive, designed for individual participation, and computer scored. One of the games reviewed that meets all of the aforementioned criteria is Greenlaw and Frey's "Finansim." This game was selected for use in this study over other games meeting the same criteria because the financial aspects of the game are closely related to the purchasing problems presented to most purchasing people, yet it was not felt that the decisions required of the participants would duplicate those of the participants' job requirements. The areas of

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13 Babb and Eisgruber, op. cit., p. 20.
14 Greenlaw and Frey, op. cit.
decision making in the "Finansim" game are discussed in Chapter I under the section entitled "Use of a Management Game for Research."

Selection of Personality Instrument

It was noted in Chapter II that the term "personality" eludes precise definition because of the fact that there exists little agreement among psychologists as to the specific traits that are included in an individual's personality. If personality is difficult to define, then the measurement of personality is equally difficult. Anastasi notes that "... the number of available personality tests runs into the hundreds." The Sixth Mental Measurements Yearbook describes 196 personality tests and many other tests have been designed by individual companies and consulting firms. The purpose of this section is to review some of the various types of personality tests available and present the rationale for selecting the Myers-Briggs Type Indicator (MBTI) for this study.

Most authors tend to classify personality tests into two broad categories. The first category is projective tests and the second is non-projective or self-report tests. Both types of personality tests


have their advantages and disadvantages. Therefore, a brief review
of these types and a discussion of the arguments for and against them
is presented in order to develop the rationale for selecting the MBTI
as a research tool for the present investigation.

Projective Tests

According to Gleser, projective personality testing tech-
niques are

... those techniques which encourage a wide variety
of complex responses, presumably determined primar-
ily by the private feelings and attitudes of the subject,
and hence revealing something of his underlying psycho-
dynamics. The term is applied to a wide range of tech-
niques, differing as to type of stimulus presented, method
of administration, degree of structuring of the task,
and nature of response.17

One of the more familiar and most widely used projective
tests is the Rorschach Ink Blot Test.18 The basic rationale of the
Rorschach method is summarized by Klopfer and Kelley in the
following quotation:

The Rorschach method offers a procedure through
which the individual is induced to reveal his "private
world" by telling what he "sees" in the several cards
upon which he may project his meanings, significance,

17G. C. Gleser, "Projective Metholologies," Annual
Review of Psychology, XIV (1963), 391.

18Samuel J. Beek, Rorschach's Test, Vol. I (New York,
Grune and Stratton, 1944).
and feelings, just because they are not socially standardized objects or situations to which he must give culturally prescribed responses. . . . It is just because a subject is not aware of what he is telling and has no cultural norms behind which to hide himself, that the Rorschach and other projective methods are so revealing. 19

Other projective techniques include the Thematic Apperception Test, 20 various word association tests such as the Kent-Rosanoff test, 21 and several sentence completion tests such as the Sentence Completion Test developed by Rohde. 22

The usual argument favoring the use of a projective technique centers around the idea that "... a person's responses to the ambiguous stimuli (such as ink blots) common to them will reveal more fully his underlying personality dynamics, thereby providing an experienced interpreter with much richer content for deriving behavioral inferences." 23


23 Campbell, Dunnette, Lawler, and Weick, op. cit., p. 134.
However, projective testing techniques are not without their disadvantages. Henry observed that these techniques are heavily dependent upon clinical interpretation. \textsuperscript{24} Anastasi points out that lack of objectivity, lack of normative data, inadequate scorer reliability, and inconclusive validation studies are major disadvantages to projective testing techniques. \textsuperscript{25}

**Non-Projective Tests**

Non-projective tests, sometimes referred to as "self-report tests," consist of a series of objective statements or questions in which the subject is asked to indicate whether certain statements apply to him. Kleinmuntz describes the self-report technique as a standardized interview. However, "... instead of interviewing each person individually, the questions or statements of an inventory are printed in a booklet and administered to a group of subjects simultaneously." \textsuperscript{26}

The initial self-report inventory was developed by Woodworth in 1920. \textsuperscript{27} This prototype was the \textbf{Woodworth Personal Data Sheet} (Chicago: Stoelting, 1920).

\textsuperscript{24} Henry, \textit{op. cit.}, p. 13.

\textsuperscript{25} Anastasi, \textit{op. cit.}, pp. 509-415.

\textsuperscript{26} Kleinmuntz, \textit{op. cit.}, p. 183.

\textsuperscript{27} R.S. Woodworth, \textbf{Personal Data Sheet} (Chicago: Stoelting, 1920).
Sheet and it was basically an attempt to adapt psychiatric interviewing to mass testing. This test was "... designed to identify soldiers emotionally unsuited for combat" during World War I. Many tests have been developed since this forerunner. A brief review of a few of the more popular tests is presented in order to illustrate some of the considerations involved in selecting a test for a study of this nature.

The Minnesota Multiphasic Personality Inventory (MMPI).--

The MMPI was first developed to "assay those traits that are commonly characteristic of disabling psychological abnormality." The MMPI was designed for adults from about sixteen years of age upward, although it has been used successfully with younger adolescents.

The MMPI provides scores on ten scales as shown below:

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28 Kleinmuntz, op. cit., p. 184.


30 Anastasi, op. cit., p. 441.
1. Hypochondriasis
2. Depression
3. Hysteria
4. Psychopathic deviate
5. Masculinity-Femininity
6. Paranoia
7. Psychasthenia
8. Schizophrenia
9. Hypomania
10. Social introversion.

According to Sundberg, the MMPI is by far the most popular self-report test in use. Anastasi verifies this position when she says, "... over 1,500 references have been published about this test." However, because of the extremely long time required to complete the questionnaire and because of the fact that some of the questions are "pruriently snooping," it was decided that the MMPI would not be well suited to this particular study. In addition, it was felt that an inventory developed for normal subjects rather than for mentally ill subjects would be better received.

31 Ibid., p. 442.
33 Anastasi, op. cit., p. 441.
34 Kleinmuntz, op. cit., p. 216.
The Guilford-Zimmerman Temperament Survey (GZTS).---
The GZTS\(^{35}\) is a self-report inventory developed by Guilford and his associates in an attempt "... to arrive at a systematic classification of personality traits."\(^{36}\) This inventory provides ten separate scores with each score being based on thirty different items. The traits being scored are:

G. **General Activity**: Hurrying, liking for speed, liveliness, vitality, production, efficiency vs. slow and deliberate, easily fatigued, inefficient.

H. **Restraint**: Serious-minded, deliberate, persistent vs. carefree, impulsive, excitement-loving.

A. **Ascendance**: Self-defense, leadership, speaking in public, bluffing vs. submissiveness, hesitation, avoiding conspicuousness.

S. **Sociability**: Having many friends, seeking social contacts and limelight vs. few friends and shyness.

E. **Emotional Stability**: Evenness of moods, optimistic, composure vs. fluctuation of moods, pessimism, daydreaming, excitability, feelings of built, worry, loneliness, and ill health.

O. **Objectivity**: Thick-skinned versus hypersensitive, self-centered, suspicious, having ideas of reference, getting into trouble.

F. **Friendliness**: Toleration of hostile action, acceptance of domination, respect for others vs. belligerence, hostility, resentment, desire to dominate, and contempt for others.

\(^{35}\) Anastasi, *op. cit.*, p. 449.

\(^{36}\) Ibid.
T. Thoughtfulness: Reflective, observing of self and others, mental poise, vs. interest in overt activity and mental disconcertedness.

P. Personal Relations: Tolerance of people, faith in social institutions vs. fault-finding, critical of institutions, suspicious, self-pitying.

M. Masculinity: Interest in masculine activities, not easily disgusted, hard-boiled, inhibits emotional expression, little interest in cloths and style vs. interest in feminine activities and vocations, easily disgusted, fearful, romantic, emotionally expressive.  

The GZTS consists of three hundred affirmative-statement items, and the respondent is asked to mark "Yes" or "No" as an indication of his agreement or disagreement with the statements.  

"Generally, the GZTS has been found most valid and useful with normal people . . ." as opposed to psychiatric patients in industry and schools. Kleinmuntz cites examples of distinct scoring patterns that characterize male and female librarians, student nurses, engineers, and teachers. However, validation studies of purchasing personnel were not reported by any of the researchers studied.

37 Anastasi, op. cit., p. 449.
38 Kleinmuntz, op. cit., p. 196.
39 Ibid., p. 198.
40 Ibid.
The GZTS was not selected as a research vehicle for this study because of the fact that the three-hundred-item questionnaire would have required an excessive amount of the participants' time. In addition, it was deemed advisable to select a personality inventory that would attempt to measure the degree of intuitive judgment that is used by the decision maker. No such trait measurement exists in the GZTS.

The Edwards Personal Preference Schedule (EPPS).—The EPPS is based on the personality "needs" developed by Murray. Edwards developed his test by representing each of the fifteen needs postulated by Murray with nine items. The items for each need are paired with items from other needs resulting in 210 pairs of items. Anastasi credits the EPPS with being "... the most comprehensive inventory designed to assess the strength of such needs. ..." Kleinmuntz, likewise, says that the EPPS "... holds promise for use among non-psychiatric groups." However, critics such as

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43 Anastasi, *op. cit.*., p. 452.

44 Kleinmuntz, *op. cit.*., p. 204.
Bordin basically agree that the inventory lacks evidence for its validity.

Nevertheless the EPPS has generated considerable interest since its inception. One of the reasons for the interest generated is that it not only provides scores for each need, but it also provides a consistency score which measures agreement in responses on fifteen pairs of items that are identical. In addition, a profile stability score is provided which indicates the correlation between the score profiles for both halves of the inventory. The EPPS was not used in the present study for two reasons. First, many of the items are extremely personal in nature and it was felt that the test might be considered offensive to some of the participants in the study. The second reason for rejection was because of the fact that the normative data were primarily based on college men and college women rather than on managers.

The Myers-Briggs Type Indicator (MBTI). As was pointed out in Chapter II, the MBTI was developed in an attempt to ascertain

46 Kleinmuntz, op. cit., p. 203.
47 Ibid., p. 201.
people's basic preferences in regard to perception and judgment.

This self-report inventory consists of 166 affirmative statements which the subject is asked to respond to by marking his choice on an answer sheet. Examples of questions are as follows:

1. Does following a schedule
   (A) appeal to you
   (B) cramp you

2. Do you usually get on better with
   (A) imaginative people
   (B) realistic people. 48

The respondent is asked to indicate the choice which appeals to him most in each of the 166 items. The test requires approximately forty-five minutes to complete and is self-administered through directions provided with the test booklet.

The respondent is classified into dichotomous type categories according to four major preferences as follows:

<table>
<thead>
<tr>
<th>Index</th>
<th>Preference as between</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI.</td>
<td>Extroversion or Introversion</td>
</tr>
<tr>
<td>SN.</td>
<td>Sensing or Intuition</td>
</tr>
<tr>
<td>TF.</td>
<td>Thinking or Feeling</td>
</tr>
<tr>
<td>JP.</td>
<td>Judgment or Perception 49</td>
</tr>
</tbody>
</table>


The EI index is designed to reflect whether the individual is an extrovert or an introvert. If he is an extrovert, he tends to focus his perception and judgment upon people and things. The introvert is oriented primarily to the inner world and therefore tends to focus his perception and judgment upon concepts and ideas. 50

The SN index is designed to reflect the individual's preference as between two opposite ways of perceiving, i.e., whether he relies primarily on the familiar process of sensing, by which he is made aware of things directly through one or another of his five senses, or primarily on the less obvious process of intuition, which is understood as indirect perception by way of the unconscious, with the emphasis on ideas or associations which the unconscious tacks on to the outside things perceived. 51

The TF index is designed to indicate the individual's preference between two opposite ways of judging. For example, does he judge through thinking impersonally or primarily upon feelings through an appreciation of personal and interpersonal values? 52

The JP index is designed to measure whether a person deals with the outer world primarily in terms of an "... evaluative,

50 Ibid., p. 1.
51 Ibid., p. 2.
52 Ibid.
judgmental attitude or in terms of an understanding and perceptive attitude."

Concerning the degree of validity, Mendelsohn observes that the MBTI was first developed in 1943 and "... since it was originally developed more than twenty years ago and has undergone several revisions, an unusually large body of reliability and validity data is available for the instrument." Likewise, Sundberg states that

The Myers-Briggs Type Indicator will undoubtedly arouse much interest among psychologists for the following reasons: (a) it is easy to administer and score; (b) it provides scores on variables which are important to both theory and common sense; (c) there is evidence of its relationship to some matters of great practical concern in the 1960's, e.g., creativity, achievement, and success at certain jobs.

Advantages and Disadvantages of Self-Report Tests

Self-report inventories in general have received both acclaim and criticism concerning their use in measuring personality.

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Cattell, one of the severest critics, observes that systematic errors in self-report inventories arise from

1. lack of self-knowledge on the part of the subjects

2. distortion of responses by such factors as dishonesty, carelessness, or ulterior motivation generally in the test situation;

3. lack of any true measurement continuum in which normative measure could be set up . . . ;

4. . . . lack of understanding, in the least intelligent quarter of the population, of what the questions and words mean. 56

On the other hand, proponents of self-report inventories argue that the uniformity of instructions and questions lend themselves to a greater degree of accuracy than projective techniques. 57

In the case of the present study, it was decided that the most practical method of measuring personality would be through the use of a self-report inventory. It was decided that the inventory should be (1) short enough to keep the participants interested; (2) designed for normal subjects rather than for psychiatric patients; (3) free of questions of a highly personal nature; and (4) designed for use with business people rather than with college students. Of the


57 Kleinmuntz, op. cit., p. 183.
tests investigated, only the Myers-Briggs Type Indicator met all four of the criteria listed above. It is acknowledged that the MBTI has its limitations as do all personality tests. However, for purposes of this study, it appeared to be the best choice.

Summary

Chapter III describes the design and method of the present study. The design and method employed in this research involved the following steps: (1) securing of volunteers, (2) identifying a group of successful purchasing managers within the group of volunteers, (3) selecting and administering a management game, and (4) selecting and administering a personality test.

The step involving the securing of volunteers was accomplished by working with the Professional Development Chairmen from selected local chapters of the National Association of Purchasing Management. Because of the problems involved concerning working with participants over a two-month continuing cycle, an analysis of the profiles of participants completing as opposed to withdrawing from the game is provided. In addition, those participants who completed the entire cycle were compared with a profile of the membership of the NAPA. This analysis was provided in order to

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58 Myers, op. cit., p. 77.
demonstrate the degree of similarity between the study group and the total membership.

This chapter also provides the rationale for selecting the twenty most successful purchasing managers participating in the study. This step was necessary in order either to prove or disprove the idea that there is a direct relationship between achieved success in purchasing management and effective decision-making ability.

Step three was accomplished by reviewing the various types of management games and developing criteria for the selection of a game to be administered in this study. Based on the information provided from this analysis, Greenlaw and Frey's "Finansim" was selected and administered.

The selection and administration of a personality test was accomplished by reviewing several personality measurement instruments in an attempt to select a test that could be administered by mail, and measure the desired attributes for this study. As a result of this search, the Myers-Briggs Type Indicator was selected. The principal research tools of this study were the "Finansim" game and the Myers-Briggs Type Indicator.
CHAPTER IV

PRESENTATION AND ANALYSIS OF THE DATA

Introduction

Chapter IV presents the results of the research and relates these results to the hypotheses. A detailed analysis of selected biographical and personality traits of the twenty most successful purchasing executives is compared to the same traits of the sixty remaining participants. This comparison is made in order either to prove or disprove Hypothesis I which states that there is a direct relationship between achieved success in purchasing management and certain identifiable characteristics.

In addition, a comparative analysis of the results achieved in the "Finansim" game is presented in an attempt either to prove or to disprove Hypothesis II which states that there are identifiable personal characteristics that are directly related to decision-making ability. This hypothesis is tested by dividing the game results into quartiles and statistically comparing the biographical and personality characteristics of the four groups.
The comparison between the twenty purchasing executives who have achieved a greater degree of success in their professional field and the remaining sixty participants is accomplished through the use of statistical inference in which a test for significant difference between two percentages is used.

The analysis of game results is performed through the use of analysis of variance. Each of the variables is analyzed by quartiles developed according to the game results. In addition several of the variables are analyzed through the use of a two-way test in an attempt to determine if there is significant interaction between them.

**Difference Between Two Percentages**

In testing the hypothesis that two samples were drawn from the same population or from different populations, it is necessary to perform a test for significance of the difference between the two sample percentages. The formula for accomplishing this test is

\[
\hat{p} = \frac{a_1 + a_2}{n_1 + n_2} \cdot 100
\]

where \( \hat{p} \) is the average of the two sample percentages,

\( a_1 \) is the number of successes in the sample,

\( n_1 \) is the number of failures in the sample,

\( n_2 \) is the number of failures in the sample.

^1 Richmond, *op. cit.*, pp. 205-207.
$a_2$ is the number of successes in the second sample,

$n_1$ is the population of the first sample, and

$n_2$ is the population of the second sample.

The first step, as described above, determines the average of the two sample percentages. The $\hat{p}$ is used in order to arrive at the estimated standard error of the difference between the two sample percentages ($Sp_1 - p_2$).

$$Sp_1 - p_2 = \sqrt{\hat{p}(100 - \hat{p}) \left( \frac{n_1 + n_2}{n_1 n_2} \right)}$$

Therefore,

$$Z = \frac{P_1 - P_2}{Sp_1 - p_2}$$

where $Z$ is the standard normal deviation,

$P_1$ is the percentage of the first sample, and

$P_2$ is the percentage of the second sample.

The above formula is used in Tables VIII through XIII in an attempt to determine whether there is a significant difference between the samples at the .05 significance level. This generally accepted level of significance indicates that in a normal distribution, 95 per cent of the sample means will fall within 1.96 standard errors of the
true mean. Therefore, a $Z$ value of 1.96 represents the .05 significance level. If the $Z$ value is greater than 1.96, the samples are judged to be from different populations. On the other hand, if the $Z$ value is less than 1.96, it is determined that no significant difference exists between the two samples, or the two samples are taken from the same population.

Comparison of Successful Participants and Remaining Group

Hypothesis I states that success in purchasing management is directly related to identifiable characteristics such as educational background, purchasing experience, size of company, age, and certain dominant personality traits. In order to test this hypothesis, the twenty purchasing executives that had demonstrated the most achieved success in their professional field were compared with the remaining sixty participants concerning the aforementioned characteristics. The data contained in Tables VIII through XIII illustrate the degree to which this hypothesis is accepted.

Educational Background

Table VIII is a comparison of the educational background of the most successful purchasing executives and the remaining group. This table indicates that there is a significant difference at the .05 significance level between the two groups with regard to a college
TABLE VIII

COMPARISON OF EDUCATIONAL BACKGROUND OF ALL PARTICIPANTS, TWENTY MOST SUCCESSFUL AND REMAINING PARTICIPANTS

<table>
<thead>
<tr>
<th>Educational Background</th>
<th>All Participants</th>
<th>Twenty Most Successful</th>
<th>Remaining Group</th>
<th>Z Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
<td>Number</td>
<td>Per Cent</td>
</tr>
<tr>
<td>High School or Less</td>
<td>31</td>
<td>41.4</td>
<td>4</td>
<td>20.0</td>
</tr>
<tr>
<td>College Degree -</td>
<td>11</td>
<td>12.9</td>
<td>7</td>
<td>35.0</td>
</tr>
<tr>
<td>Technical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College Degree -</td>
<td>34</td>
<td>42.2</td>
<td>8</td>
<td>40.0</td>
</tr>
<tr>
<td>Non-Technical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate Degree</td>
<td>4</td>
<td>3.5</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>100.0</td>
<td>20</td>
<td>100.0</td>
</tr>
</tbody>
</table>

degree in a technical field such as engineering or science. The data in this table indicate that 35 per cent of the successful group held bachelor's degrees in a technical field, whereas only 6.7 per cent of the remaining group held a similar degree. Likewise, the data concerning participants with high school diplomas or less support this hypothesis. Only 20 per cent of the executive group had not
received college degrees, whereas 45 per cent of the remaining group were not educated beyond the high school level.

Table VIII also indicates that there is no significant difference between the two groups with regard to non-technical college degrees as well as graduate degrees. Forty per cent of the most successful group held non-technical college degrees, and 43.3 per cent of the remaining participants held similar degrees. The participants who had earned master's degrees were equal in both groups. However, only four of the participants in the entire group indicated that they held a master's degree or higher.

In summary, the data in Table VIII appear to indicate that top management prefers to promote those individuals who possess technical degrees into top purchasing jobs. The information concerning actual decision-making ability presented in Tables XIII through XVII is developed in an attempt to determine whether or not these promotion policies are based on fact or on long-standing tradition.

Purchasing Experience

The data in Table IX indicate that years of experience in purchasing have little to do with whether or not success is achieved in the profession. It was not surprising, however, to find that 65
per cent of the successful group reported over ten years of purchasing experience as opposed to only 45 per cent of the remaining group reporting the same amount of experience.

One reason for the lack of significant difference between the two groups in the area of purchasing experience is explained by the finding that only eleven of the participants entered the field of purchasing directly from school or service. The remaining sixty-nine participants moved into purchasing from some other functional area. The following breakdown indicates the area that most of the sixty-nine participants moved into purchasing from:

<table>
<thead>
<tr>
<th>Function</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>10</td>
</tr>
<tr>
<td>Sales</td>
<td>9</td>
</tr>
<tr>
<td>Production</td>
<td>8</td>
</tr>
<tr>
<td>Stores, Inventory Control, and Related Functions</td>
<td>10</td>
</tr>
<tr>
<td>Finance</td>
<td>7</td>
</tr>
<tr>
<td>Administration</td>
<td>7</td>
</tr>
<tr>
<td>Other</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
</tr>
</tbody>
</table>

Therefore, it is apparent that success in the field of purchasing is not predicated on experience in the field alone. Instead, it appears that top management prefers to promote purchasing personnel into purchasing jobs based on their background in many of the more traditional functional areas.
## TABLE IX

COMPARISON OF PURCHASING EXPERIENCE OF ALL PARTICIPANTS, TWENTY MOST SUCCESSFUL, AND REMAINING GROUP

<table>
<thead>
<tr>
<th>Years of Experience</th>
<th>All Participants</th>
<th>Twenty Most Successful</th>
<th>Remaining Group</th>
<th>Z Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
<td>Number</td>
<td>Per Cent</td>
</tr>
<tr>
<td>5 or Less</td>
<td>29</td>
<td>36.3</td>
<td>5</td>
<td>25.0</td>
</tr>
<tr>
<td>6 to 10</td>
<td>11</td>
<td>13.7</td>
<td>2</td>
<td>10.0</td>
</tr>
<tr>
<td>Over 10</td>
<td>40</td>
<td>50.0</td>
<td>13</td>
<td>65.0</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>100.0</td>
<td>20</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Company Size**

Table X presents a comparison of company sizes represented by the participants. The test for significance of difference reveals that there is a significant difference between the successful purchasing executives and the remaining group at both extremes of the scale. Forty-five per cent of the successful group reported that they represented firms with $100 million in sales or more, whereas only 18.3 per cent of the remaining group represented similar sized firms. Similarly, at the opposite end of the scale 21.7 per cent of the
remaining group represent firms with under $5 million in sales, but none of the executive group were from the smaller firms.

**TABLE X**

**COMPARISON OF COMPANY SIZE OF ALL PARTICIPANTS, TWENTY MOST SUCCESSFUL, AND REMAINING GROUP**

<table>
<thead>
<tr>
<th>Company Size Annual Sales (Dollars)</th>
<th>All Participants</th>
<th>Twenty Most Successful</th>
<th>Remaining Group</th>
<th>Z Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
<td>Number</td>
<td>Per Cent</td>
</tr>
<tr>
<td>Over 500 Million</td>
<td>7</td>
<td>8.8</td>
<td>4</td>
<td>20.0</td>
</tr>
<tr>
<td>100-500 Million</td>
<td>13</td>
<td>16.2</td>
<td>5</td>
<td>25.0</td>
</tr>
<tr>
<td>50-100 Million</td>
<td>9</td>
<td>11.3</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>10-50 Million</td>
<td>9</td>
<td>11.3</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td>5-10 Million</td>
<td>3</td>
<td>3.7</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td>Under 5 Million</td>
<td>13</td>
<td>16.2</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>No Data Reported</td>
<td>26</td>
<td>32.5</td>
<td>9</td>
<td>45.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>80</td>
<td>100.0</td>
<td>20</td>
<td>100.0</td>
</tr>
</tbody>
</table>

A study by Hutner and his associates revealed that larger companies tend to have a distinct advantage over smaller companies.
in attracting high-caliber executives. The present study supports the claim that achieved success is directly related to firm size, but it rejects the idea that the more successful executives are better decision makers. However, the method of selection of the twenty most successful participants, as reported in Chapter III, may have biased this finding to some degree.

Age Group

The data in Table XI indicate that age is neither a barrier nor an asset in achieving success in the purchasing profession. No significant difference is noted between the two groups concerning their ages. It was not surprising that none of the successful group were in the under-thirty age group, but the test for significance of difference indicated that the difference could have been due to chance. Therefore, it is likely that even the younger group of participants was selected from the same population.

The mean age of the successful executive group is 44.9 years, whereas the mean age of the remaining group is 41.3 years. These means do not differ significantly from the mean age of all participants which is 42.1 years of age.

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2 Hutner, Levy, Rosen, and Stopal, op. cit., p. 49.
TABLE XI

COMPARISON OF AGE GROUP OF ALL PARTICIPANTS, TWENTY MOST SUCCESSFUL, AND REMAINING GROUP

<table>
<thead>
<tr>
<th>Age Group</th>
<th>All Participants</th>
<th>Twenty Most Successful</th>
<th>Remaining Group</th>
<th>Z Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
<td>Number</td>
<td>Per Cent</td>
</tr>
<tr>
<td>Under 30</td>
<td>7</td>
<td>8.8</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>30-39</td>
<td>23</td>
<td>28.7</td>
<td>5</td>
<td>25.0</td>
</tr>
<tr>
<td>40-49</td>
<td>36</td>
<td>45.0</td>
<td>10</td>
<td>50.0</td>
</tr>
<tr>
<td>50 and Over</td>
<td>14</td>
<td>17.5</td>
<td>5</td>
<td>25.0</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>100.0</td>
<td>20</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Personality Traits**

The analysis of personality traits presents some interesting data concerning the entire group of participants. However, only one of the four dichotomous scales proved to distinguish the successful group from the remaining sixty participants. The data in Table XII indicate that there is a significant difference between the two groups on the extroversion-introversion scale, but no significant differences exist in the remaining three scales.
TABLE XII

COMPARISON OF SPECIFIC PERSONALITY TRAITS PREFERRED
BY ALL PARTICIPANTS, TWENTY MOST SUCCESSFUL,
AND REMAINING GROUP

<table>
<thead>
<tr>
<th>Personality Trait</th>
<th>All Participants</th>
<th>Twenty Most Successful</th>
<th>Remaining Group</th>
<th>Z Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per Cent</td>
<td>Number</td>
<td>Per Cent</td>
</tr>
<tr>
<td>Extroversion (E)</td>
<td>44</td>
<td>55.0</td>
<td>7</td>
<td>35.0</td>
</tr>
<tr>
<td>Sensing (S)</td>
<td>62</td>
<td>77.5</td>
<td>14</td>
<td>70.0</td>
</tr>
<tr>
<td>Thinking (T)</td>
<td>59</td>
<td>73.8</td>
<td>16</td>
<td>80.0</td>
</tr>
<tr>
<td>Judgment (J)</td>
<td>57</td>
<td>71.2</td>
<td>13</td>
<td>65.0</td>
</tr>
<tr>
<td>Introversion (I)</td>
<td>36</td>
<td>45.0</td>
<td>13</td>
<td>65.0</td>
</tr>
<tr>
<td>Intuition (N)</td>
<td>18</td>
<td>22.5</td>
<td>6</td>
<td>30.0</td>
</tr>
<tr>
<td>Feeling (F)</td>
<td>21</td>
<td>26.2</td>
<td>4</td>
<td>20.0</td>
</tr>
<tr>
<td>Perception (P)</td>
<td>23</td>
<td>28.8</td>
<td>7</td>
<td>35.0</td>
</tr>
</tbody>
</table>

The analysis shown indicates a fairly even distribution
between extroverts and introverts among all participants. Table XII
indicates that 55 per cent of the participants focus their perception
and judgment on people and things, whereas 45 per cent of the partic-
ipants tend to focus their perception and judgment on concepts and
ideas. Even though there was no significant difference between preferences for extroversion or introversion, it is revealing to note that 65 per cent of the successful group of executives indicated a preference for introversion, whereas only 38.3 per cent of the remaining sixty participants indicated a similar preference.

The SN Index, sensing versus intuition, indicates a strong preference for sensing as opposed to intuition. The data indicate that 77.5 per cent of the total group rely primarily on awareness of things through the use of one or more of their five senses. Only 22.5 per cent of the participants expressed a preference for intuitive decision making. The intuitives tend to base their decisions on "ideas or associations which the unconscious tacks on to the outside things perceived." However, there was no significant difference on the SN index between the responses of the two groups being compared.

Likewise, the participants voiced a strong choice for thinking as opposed to feeling. The responses on the TF index indicate that the eighty participants strongly favored thinking impersonally as opposed to basing judgments primarily upon feelings through an appreciation of personal and interpersonal values. "Thinkers" outnumber "feelers" at the rate of fifty-nine to twenty-one, or 73.8 per cent as

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opposed to 26.2 per cent. Nonetheless, there was no significant difference noted between the successful group and the remaining group on the TF index.

The JP index revealed a similar trend to the two previous indices, with 71.2 per cent of the participants indicating that they dealt with problems primarily in terms of an evaluative, judgmental approach. On the other hand, only 28.8 per cent of the respondents gave answers on the MBTI that indicated an understanding and perceptive attitude. Once again, however, no significant trend was noted on the JP index concerning differing attitudes between the successful group and the remaining participants.

In summary, the personality data collected for this study indicate a preference for introversion among the executive group studied, and no significant differences are indicated on the other three indices. In addition, the results of the MBTI indicate a strong tendency toward sensing, thinking, and judgment as opposed to intuition, feeling, and perception. This finding is not surprising due to the nature of the job of purchasing personnel. These results further support the idea that the purchasing profession involves decision-making functions and that purchasing personnel are characterized by the personality traits that lend themselves to logical, factual decision making.
Game Results

The results achieved in the "Finansim" game by the participants were dependent upon many variables. Adequacy of forecasting, financing, purchasing capital equipment, dividend policies, and many other decision areas played an important role in the participants' final results. All of these factors were reflected in the player's equity per share at the end of eight periods of play. However, one adjustment was necessary in order to reflect accurately the effectiveness of the decisions made. The game has an automatic loan feature that is designed to keep a player from entering into bankruptcy during game play. Therefore, each financial statement was analyzed at the end of play and players who had required subsidies were charged a 10 per cent per year penalty for subsidized transactions. This adjustment resulted in the adjusted equity per share which is used as a basis of comparison of overall decision effectiveness.

The analysis of the successful purchasing group and the remaining group game results indicates that the successful group had a mean adjusted equity per share of $7.69 as opposed to $4.91 for the remaining group. The analysis of variance on these two groups indicates a significant difference between the successful group and the remaining participants at the .1155 level of significance.
Quartile Analysis of Participants

Hypothesis II states that there are identifiable personal characteristics that are directly related to decision-making ability. The characteristics studied in this research are educational background, purchasing experience, firm size, age, and personality type. In order to test this hypothesis, the participants were divided into quartiles according to the results achieved in the management game and they were compared according to the aforementioned characteristics. Adjusted equity per share was calculated in the same manner as described in the previous section.

Educational Background

The questionnaire that was provided to the participants at the beginning of this experiment was the basis for determining the extent and type of academic background. The participants were asked to indicate the highest level of formal education attained. These data were analyzed and segmented into four categories. These categories were high school or less, college degree - technical, college degree - non-technical, and graduate degree. However, because of the fact that only four of the eighty participants indicated that they held a Master's degree, these degrees were considered in the technical and non-technical degrees. Therefore the data in
Table XIII are segmented according to only three classifications of educational background.

A test of significance of difference between the means using analysis of variance indicates that there is a significant difference between the means according to educational background at the .0787 significance level. Table XIII indicates that college graduates with non-technical degrees earned $6.39 mean adjusted equity per share, whereas technical college degree holders accumulated $5.34 mean adjusted equity per share. The participants who indicated that they had a high school diploma or less scored only $4.76 mean adjusted equity per share. However, analysis of the first three quartiles reveals little difference between educational levels. It is interesting to note that the worst high school group, as indicated in the fourth quartile, did significantly better than the worst college groups.

Purchasing Experience

The analysis of game results by purchasing experience reported by the participants indicates that tenure in purchasing does not predict successful results in the decision-making exercise. Table XIV is presented in order to illustrate this point.

The analysis of variance by purchasing experience indicates a surprising similarity between the participants in the three groups.
<table>
<thead>
<tr>
<th>Educational Background</th>
<th>All Participants</th>
<th>QUARTILE</th>
<th>QUARTILE</th>
<th>QUARTILE</th>
<th>QUARTILE</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School or Less</td>
<td>31</td>
<td>$4.76</td>
<td>4</td>
<td>$12.08</td>
<td>8</td>
</tr>
<tr>
<td>College Degree - Technical</td>
<td>12</td>
<td>5.34</td>
<td>4</td>
<td>12.11</td>
<td>2</td>
</tr>
<tr>
<td>College Degree - Non-Technical</td>
<td>37</td>
<td>6.39</td>
<td>12</td>
<td>11.74</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>$5.60</td>
<td>20</td>
<td>$11.88</td>
<td>20</td>
</tr>
</tbody>
</table>
### TABLE XIV

**COMPARISON OF PURCHASING EXPERIENCE OF ALL PARTICIPANTS BY QUARTILES**

<table>
<thead>
<tr>
<th>Years of Experience</th>
<th>All Participants</th>
<th>QUARTILE</th>
<th>QUARTILE</th>
<th>QUARTILE</th>
<th>QUARTILE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 or Less</td>
<td>28</td>
<td>$4.98</td>
<td>6</td>
<td>$12.11</td>
<td>5</td>
</tr>
<tr>
<td>6 to 10</td>
<td>13</td>
<td>7.19</td>
<td>3</td>
<td>11.42</td>
<td>4</td>
</tr>
<tr>
<td>Over 10</td>
<td>39</td>
<td>5.52</td>
<td>11</td>
<td>11.89</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>$5.60</td>
<td>20</td>
<td>$11.88</td>
<td>20</td>
</tr>
</tbody>
</table>
shown in Table XIV. The thirteen participants indicating between six and ten years of purchasing experience earned $7.19 mean adjusted equity per share, whereas both the less experienced and the more experienced purchasing personnel earned somewhat less. Nevertheless, there was no significant difference between the three groups. The probability, as indicated by analysis of variance, that purchasing experience does not play a significant role in decision-making ability is .8459. Therefore, it is concluded, at least for this sample, that experience is not a determinant of success in the decision-making process.

Company Size

Two tests were run on the participants according to the size of the firm that they represented. These tests were run in an attempt to determine if those participants representing larger firms performed the decision-making exercise significantly more efficiently than participants from smaller firms. The first test of significance of difference was developed around the segmentation shown in Table X using analysis of variance. This test revealed that there was no significant difference between the means of the six groups ranging from representatives of companies with less than five million dollars in annual sales to representatives of companies that reported sales in
excess of 100 million dollars per year. The mean adjusted equity per share ranged from $4.27 per share to $8.62 per share, but the analysis of variance indicated that the probability that the differences between the groups was due to chance was .8276.

The second test involved separating the firm sizes into only two groups. These two groups were representatives of companies reporting annual sales of $50 million and over, and firms reporting less than $50 million in annual sales. The results of this test are illustrated in Table XV.

Table XV illustrates that the twenty-nine representatives of larger firms did somewhat better on the exercise than the twenty-five representatives of smaller firms, but no significant difference between the two groups exists. The analysis of variance of these groups reveals that the level of significance is .1695. However, a two-way analysis of variance between the two groups by quartiles reveals a significance level of .0238. The results indicate that there is a surprising similarity between the first three quartiles, but the fourth quartile analysis reveals that the least successful decision makers were representatives of firms with annual sales of $50 million and over. This finding tends to reject the idea that larger firms attract more qualified managers than their smaller counterparts. At least this sample supports the conclusion that larger firms may tend to
TABLE XV

COMPARISON OF COMPANY SIZE OF ALL PARTICIPANTS BY QUARTILES

<table>
<thead>
<tr>
<th>Company Size (Dollars)</th>
<th>All Participants</th>
<th>QUARTILES</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 Million and Over</td>
<td>29</td>
<td>$6.79</td>
</tr>
<tr>
<td>Under 50 Million</td>
<td>25</td>
<td>$4.75</td>
</tr>
<tr>
<td>Total</td>
<td>54</td>
<td>$5.84</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>QUARTILES</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
</tr>
<tr>
<td>No.</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

| III       | IV        |
| No.       | Mean Adj. Equity/Share |
| 7         | (2.70)     |

|          |          |
| ($5.35)  |          |
provide a safe haven for less qualified decision makers in the field of purchasing.

Age Group

The analysis of game results by age groups reveals that there is no significant difference between the ages of the participants and their success in the decision-making exercise. The results range from a high of $8.06 for the group in the under thirty age group to a low of $2.26 for the group that had passed the half-century mark in age. The mean adjusted equity per share for all participants was $5.60. However, the analysis of variance indicates a probability of .1777 that the difference is due to chance rather than due to the fact that the groups represent different populations. Therefore, at the .10 significance level, there is no significant difference between the age groups.

Personality Traits

The analysis of game results by personality traits presented in Tables XVI and XVII illustrates the degree to which Hypothesis II, concerning the importance of personality traits in decision-making ability, is true. It was hypothesized that there are certain identifiable personality traits that are important variables in decision-making ability. The personality traits studied in this research were
determined by administering the Myers-Briggs Type Indicator (MBTI) to all participants. It is felt that the most meaningful analysis of this data is possible by analyzing the individual traits using two-way analysis of variance in tests of significance of difference between the traits.

**Extroversion-Introversion (EI) vs. Judgment-Perception (JP)**

The EI scale analysis reveals a significant difference between the participants at the .0846 level of significance. The thirty-six participants who demonstrated a preference for introversion scored $7.06 mean adjusted equity per share, while the extroverts accumulated only $4.41 per share. A two-way test of significance reveals that there is no significant difference at the .10 significance level between the EI scale and the SN or the TF scale. But this same test reveals significant interaction between the EI scale and the JP scale. Table XVI illustrates this interaction.

The information in Table XVI illustrates that the dichotomous scale of judgment and perception yields almost identical scores of $5.61 and $5.59 respectively, but it also points out that the nine participants who indicated a preference for both introversion and perception earned $9.52 mean adjusted equity per share.
TABLE XVI

COMPARISON OF GAME RESULTS BETWEEN EXTROVERSION-INTROVERSION AND JUDGMENT-PERCEPTION

<table>
<thead>
<tr>
<th>Personality Trait</th>
<th>Perception</th>
<th>Judgment</th>
<th>Row Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extroversion</td>
<td>10</td>
<td>$2.06</td>
<td>34</td>
</tr>
<tr>
<td>Introversion</td>
<td>0</td>
<td>9.52</td>
<td>27</td>
</tr>
<tr>
<td>Column Totals</td>
<td>19</td>
<td>$5.95</td>
<td>61</td>
</tr>
</tbody>
</table>

On the other hand, the ten participants who demonstrated a preference for both extroversion and perception earned only $2.06 mean adjusted equity per share. The probability that this phenomenon would occur due to chance is .0763. Therefore, the present study reveals that more successful decision makers tend to be introverted as defined in Chapter II. Furthermore, among the introverted participants, those demonstrating an understanding and perceptive attitude are more likely to make good decisions than are their extroverted counterparts.
Sensing-Intuition (SN) vs. Thinking-Feeling (TF)

The SN scale analysis reveals a remarkable similarity between those participants who indicated that they based decisions primarily on awareness of things through one or more of their five senses as opposed to participants who rely basically on intuitive decision making. Table XVII is presented in order to illustrate the degree of similarity between the participants regarding this index.

**TABLE XVII**

**COMPARISON OF GAME RESULTS BETWEEN SENSING-INTUITION AND THINKING-FEELING**

<table>
<thead>
<tr>
<th>Personality Trait</th>
<th>Thinking</th>
<th>Feeling</th>
<th>Row Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing</td>
<td>47</td>
<td>$5.78</td>
<td>15</td>
</tr>
<tr>
<td>Intuition</td>
<td>13</td>
<td>$8.07</td>
<td>5</td>
</tr>
<tr>
<td>Column Totals</td>
<td>60</td>
<td>$6.28</td>
<td>20</td>
</tr>
</tbody>
</table>

Table XVII indicates that an overwhelming majority of the participants depend on sensing rather than intuition, sixty-two as opposed to eighteen. But the mean adjusted equity per share of these
two groups is almost identical, $5.61 as compared to $5.59 respectively. However, the most revealing fact in this analysis centers around the TF scale. The thinking participants outscored their dichotomous counterparts considerably. Thinkers scored $6.28 vs. $3.57 for feelers.

Even more revealing, however, is the finding that there is a significant interaction between the SN index and the TF index at the .0452 level of significance. Thinking intuitives earned $8.07 per share, whereas those participants who indicated that they used both intuition and feeling in decision making lost an average of eighty-seven cents per share. Therefore, the results of this study indicate that better decisions will be generated by individuals who think impersonally. Furthermore, among these individuals, those who based decisions on intuitive judgment as opposed to relying on the five senses are more likely to succeed in decision making.

Other Interactive Personality Traits

A two-way analysis of variance was run on all possible combinations of personality traits with no significant interaction between the combinations at the .10 level of significance except as noted in Tables XVI and XVII.
Summary

Chapter IV presents the data collected in the present study and analyzes the data in relation to the hypotheses. The examination of the twenty most successful purchasing executives compared with the remaining sixty participants reveals that certain aspects of Hypothesis I are accepted. The study reveals that purchasing personnel who possess technical college degrees are more likely to be selected as purchasing managers than the other educational levels. In addition, the data indicate that the participants from larger firms are more likely to be promoted into managerial positions than representatives of smaller firms.

The analysis of dominant personality traits also points to the fact that at least one trait separates the executive group from the remaining participants. Among the executive group, introversion was the most distinguishing trait. But an overwhelming majority of the entire group indicated a strong tendency toward sensing, thinking, and judging as opposed to dichotomous counterparts of intuition, feeling, and perception. No significant differences were noted between the executive and remaining groups in the latter three indices.

No significant difference was observed between the two groups concerning age or length of time the participants had been engaged in the purchasing profession. This finding tends to indicate
that age and experience are neither a barrier nor an asset in achieving managerial status in the purchasing profession.

The game results of the successful groups were somewhat better than those of the remaining group, but no significant difference was revealed at the .10 level of significance. Therefore, it is concluded that Hypothesis I is only partially accepted. Decision-making ability as measured by the game results, is not directly related to achieved success in purchasing management.

Hypothesis II states that there are identifiable personal characteristics that are directly related to decision-making ability. The findings support the conclusion that academic background is a major determinant of successful decision making. College graduates with non-technical degrees outscored their technical counterparts. However, perhaps the most revealing finding concerning academic achievement is that technical college graduates tend to be promoted into executive positions in spite of the fact that, at least for this sample, non-technical college graduates indicated a firmer grasp on decision-making ability.

The examination of firm sizes indicated no significant differences between the more successful decision makers, but a significant difference was noted among the less successful decision makers. Representatives of larger firms achieved considerably less success
in the fourth quartile than the participants from smaller firms in the same quartile. Therefore, the findings of this study appear to deny the idea that larger companies have a distinct advantage over smaller firms in attracting more qualified personnel. On the contrary, larger firms may tend to provide a breeding ground for more inefficient decision making among the least efficient participants.

The data concerning personality traits reveal several significant findings. The participants who indicated a preference for introversion were significantly more successful in the decision-making exercise than those preferring extroversion. But, among the introverted group, there was significant interaction on the JP scale. Those participants who indicated a preference for both introversion and perception scored over four and one-half times better than the participants who preferred extroversion and perception. The finding that introverts tend to be promoted into purchasing management tends to support the idea that top management promotion decisions and decision-making ability are compatible.

The data presented concerning intuitive decision making seem to emphasize the fact that intuition plays an important role in conjunction with thinking. But intuition exercised in conjunction with feeling resulted in extremely ineffective decisions.
CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS, AND IMPLICATIONS

Introduction

Chapter V presents a summary of the results of the statistical analyses presented in Chapter IV. These results are related to the hypotheses of this study and the general conclusions are developed. The implications of this research for management are presented. Finally, recommendations for future research are made in order to verify or reject the findings of the present study.

Summary of Findings

Hypothesis I states that there is a direct relationship between achieved success in purchasing management and decision-making ability. This hypothesis is tested by comparing the twenty executives who have achieved success in purchasing with the remaining group. The variables compared in this study are

1. Decision results,
2. Academic background,
3. Purchasing experience,
4. Company size,
5. Age,

6. Selected personality traits.

This hypothesis is only partially accepted in accordance with the summary of findings presented in Table XVIII.

**TABLE XVIII**

**SUMMARY OF STATISTICAL FINDINGS RELATED TO HYPOTHESIS I**

<table>
<thead>
<tr>
<th>Comparison of 20 Most Successful and Remaining Group by:</th>
<th>Significant Difference</th>
<th>No Significant Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.05 Level</td>
<td>.10 Level</td>
</tr>
<tr>
<td>1. Decision results</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2. Academic background</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>3. Purchasing experience</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>4. Company size</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>5. Age</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>6. Personality traits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introversion</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sensing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thinking</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Judgment</td>
<td>/ X</td>
<td>X</td>
</tr>
</tbody>
</table>
Hypothesis II states that there are identifiable attributes that are directly related to decision-making ability. This hypothesis is tested by segmenting the game results by quartiles and analyzing the following personal characteristics:

1. Educational background,
2. Purchasing experience,
3. Company size,
4. Age,
5. Selected personality traits.

This hypothesis, like Hypothesis I, is only partially accepted in accordance with the summary of findings presented in Table XIX.

Conclusions

The primary conclusion of this research is that, even though certain attributes were positively correlated with decision-making ability, insufficient justification exists in this study to claim undeniable predictive factors of success. However, several general conclusions were unveiled in this study that should offer guidance to managers who are attempting to identify potential purchasing executives.

In spite of its limitations, the present study reveals several findings that have been heretofore unexplored in the purchasing
### TABLE XIX

**SUMMARY OF STATISTICAL FINDINGS RELATED TO HYPOTHESIS II**

<table>
<thead>
<tr>
<th>Analysis of Game Results of All Participants by:</th>
<th>Significant Difference</th>
<th>No Significant Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.05 Level</td>
<td>.10 Level</td>
</tr>
<tr>
<td>1. Educational background</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2. Purchasing experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Company size</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4. Age</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>5. Personality traits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introversion vs. extroversion</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Judgment vs. perception</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensing vs. intuition</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Thinking vs. feeling</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Interaction between personality traits:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introversion and perception</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Intuition and thinking</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>All other combinations</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
literature. The following general conclusions are presented in an attempt to relate the findings of this research to the previously stated hypotheses.

General Conclusion 1

The data presented in Chapter IV indicate that individuals who have been successful in the field of purchasing are more likely to hold a bachelor degree in a technical field such as engineering or science. But the analysis of the game results indicates that college graduates in non-technical fields such as business administration or liberal arts achieved significantly better results than both technical college graduates and high school graduates. Therefore, if the sample in the present study is representative of the population, it is concluded that achieved success in purchasing is directly related to educational background in the form of a technical college degree. However, a non-technical college degree is more likely to prepare purchasing personnel to become more effective decision makers. This apparent conflict concerning educational background tends to support the idea that top management should look beyond technical competence in their promotion decisions.
General Conclusion 2

The findings presented in Chapter IV indicate that no significant difference exists concerning either purchasing experience or age between the twenty most successful purchasing executives and the remaining group. Likewise, no significant difference was noted concerning experience or age in the analysis of game results. Therefore, these findings tend to indicate that age and experience are neither a barrier nor an asset in either achieving success in purchasing or decision-making ability.

General Conclusion 3

Another apparent conflict between the findings concerning the firm sizes represented by the twenty most successful executives and the most successful decision makers is uncovered in the present study. The analysis of the twenty most successful purchasing executives revealed that there was a significant difference at the .05 level of significance between achieved success and the size of the firm represented. Forty-five per cent of the successful executives represented firms with sales in excess of $100 million per year, whereas only 18.3 per cent of the remaining group represented similar sized firms. On the other hand, a two-way analysis of variance by firm size and quartile of game results brought to light an
interesting finding. The results of this analysis indicated a surprising similarity between the first three quartiles, but the least successful decision makers were primarily representatives of firms with annual sales of $50 million and over. This finding tends to reject Hutner* and his associates' claim that larger companies have a distinct advantage over smaller companies in attracting high-caliber executives. On the contrary, the findings of this study support the conclusion that larger firms may tend to provide a safe haven for less qualified decision makers in the field of purchasing.

**General Conclusion 4**

There is a significant difference at the .05 level of significance between the twenty most successful purchasing executives and the remaining group with regard to one independent personality trait. The dichotomous scale of extroversion-introversion reveals that the executive group indicated a preference for introversion as opposed to extroversion. This finding supports the conclusion that Henry reached when he reported that one of the more general personality traits of successful executives is "... an inherent reliance upon himself as an ultimate authority, ..." But these findings

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conflict with the findings of Rosen whose study typified the successful executive as "enormously" extroverted. Likewise, the most successful decision makers in the present study reported a preference for introversion to a significant degree. In addition, those participants who indicated a preference for both introversion and perception scored over four and one-half times better in the exercise than their extroverted counterparts.

The analysis of two other dichotomous scales, sensing versus intuition and thinking versus feeling, reveals another significant interaction. The data concerning intuitive decision making appear to emphasize the idea that intuition exercised in conjunction with feeling results in extremely ineffective decisions.

**Implications to Management**

The conclusions drawn from this study are not sufficient to present an equation or "magic" formula for predicting success. But there are several implications that deserve attention from those whose responsibility it is to identify and select potential purchasing executives. If the present study only illustrates the need for an objective view of the need for an evaluation and assessment program involving the personnel who are responsible for spending over one-half...
of the sales dollars in the typical manufacturing firm, then it has been worthwhile.

The finding that the twenty executives who had achieved success in purchasing did not make significantly better decisions in the game than did the sixty remaining participants implies that there exists a vast reservoir of virtually untapped creative decision-making potential among the rank and file of the purchasing department. This finding should logically lead to the acceptance by top management of the idea that decision making may be decentralized to a greater degree than is generally practiced. Many behavioral scientists such as Drucker\(^4\) and McGregor\(^5\) have long espoused the idea of decentralization of the authority to make decisions. The findings of the present study tend to lend additional credence to these theories.

The stated purpose of this research was to determine the relationships between identifiable attributes of purchasing personnel and their proficiency in decision making. The question was posed in Chapter I: "Is there a direct relationship between decision-making ability and achieved success in purchasing?" The findings of this study indicate that the answer is, "probably not." However


\(^5\)McGregor, op. cit.
somewhat serendipitously, it was found that there are certain con-
flicts between promotion criteria that is used in industry and demon-
strated attributes of successful decision making. For instance, it
was found that participants in this study who held a technical college
degree were more likely to be promoted into executive positions than
their non-technical counterparts. But, according to the game results,
holders of non-technical college degrees achieved significantly better
results than either technical college degree holders or participants
who indicated that they had less than a college degree. This finding
implies that management may well look beyond technical expertise in
their never ending search for qualified decision makers.

In spite of the fact that the present study indicates some
statistically significant differences among attributes such as educa-
tional background, company size, and certain combinations of per-
sonality traits, it is questionable that these findings alone justify the
implementation of an assessment program developed to positively
identify potential purchasing executives. However, if this research
stands the test of time, verification and expansion, it could be very
useful as a stepping stone to the implementation of new methods of
Manager, observes the impending shortage of effective managers and the outmoded methods of managerial identification. He encourages the use of alternative identification methods such as assessment centers and simulated decision-making exercises to meet the challenge of the present decade. Therefore, it is hoped that this study will provide new insights into effective decision-making ability, and provide the foundation for the establishment of criteria for assessing managerial potential.

**Recommendations for Future Research**

The value of the findings of this research may be more readily apparent if it is verified through more extensive research using varying subjects and with varying objectives. The research design of the present study is felt to be only the beginning of other investigations into the somewhat ambiguous field of study dealing with decision-making ability of purchasing personnel. There appears to be little question that degrees of success in purchasing decisions exist, but the almost mystical nature of the subject seems to have evaded researchers' attempts at identifying the characteristics associated with the successful decision maker.

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6 Lopez, op. cit.
Specific future research recommendations fall into three categories: (1) further research dealing with the study of management games both as an effective research tool and as an aid in executive development, (2) investigations into the dimensions of educational background as they relate to successful decision-making ability, and (3) research centered around additional personality factors and their relationship to managerial identification.

The use of management games for research, while not an original attempt, is felt to be effective for three reasons. First, the game approach is useful because of the fact that it provides the opportunity to compress an entire year's decisions into a very short period of time. Second, the game method provides the participant with rapid feedback of decision results. Third, the unique nature of the management game approach provides a challenging and exciting opportunity for the participant to become involved in major decision making without the fear of consequences or the threat of reprisal for ineffective decisions. While the investigation of the use of management games for executive development is beyond the scope of the present study, it is felt that this field of study is worthwhile. It is felt that the management game approach to both research in decision making and executive development holds considerable promise for future studies in these fields.
The dimensions of educational background of successful decision makers is the second area of specific investigation that evolves from this study. The present study reveals significant differences among educational levels represented by the participants. There are many dimensions of an individual's educational background such as time elapsed since last degree, major field of study, occupational endeavor in relation to the field of study, extent of education, and specific interests. The present study was limited to only three categories of education—high school or less, technical college degree, and non-technical college degree. Additional research into other dimensions of educational background could be a meaningful endeavor for educational researchers who are interested in pursuing this aspect of decision-making ability.

The third area of recommended research is centered around the inquiry into other personality factors that could prove to be as meaningful, or even more so, as the personality traits that were identified in the present study as important variables in decision-making ability. Other personality factors that might be considered in studies of this nature might include drive, ambition, social mobility, aggressiveness, and a host of other measurable traits. Investigations of this type appear to fall into the research purview of the industrial psychologist.
Chapter V presents a summary of the findings of this research and relates these findings to the hypotheses. Hypothesis I states that there is a significant relationship between achieved success in the field of purchasing and certain identifiable characteristics. This hypothesis further states success in purchasing management is directly related to identifiable characteristics such as educational background, purchasing experience, age, size of company, and certain dominant personality traits. The findings of this research reject the idea that achieved success in purchasing is directly related to decision-making ability. This denial is based on the fact that the purchasing executive group did not achieve significantly better results at the .10 level of significance in the management game than the remaining participants. However, the present study was successful in identifying three of the hypothesized variables as playing major roles in the attainment of executive positions for the participants of this study. Significant differences at the .05 level of significance were noted in academic background, company size, and one of the four dichotomous personality indices—introversion as opposed to extroversion. No significant differences were observed in the remaining variables.
Hypothesis II states that there are identifiable personal characteristics that are directly related to decision-making ability. The personal characteristics that are judged to be measurably significant at the .05 level of significance include firm size represented and intuition in conjunction with thinking. At the .10 level of significance, educational background and introversion were judged to be significantly different. In addition, interaction between introversion and perception was judged to be significant at the .10 level of significance.

Four general conclusions are drawn as a result of this research:

1. A college degree in a technical field is shown to be a significant factor in achieving success in purchasing. However, non-technical college degree holders achieved significantly better results in the decision-making process.

2. No significant differences were noted concerning either age or purchasing experience. Therefore it is concluded that, for this sample, age and experience are neither an asset nor a barrier to either achieved success in purchasing or decision-making ability.

3. The analysis of firm size represented by the participants reveals an apparent conflict between the most successful purchasing executives and the most successful decision makers. The
executive group studied was, as expected, primarily from larger firms. However, the most successful decision makers were fairly equally split between large and smaller firms. The most surprising result of this analysis was that the least successful decision makers were primarily representatives of larger firms. As a result of this finding, it was concluded that larger firms may tend to provide a safe haven for less qualified decision makers in the field of purchasing.

4. Both the executive group and the most successful decision makers indicated a preference for self-reliance in the form of introversion. Other individual personality traits measured indicate no significant differences for the participants of this study. However, significant differences are apparent in the analysis of interaction between the four personality indices. Introversion coupled with perception, and intuition in conjunction with thinking are statistically significant at the .10 and .05, respectively, levels of significance. These findings lead to the conclusion that there are certain identifiable personality traits that are closely associated with decision-making ability.

The implications of the present study to management are basically that there are no secret formulas for identifying managerial potential. But several useful ideas surfaced as a result of the present study. The evidence presented indicates that much decision-
making potential is found among rank and file purchasing personnel and management is advised to make use of this latent potential. In addition, management is shown that non-technical college degree holders may be excellent candidates for managerial selection. Finally, this study presents the basic foundation for implementing executive assessment centers and similar nontraditional management development programs.

The present study represents an incomplete effort to establish a method of managerial identification that goes beyond the traditional techniques that are commonly used for purchasing personnel. It is with this idea in mind that recommendations for future research are made. Recommendations for future research are in the areas of (1) the use of management games for research and executive development, (2) investigations into the dimensions of educational background as they relate to successful decision making, and (3) research centered around additional personality factors and their relationship to managerial identification.
APPENDIX A

SAMPLE LETTER TO PROFESSIONAL DEVELOPMENT CHAIRMEN
REPRESENTING THE PURCHASING ASSOCIATIONS
PARTICIPATING IN THE STUDY
June 15, 1971

Mr. Ocil Chism
2004 Second Avenue
Canyon, Texas 79015

Dear Mr. Chism:

I am writing this letter to you as the Pro D Chairman for the Texas Panhandle Purchasing Management Association concerning a professional development activity that I hope will interest you and your members. Mr. Everett Warner, district Pro D Chairman, has suggested your association as one of six local associations that might be interested in participating in a computerized management game. The objectives of this exercise are twofold. First, it provides the participants with an opportunity to sharpen their decision-making ability and compare their decisions with other participants. The second objective is to collect data from decisions made in the management game in an attempt to determine what, if any, identifiable attributes contribute to good decision making of purchasing personnel.

I am presently teaching Purchasing and Materials Management at North Texas State University and writing a doctoral dissertation under the direction of Dr. Kenneth Cox. This research is being conducted under the sponsorship of an NAPM doctoral dissertation grant. In addition, I have been an active member of the Dallas Association for the past two years.

Due to the fact that the NAPM is funding this research, there will be no charge to the participants in the game. Computer time, mailing, secretarial, and traveling expenses are all being paid by the NAPM grant. Therefore, the participants will only be asked to spend approximately one hour per week making operating decisions for a simulated company. These decisions are processed by an IBM360-50 computer which produces an updated balance sheet and income statement along with supplemental information that will enable the participant to make operating decisions for the next period. The entire game will consist of eight periods of play.

Management games have been used in many executive development programs and research projects. Here are some typical comments of business executives who have played management games.
It gave me the opportunity to work with and observe the interaction of all parts of the business.

The management game approach gave me the opportunity to test new ideas with fictitious money—I believe that it was extremely helpful.

These comments, and many others, reflect the attitude that management games can be both fun and helpful to the businessman.

I sincerely hope that you can find time in your busy schedule to promote this professional development opportunity in your association. If this activity sounds interesting to you, I would appreciate your prompt response concerning the following:

1. Number of members in your association,
2. Average attendance at meetings (approximate),
3. June and July meeting dates,
4. Any comments that you might care to make.

If your association decides to participate, I will be happy to meet with you and/or your executive committee to explain this activity in more detail. In addition, I will provide a mail "flyer" that can be sent to each member. I will meet with your association and briefly explain the game to your members. Those members who volunteer to take part in the exercise will have a one hour orientation session and the remainder of the game will be played by mail. Anyone who is connected with purchasing in any way is invited to participate. We are hoping to get a wide variety of participants in terms of age, experience, academic background, types of industries, and company sizes.

Your assistance in bringing this opportunity to your members is greatly appreciated.

Sincerely,

Norman D. Ellis

NDE:cc
APPENDIX B

CONDENSED OPERATING INSTRUCTIONS

FOR PLAYING "FINANSIM"
The Management game is an exciting new educational technique designed to provide businessmen with greater insight into the skills in dealing with managerial problems. The management game that you are about to play is a sequential decision-making problem structured around a model of a business operation which participants assume the role of managing a simulated firm.

The attached instructions have been condensed from Paul S. Greenlaw and M. William Frey's "Finansim." The condensed instructions are intended to give the participant sufficient information concerning the decisions to be made. However, in some cases, lengthy explanations of reasons for the game being programmed in a certain way have been deleted. The participant should bear in mind that the "Finansim" game is a simulation, rather than attempt to relate his own company's experiences to those of the game.

Each "Finansim" firm produces and sells an unnamed, unidentified product. For each period of play, which represents one year, "Finansim" managers make a number of decisions.

1. To invest in any or all of three different types of capital improvements each period which will effect future savings for the firm by reducing its operating costs;
2. To maintain or expand the firm's plant and machine capacity;
3. To determine the number of production units to be manufactured;
4. To purchase or sell marketable securities;
5. To obtain bank-term loans to help finance company operations;
6. To float new or retire existing 10-year debentures;
7. To issue new common stock; and
8. To make dividend payments on existing Common Stock.

Each "Finansim" firm will begin the simulation by operating a going concern that has been in operation for one year. Decision forms will be submitted for Period 2. Decisions for Period 1, which are the same for all firms, have already been made and are shown on the attached computer print-out.

After each period's decisions have been processed on the IBM 360-50 you will get the following information:
1. An income statement for your firm.
2. A position statement for your firm.
3. Supplemental information concerning your firm.
4. A report showing results of previous decisions for all firms playing the game in your group. (Note: Game players will be identified by firm number only.)

We sincerely hope that you derive the same benefit from playing this game that others before you have. It is imperative that your decisions reach us by ______________________. All decisions must be in before we can make a computer run.

Return decisions to:
Norman D. Ellis
College of Business Administration
North Texas State University
Denton, Texas

Sales, Price, and Sales Revenue

The computer generates a level of demand for the firm's product. The demand forecast is projected for 5 periods, the first being the most accurate then decreasing in accuracy from there on. The demand level is contingent on the economic business conditions and are beyond the control of the player. The selling price per unit is also beyond the control of the player and may change from time to time.

Demand may be met from both beginning inventory and units produced during the period. If the firm cannot satisfy the demand the sales are lost to the firm forever.

The firm will receive 90% of the payments for units sold in that year, and the remaining 10% the next period. For example, if a "Finansim" company sells 100,000 units of its product at $40 per unit, its cash collections would be $3,600,000 and its accounts receivable at the end of the period would be $400,000.

Production and Inventories

Each period the player will decide on production levels, this decision must be made in even thousands of units. The production decision entered must be the total number of units you want to produce in the next period.

The unit cost is equal to a set of basic production costs, minus per unit cost of production which may be realized through the
players' decisions to invest in capital improvements. The computer read-out will supply the current unit cost of production each period.

The firm incurs inventory carrying cost each period amounting to 30% of total value of the ending inventory for the period. Ninety % of the firm's cost of production must be paid for during the period in which it was incurred, the remaining 10% will be carried as accounts payable and must be paid in the next period. The firm's production expenses for income tax purposes are equal to the value of the goods sold rather than the value of the units produced.

**Plant Capacity**

Each unit of the firm's plant capacity is valued at $8 in fixed assets. The manager of the firm may purchase any number of units of plant capacity in even thousands of units. Each unit of capacity so acquired

2. Must be paid for in the period purchased and will be added to the firm's fixed assets that period.
3. May not be utilized for production until the period after its purchase.

When entering your decision on expanding plant capacity enter the amount that when added to the projected plant capacity the correct level of production will be reached.

The plant capacity in period 2 of 79,892 units was purchased at different times and will depreciate as Figure I shows. If no new plant capacity is purchased in period 2 the plant capacity will depreciate to 73,284 units for period 3.

When figuring depreciation on plant capacity subtract the two figures for plant capacity in your supplemental information and multiply that figure by $8 for your depreciation for the next period.

**Figure I**

Schedule of Existing Plant Capacity
(Assuming no Additions to Capacity)

<table>
<thead>
<tr>
<th>At the beginning of year</th>
<th>Units capacity will be</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>73,284</td>
</tr>
<tr>
<td>4</td>
<td>66,877</td>
</tr>
<tr>
<td>5</td>
<td>60,676</td>
</tr>
<tr>
<td>6</td>
<td>54,701</td>
</tr>
<tr>
<td>7</td>
<td>48,956</td>
</tr>
<tr>
<td>8</td>
<td>43,453</td>
</tr>
<tr>
<td>9</td>
<td>38,206</td>
</tr>
<tr>
<td>10</td>
<td>33,226</td>
</tr>
<tr>
<td>11</td>
<td>28,528</td>
</tr>
</tbody>
</table>
All plant capacity will decrease by 5% each period for the 20 years as the plant wears out, beginning with the period after the plant capacity is purchased. The value of the decrease is 5% of $8, or $.40/unit/year, and will be treated as depreciation expenses.

**Machine Capacity**

Each unit of machine capacity is valued at $2. Each period the manager may purchase any number of additional units of machine capacity subject to the following restrictions:

1. All purchases must be in even thousands of units.
2. Total machine capacity may not exceed the firm’s plant capacity at the beginning of the period.

If it did, the computer would correct the machine capacity to correspond with the plant capacity. Each unit of machine capacity cost $2, must be paid for immediately and will be added to fixed assets in the period it was purchased, and may be used in the period it is purchased.

All machine capacity acquired in any period will decrease 20% of $2 each year for 5 years, beginning in the period in which it was purchased. The firm's existing machine capacity of 49,997 units was acquired in different hypothetical prior years. Existing capacities for period 2 through 6 are shown in Figure II.

**Figure II**

Schedule of Existing Machine Capacity

(Assuming No Additions to Capacity)

<table>
<thead>
<tr>
<th>At the beginning of year</th>
<th>Units machine capacity will be</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>49,997</td>
</tr>
<tr>
<td>3</td>
<td>30,010</td>
</tr>
<tr>
<td>4</td>
<td>15,005</td>
</tr>
<tr>
<td>5</td>
<td>5,000</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

When calculating the depreciation on machine capacity for period 2 you need to subtract 49,997 from 30,010 which equals 19,987 units at $2 a unit, then take 20% of any machine capacity that was added in period 2 (remember that machine capacity cannot exceed plant capacity) and multiply that figure by $2. Add these two figures together along with any depreciation on capital investments that you may have made during the period. The total will be the amount of depreciation on machinery and equipment for period 2. The same reasoning is used for each of the following periods.
Fixed Manufacturing Expenses

There is a fixed level of manufacturing expenses that will be incurred no matter what level of production is being maintained. For each unit of plant capacity acquired, the firm will incur fixed manufacturing expenses of $.25 in each of the 20 years following that in which the capacity is obtained. For each unit of machine capacity acquired, the firm will incur fixed manufacturing expenses of $.20 in each of the 5 years beginning with the period in which the machinery is obtained. This expense constitutes both an outflow of cash, and an expense for tax purposes in which it is incurred.

The fixed manufacturing expenses which the company will incur on existing plant and machine capacity is shown on the schedule in Figure III.

Figure III
Schedule of Fixed Manufacturing Expenses
Charged to Existing Plant and Machinery

<table>
<thead>
<tr>
<th>Year</th>
<th>Fixed Manufacturing Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>58,029</td>
</tr>
<tr>
<td>3</td>
<td>52,026</td>
</tr>
<tr>
<td>4</td>
<td>45,994</td>
</tr>
<tr>
<td>5</td>
<td>39,891</td>
</tr>
<tr>
<td>6</td>
<td>28,729</td>
</tr>
<tr>
<td>7</td>
<td>27,513</td>
</tr>
<tr>
<td>8</td>
<td>26,237</td>
</tr>
<tr>
<td>9</td>
<td>24,897</td>
</tr>
<tr>
<td>10</td>
<td>23,490</td>
</tr>
</tbody>
</table>

Selling and Administrative Expenses

Each year the firm will incur selling and administrative expenses equal to $50,000 plus 10% of the value of its sales for the period. These expenses represent both a cash outflow and an expenses for tax purposes in the period in which they are incurred. For instance, if a firm sells 80,000 units at $42/unit, its selling and administrative expenses will be $50,000 + .10(80,000)($42), or $386,000.
Income Taxes

The tax rate for your firm is 50% of the income which is earned during one period. The taxes are handled on an accurate basis, and are paid out as cash disbursements at the beginning of the period following that in which they are incurred. All tax payments and the corresponding cash disbursements are automatically handled by the computer.

Capital Improvements

Each period the manager is given the opportunity to make any or all of three different kinds of capital improvements for his firm. In each period, one of these is referred to as A; the second as B; and the third as C. These improvements may be thought of as representing such items as material handling equipment, jigs or fixtures which will increase machine efficiency, data processing equipment, etc. Each capital improvement will either:

1. Result in savings in per unit production costs and reduce fixed manufacturing expenses; or
2. Result in savings in per unit production costs but increase fixed manufacturing expenses; or
3. Reduce fixed manufacturing expenses but result in increase in the firm's per unit production costs.

All such changes will take effect in the period in which the improvement is acquired; and all improvements must be paid for in the period in which they are acquired.

Different capital improvements will have different economic lives and will effect different changes in per unit production costs and fixed manufacturing expenses. Further, each capital improvement has a capacity limitation, that is, its acquisition will result in savings (or increase) in per unit production costs only up to a certain level of production.

The manager may purchase either 1, 2, or 3 capital improvements of each of the three different kinds made available to him each period. He will be given on his computer print-out from the previous period the following information about each of the three different kinds of capital improvement alternatives available to him in the period.

1. The cost of one improvement.
2. Per unit production cost savings (or increase) per year for each improvement.
3. The capacity limitation per improvement.
4. The changes which will occur in the firm's fixed manufacturing expenses per improvement, and
5. The number of years for which changes in per unit production costs and fixed manufacturing expenses will be affected with the acquisition of the improvement

Certain other observations are in order concerning the capital improvements opportunity:

First, it is permissible for the manager to acquire one or more capital improvements of any type, the total capacity of which exceeds his machine capacity. Since production may never exceed machine capacity, however, in such cases any per unit production savings realized from the capital improvements will be only for units of production up to and including the firm's machine capacity.

Second, each capital improvement is depreciated on a straightline basis throughout the length of its economic life. The depreciation charges on capital improvements are included in the same account as those for the firm's machine capacity—both are included in the "Depreciation on Machinery and Equipment" category of the income statement.

Third, at the present time (that is, at the beginning of Period 2), the firm has no capital improvements in effect. Thus, the value of "Machinery and Equipment" indicated on the period 1 position statement represents only that of its machine capacity.

Finally, we should point out that some of the capital improvement opportunities, which will be made available to the manager, will be "desirable ones," while others will generate savings not sufficiently adequate to justify their being chosen.

Purchase and Sale of Marketable Securities

The manager may invest in marketable securities in any period or may sell any securities which the firm owns. However,

1. All securities, purchases and sales must be in even thousands of dollars, and
2. Securities may not be purchased and sold in the same period.

Securities purchased must be paid for immediately; conversely, those sold generate cash for the firm in the period in which they are sold. The interest rates on the securities will vary from period to period depending on economic conditions. The yield on securities purchased is known to the manager in the previous period in the form of information on his computer print-out. Securities are considered as being purchased at the beginning of the period and thus start earning interest in the period in which they are bought. The same
holds true if you were to sell securities. The firm would receive the cash for the securities sold but not the interest for that year.

For the firm's that have security portfolios with securities that have different yield rates, the computer sums all income from securities, and divides this figure by the total value of securities held to obtain the average interest rate on existing securities; and any securities sold by the firm are considered as being securities earning the average interest rate. Your marketable securities at the beginning of period 2, of $500,000 represents liquid investments in other firms and do not represent the "Finansim" firm's common stock.

Sources of Funds

Common Stock

Each firm begins the 2nd period with 100,000 shares of common stock outstanding at a par value of $5. Each period the firm may pay any amount of dividends to its common stock holders (in even thousands of dollars) subject to the following restrictions:

If the dividend payment would result in retained earnings becoming negative at the end of the period, no dividends may be paid. Should any dividend payment decision of the manager result in negative retained earnings, the entire payment will be rejected by the computer. All dividend payments will also be rejected if ending period retained earnings become positive as a result of aid given the firm to render it solvent; but otherwise would have been negative. We will discuss the problem of insolvency later.

In any period the firm can issue additional shares of common stock (in even thousands of shares). All such shares will be sold at market value, which is indicated each period or the computer print-out.

No shares of stock may be issued in a period if the market price of the firm's common stock was less than its par value of $5 at the end of the previous period. Any issue attempted under such conditions will be rejected by the computer.

The market price of the firm's common stock will vary from period to period and is influenced by the following factors:

1. Economic conditions (over which the manager has no control),

2. Investors' expectation as to the firm's future future earnings (ROI, or Return on Investment);

3. The firm's long-term debt to equity relationship;
4. The firm's dividend policy.

Two final observations concerning common stock, when the common stock issued sales at par value the Common Stock account will increase, if the stock sells above par value the additional cash will go to the Paid in Surplus account. Second, the retirement of common stock is not permissible in the simulation. Once common stock has been issued it remains outstanding in all future periods.

Debentures

The manager is given an opportunity both to issue and retire 10-year debentures to help finance his operations. The manager may issue any amount of debentures (in even thousands of dollars) in any period subject to three limitations:

First, the new issue may not result in the firm's total long-term debt at the end of the period being greater than 60% of its period ending total owners' equity.

Second, any new debenture issues may not result in the firm's ending period total owners' equity being less than $0. If this should happen the entire debenture issue will be cancelled.

Finally, if the issuance of any debentures should result in the firm's becoming insolvent, which will be discussed later, the entire debenture issue will be cancelled.

Debenture issues are considered as taking place at the beginning of the period. In consequence,

1. funds obtained from a new issue are available for use in the period in which the issue is floated, and
2. Interest payments on the issue also commence at the end of this period.

The interest rate which the manager will have to pay on any new debenture issue will vary from period to period. The rate will never be less than 4%. The firm's actual interest rate for a new debenture issue in any period will equal the base rate as long as total long-term debt outstanding at the end of the period does not exceed 10% of the firm's total equity if it does exceed 10% the interest charged will increase. Each debenture issue will automatically be retired upon maturity by the computer, excluding any of the debentures which have already been retired in advance by the manager. In any period the manager may retire existing debentures in advance of their maturity date subject to the restrictions that all retirements must be made in even thousands of dollars. The retirement of debentures in advance of maturity has two points to be considered.
1. The firm is charged a premium of 3% of the value of all debentures so retired. This charge is included in "Bond Redemption Premium Expenses" in the period in which the debentures are retired.

2. When the firm has more than one issue of debentures outstanding and decides on some retirement, its debentures maturing farthest in the future will be retired first, those in the next farthest period. All debentures are considered as being retired at the beginning of the period; therefore no interest payments must be made in the period in which they are retired.

All interest paid on debentures is based on either their original or residual value. By residual value, we mean the original value of the issue minus any portion of the issue which has been retired in advance.

Bank Term Loans

The manager may obtain bank term loans to help finance his operation. Bank term loans may be for either 3, 4, or 5 years. In any period not more than one loan of each of these three types may be obtained. All interest payments are based on the balance of the loans outstanding at the end of the period. Bank term loans may be of any amount, in even thousands of dollars, subject to the same restrictions as for debentures. The new bank loans may not result in the firm's ending period total long-term debt being greater than 60% of the ending equity.

The interest rate which must be paid on any bank loan will vary from period to period. This rate will be less than 5%. See the supplemental information for your firm's interest rate each period.

Notes Payable

The firm is required to maintain an ending cash balance each period of not less than 5% of its total assets at the beginning of the period. If after all financial transactions have been completed for a period, insufficient cash is available to meet this requirement the firm will be required to borrow, via short term bank notes, an amount necessary to satisfy these restrictions. All short term bank notes, plus the interest due on them must be paid in the following period. Both loans and repayments of notes payable are handled automatically by the computer, no decision for this type of loan is required.
The interest rate on notes payable will be a function of the liquidity position of the firm. A minimum rate of 6% will be charged if the firm's current ratio prior to obtaining the notes is 2:1 or higher. The interest rate on notes payable will increase as the firm's current ratio prior to obtaining the notes falls below 2:1 up to a maximum of 8% when the current ratio is .5:1.

Insolvency

In the preceding section, we indicated that the interest rate on notes payable will reach a maximum of 8% of the firm's current ratio prior to obtaining the notes falls to as low as .5:1. If a firm's current ratio should fall below .5:1 its liquidity position will be considered so poor by potential lenders that no notes payable may be obtained. In consequence, if both (1) a firm's current ratio is less than .5:1, and (2) its cash position is so low that it must obtain notes payable to meet its minimum cash balance requirements it will have become insolvent.

Should this situation occur the following steps will be taken to render the firm solvent again:

1. The firm will be given a cash subsidy just large enough to enable it to meet its minimum ending cash balance requirements.
2. Its retained earnings will be increased by the amount of cash subsidy which it is given.

When a firm has been granted a subsidy a footnote will be included on its position statement indicating the amount of the subsidy. The participants should be very careful not to require aid in the form of a subsidy due to the fact that the stockholders look with a dim view on firm's requiring aid and penalize the participant heavily. The aid is not repayable and there is no interest on the money.

Entering "Finansim" Decisions

When filling out the decision form the participant must remember to enter the period number on the blanks 1 and 2, and his firm code in blanks 3 and 4.

Period Number _____________ Firm Number _____________
Capital Improvements

In the blank beside the desired alternative enter the number of improvements of that particular type you want. If you wanted 1, A alternative, and 2, C Alternatives, enter a 1 in blank 6, a 0 in blank 7, and a 2 in blank 8.

Capital Expansion

In the remaining items the blank spaces on the right are the thousands, the middle spaces are the ten thousands, and the left hand spaces are the hundred thousands.

For the item "Expand Plant Capacity by" the number entered there will increase the plant capacity for the next period. For example, in your supplemental information the item "plant capacity in period 3" is 73,284 units, if you decided to increase plant capacity by 20,000 units for period 3 you will enter a 2 in blank 11 and a 0 in blank 12, on your period 2 decision form.

In "Expand Machine Capacity by" the amount you enter will be added to the period 2 machine capacity for period 2.

In "Production Decision-Produce" you must enter the total amount of units you want to produce in the period. You cannot produce more than you have machine or plant capacity for.

If you wish to sell or buy marketable securities you will place a - in space 23 for sell, or a + for buy. In space 24-26 you will place the amount.

See Appendix I for the Period 1 decision entered in the game.

Financial Indicators

Return on Investment = \( \frac{\text{income after tax}}{\text{total assets}} \) indicates the % return on capital invested in his firm. Profitability of the firm's assets.

Return on Equity = \( \frac{\text{Income after tax}}{\text{Owner equity}} \)

"Productivity" of the capital contribution of common stock holders.

Current Ratio = \( \frac{\text{Current Assets}}{\text{Current Liability}} \)

Measure of liquidity—that is, can the firm meet its current obligations as they come due.

Long-term Debt to Equity = \( \frac{\text{Long term liability}}{\text{Equity}} \)

The higher a company's long-term debt to equity ratio is at the end of any period the lower will common stock market price be at the end of that period; and vice versa.
APPENDIX C

SAMPLE PERSONAL AND PROFESSIONAL DATA SHEET
PERSONAL AND PROFESSIONAL DATA SHEET

1. Name: ____________________________  2. Age ___

3. Mailing Address: __________________________
                        __________________________
                        __________________________

4. Firm: ____________________________  Years with this firm: ___

5. Approximate Sales Volume for your
   Firm (in Dollars): $ ______________

6. Approximate Purchase Volume for your Firm (in Dollars): $ ______________

7. Type of Industry: ____________________________________________
   (aircraft, electronics, utility, etc.)

8. Your Job Title: ______________  9. Years Experience in Purchasing or related fields: ______________

10. Briefly describe your primary job responsibilities (i.e., Buying, Inventory Control, Transportation, etc.)

11. Approximate Salary Range:
    Less than $5,000/yr. _____  $ 5,000-$ 8,000 _____
    $ 8,001-$ 11,000 _____  $11,001-$ 14,000 _____
    $14,001-$ 17,000 _____  $17,001-$ 20,000 _____
    $20,001-$25,000 _____  Over $25,000/yr. _____

12. How did you enter the Purchasing Profession? (check one)
    Directly from school or service _______________________
    Moved from another functional area _____________________. (See Question 13)
    Other ____. (Specify) ________________________________
13. Which of the following functional areas were you in prior to entering your present occupational area? (Check one)
Sales _____, Production _____, Finance _____ Personnel _____,
Engineering _____, Other _____ (Specify) _________.

14. Did you earn a College degree? (yes or no) __________
A. (If yes) Degree earned _______ year _________.
   Major ____________________________
B. (If no) Indicate highest educational level completed
   ________________________________

15. Have you completed any graduate level courses? Semester hours _____________.
Degree earned ____________________, Year ________, Major _________.

16. Have you ever participated in a Computerized Management Game? _________.

APPENDIX D

"FINANSIM" INCOME STATEMENT
"FINANSIM"

INCOME STATEMENT

FIRM NUMBER 12                    PERIOD NUMBER 1

Sales Revenue (71125. units at $39.00/unit)  2773875.

Cost of Goods Sold
  Beginning Inventory (3000 at $28.00)  84000.
  Cost of Production (74987. at $30.47)  2284753.
  Goods Available for Sale  2368753.
  Less Ending Inventory (6862. at $30.37)  208424.
  Period Production Expenses  2160329.
  Fixed Manufacturing Expenses  80652.
  Inventory Carrying Costs  62527.
  Depreciation on Plant  80864.
  Depreciation on Machinery and Equipment  49980.  2434352.

  Gross Profit  339523.

Selling and Administrative Expenses  327387.

Operating Income  12136.

Other Revenue
  Income from Securities  20000.

Other Expenses
  Interest on Notes Payable  0.
  Interest on Bank Term Loans  6192.
  Interest on Debentures  28933.
  Bond Redemption Premium Expense  0.  35125.

  Income before Taxes  -2989.
  Income Taxes (50 Per Cent)  0.

  Income after Taxes  -2989.
  Common Stock Dividends  50000.

Net Income Transferred to Retained Earnings  -52989.
APPENDIX E

"FINANSIM" POSITION STATEMENT
"FINANSIM"

POSITION STATEMENT

FIRM NUMBER 12 PERIOD NUMBER 1

<table>
<thead>
<tr>
<th>Assets</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Assets</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>100000.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketable Securities</td>
<td>500000.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts Receivable</td>
<td>277387.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inventory (6862. units at $30.37/unit)</td>
<td>208424.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Current Assets</strong></td>
<td><strong>1085812.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed Assets (Net of Depreciation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant (79892. units at $8)</td>
<td>639136.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machinery and Equipment</td>
<td>99994.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Fixed Assets</strong></td>
<td><strong>739130.</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Total Assets</strong></td>
<td><strong>1824942.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Liabilities and Owner's Equity | | | | |
| Current Liabilities | | | | |
| Accounts Payable | 228475. | | | |
| Accrued Taxes Payable | 0. | | | |
| Bank Notes Payable | 370694. | | | |
| Bank Term Loans Payable | 39979. | | | |
| Debentures Maturing | 52128. | | | |
| **Total Current Liabilities** | **691276.** | | | |
| Long Term Liabilities | | | | |
| Bank Term Loans | 59093. | | | |
| Debentures | 522624. | | | |
| **Total Long Term Liabilities** | **581717.** | | | |
| **Total Liabilities** | **1272993.** | | | |

| Owners' Equity | | | | |
| Common Stock (100000. SH. at $5) | 500000. | | | |
| Paid in Surplus | 25000. | | | |
| Retained Earnings | 26949. | | | |
| **Total Equity** | **551949.** | | | |
| **Total Liabilities and Equity** | **1824942.** | | | |
APPENDIX F

"FINANSIM" SUPPLEMENTAL INFORMATION
**"FINANSIM"**

**SUPPLEMENTAL INFORMATION**

**FIRM NUMBER 12**

**PERIOD NUMBER 1**

<table>
<thead>
<tr>
<th>Cumulative Measures of Overall Performance</th>
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<tbody>
<tr>
<td>Dividends Accumulated per Share</td>
<td>0.0</td>
</tr>
<tr>
<td>Change in Value of Stock per Share</td>
<td>0.0</td>
</tr>
<tr>
<td>Per Share Growth in Owners' Wealth</td>
<td>0.0</td>
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<tr>
<td>Number of Times Insolvent</td>
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<table>
<thead>
<tr>
<th>Information from Previous Decision (Period 1)</th>
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<td>Units Sold</td>
<td>71125.</td>
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<tr>
<td>Actual Demand</td>
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<td>Return on Investment</td>
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<tr>
<td>Return on Equity</td>
<td>-0.0054</td>
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<td>Long Term Debt to Equity</td>
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<tr>
<td>Current Ratio</td>
<td>1.5707</td>
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<tr>
<td>Average Yield on Securities Held</td>
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<tr>
<td>Notes Payable Interest Rate</td>
<td>0.0657</td>
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<tr>
<td>Bank Term Loan Interest Rate</td>
<td>0.0680</td>
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<tr>
<td>Debenture Interest Rate</td>
<td>0.0544</td>
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<tr>
<td>Cost of Capital</td>
<td>0.0345</td>
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<tr>
<td>Common Stock Price at Closing, Dec. 31</td>
<td>4.58</td>
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<tr>
<td>Earnings per Share</td>
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<tr>
<td>Yield on Common Stock</td>
<td>0.1092</td>
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<tr>
<td>Earnings Price Ratio</td>
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<td>Earnings Price Ratio for Industry</td>
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<td>Yield on Securities Purchasable</td>
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<td>Base Debenture Interest Rate</td>
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<td>Base Bank Term Loan Interest Rate</td>
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<td>Debenture Interest due</td>
<td>26309.</td>
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<td>Bank Term Loan Interest Due</td>
<td>3693.</td>
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<td>Fixed Manufacturing Expenses</td>
<td>58029.</td>
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<td>Plant Capacity</td>
<td>79892.</td>
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<td>Plant Capacity in Period 3</td>
<td>73284.</td>
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<td>Machine Capacity</td>
<td>49997.</td>
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### Unit Production Cost

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<th>40000</th>
<th>60000</th>
<th>80000</th>
<th>120000</th>
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</thead>
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<td>Units to</td>
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<td>40000</td>
<td>60000</td>
<td>80000</td>
<td>120000</td>
<td>180000</td>
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<tr>
<td>Cost/Unit is</td>
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### Demand Forecasts

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<tr>
<td>Units</td>
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<td>97979</td>
<td>88304</td>
<td>86728</td>
<td>77928</td>
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### Investment Alternatives

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<tr>
<th>First Cost</th>
<th>Economic Life (Years)</th>
<th>Change in Fixed Expense</th>
<th>Savings per Unit Produced</th>
<th>Maximum Capacity/Alternative</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>36000</td>
<td>5</td>
<td>3000</td>
<td>0.30</td>
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<tr>
<td>B</td>
<td>60000</td>
<td>5</td>
<td>-3000</td>
<td>0.75</td>
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<tr>
<td>C</td>
<td>50000</td>
<td>4</td>
<td>9000</td>
<td>0.60</td>
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</table>
APPENDIX G

"FINANSIM" DECISION FORM
"FINANSIM" DECISION FORM

<table>
<thead>
<tr>
<th>Period Number</th>
<th>Firm Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Capital Improvements
Number to be Purchased (0, 1, 2, or 3 of each)
Alternative A ______ 6
Alternative B ______ 7
Alternative C ______ 8

Capacity Expansion
Expand Plant Capacity by ______ 10 11 12 000 units
Expand Machine Capacity by ______ 13 14 15 000 units
Production Decision--Produce ______ 17 18 19 000 units

Marketable Securities Decision
+ if Purchase
- if Sell

Amount $ ______ 23 000

Bank Term Loan Acquisition
Three Year Loan $ ______ 30 31 32 000
Four Year Loan $ ______ 36 37 38 000
Five Year Loan $ ______ 42 43 44 000

Debenture Decision
Issue Debentures $ ______ 48 49 50 000
Retire Debentures $ ______ 53 54 55 000

Common Stock Decision
Issue $ ______ 60 61 62 000 shares
Pay Dividend of $ ______ 66 67 68 000
APPENDIX H

SAMPLE LETTER MAILED TO PARTICIPANTS AT THE END OF PERIOD 8 EXPLAINING PERSONALITY TEST
NOTICE TO MANAGEMENT GAME PARTICIPANTS

The results of Period 8 are enclosed in this packet and it appears that economic conditions are somewhat brighter for Period 9. The decisions that you have been making during the past 8 weeks hopefully have served two purposes. First, if you have seriously considered the various alternatives and made decisions similar to those that you would have made in an actual situation, you have been through a learning experience that would be difficult to match.

The second purpose that has been served by this experiment centers around the fact that the vast amount of data that we have been collecting may provide the purchasing profession with significant knowledge concerning decision-making ability of purchasing personnel. As you know, we are attempting to correlate the information concerning your decisions with factors such as work experience, educational background, and personality traits. The information that you provided on the "Personal and Professional Data Sheet" when you began this exercise gave us the needed data concerning your work experience and educational background. Enclosed in this packet you will find, in addition to the print-outs that you usually receive, a Meyers-Briggs Type Indicator test booklet and a form F answer sheet. Please read the instructions on the front cover and respond to the questions in the booklet.

It is extremely important that you complete the answer sheet and return it with your period 9 decision along with the test booklet. Please do not write in the booklet due to the fact that it is reusable. An addressed manilla envelope is included in this packet so that you may return:

1. Period 9 decision
2. Form F Answer sheet
3. Meyers-Briggs Type Indicator booklet

After the period 9 decisions have been tabulated you will receive your firm's results and adjusted results of all participants in your group. Even though period 9 is the last period that you will be playing, do not make your decisions solely on the short-run prospects. Adjustments will be made at the end of play that reflect whether or not
your firm is a "going concern." In other words, you should provide for sufficient plant capacity to produce the period 10 demand, etc.

Thank you once again for your participation in this project.

Sincerely,
APPENDIX I

SAMPLE OF LETTER MAILED TO PARTICIPANTS ADVISING THEM CONCERNING THEIR RANK IN THE "FINANSIM" GAME IN RELATION TO THEIR GROUP
NOTICE TO GAME PARTICIPANTS GROUP

Now that the "Finansim" exercise has come to a close, I would like to express my appreciation to each of you who participated. I sincerely hope that you had an enjoyable and educational experience. Your period 9 results are enclosed with this notice. I am sure that each of you are interested in knowing how your firm ranked among the group that you participated with.

As you know, there were many factors that were measured in the game. But in the final analysis, your stockholders were concerned with one overriding measure—their wealth. Therefore, the adjusted ranking that is listed below is based on an adjusted book value of owners equity along with the accumulated dividends per share.

The following list indicates how your firm did in this respect.

<table>
<thead>
<tr>
<th>RANK</th>
<th>FIRM</th>
<th>RANK</th>
<th>FIRM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st.</td>
<td></td>
<td>11th.</td>
<td></td>
</tr>
<tr>
<td>2nd.</td>
<td></td>
<td>12th.</td>
<td></td>
</tr>
<tr>
<td>3rd.</td>
<td></td>
<td>13th.</td>
<td></td>
</tr>
<tr>
<td>4th.</td>
<td></td>
<td>14th.</td>
<td></td>
</tr>
<tr>
<td>5th.</td>
<td></td>
<td>15th.</td>
<td></td>
</tr>
<tr>
<td>6th.</td>
<td></td>
<td>16th.</td>
<td></td>
</tr>
<tr>
<td>7th.</td>
<td></td>
<td>17th.</td>
<td></td>
</tr>
<tr>
<td>8th.</td>
<td></td>
<td>18th.</td>
<td></td>
</tr>
<tr>
<td>9th.</td>
<td></td>
<td>19th.</td>
<td></td>
</tr>
<tr>
<td>10th.</td>
<td></td>
<td>20th.</td>
<td></td>
</tr>
</tbody>
</table>

Many of you have asked for your results on the Myers-Briggs Type Indicator. These results have not been analyzed yet, but we hope to have them analyzed in a few weeks. If you are interested in knowing how you scored yourself on this test, drop me a line and I will give you this information when it is available.

Thank you once again for your enthusiastic acceptance and participation.

Norman D. Ellis
College of Business
Box 13677 NTSU
Denton, Texas 76203
APPENDIX J

SAMPLE LETTER MAILED TO PARTICIPANTS ADVISING THEM OF THE MYERS-BRIGGS TYPE INDICATOR RESULTS
NOTICE TO "FINANSIM" GAME PARTICIPANTS

The "Finansim" game decisions are now in for all six of the groups that participated. We would like to take this opportunity to thank each and every one of you for your cooperation in this exercise. The enthusiastic response that this management game evoked is good indication that you have benefited from this learning experience and we are hopeful that the tabulated results of the game will provide the purchasing profession with some valuable insights into the important variables in purchasing decision making.

Many of you requested the results of the Myers-Briggs Type Indicator (MBTI). Therefore your results along with an explanation of the types are included in this mailing. The MBTI contains separate measurements for determining each of four basic preferences which are important in structuring an individual's personality. The four scales that were measured by the MBTI were (1) extroversion or introversion, (2) sensing or intuition, (3) thinking or feeling, and (4) judgment or perception. Therefore, the four letters in your type as indicated below are intended to indicate your basic preferences as reported by your responses to the questions.

A word of caution is in order at this point. Personality tests alone are not generally accepted as absolutely reliable. They are merely a means of gaining insights into particular traits of individuals. However, for purposes of correlation, personality tests may be considered to be relatively accurate when used with groups of people.

The enclosed explanation of the 16 possible personality types should be helpful to you in interpreting your particular type.

Your type preference as indicated by your responses is

We hope to have all of the data and correlation completed in the next few months. Once again thank you for your cooperation.

Norman D. Ellis

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APPENDIX K

BIOGRAPHICAL, PERSONALITY, AND GAME RESULTS

FOR ALL PARTICIPANTS BY COMPANY NUMBER
<table>
<thead>
<tr>
<th>Company I.D.</th>
<th>Age</th>
<th>Years in Purchasing</th>
<th>Firm Size</th>
<th>Type of Industry</th>
<th>Title</th>
<th>Salary Range</th>
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</thead>
<tbody>
<tr>
<td>A03</td>
<td>32</td>
<td>8</td>
<td>5</td>
<td>Metal Fabrication</td>
<td>Purch. Mgr.</td>
<td>4</td>
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<tr>
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<td>6</td>
<td>Wholesale</td>
<td>Purch. Mgr.</td>
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<tr>
<td>A05</td>
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<td>5</td>
<td>6</td>
<td>Hardware</td>
<td>Purch. Agent</td>
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</tr>
<tr>
<td>A06</td>
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<td>4</td>
<td>Mfr. -- G. Def.</td>
<td>Material Mgr.</td>
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<td>0</td>
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<td>Dir. Purch.</td>
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### FOR ALL PARTICIPANTS BY COMPANY NUMBER

<table>
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<tr>
<th>How Entered Purchasing</th>
<th>Area Moved From</th>
<th>Education</th>
<th>Major</th>
<th>MBIT</th>
<th>Adj. Equity Per Share</th>
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<td>ENTJ</td>
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<td>I.A.</td>
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<td>Bus. Adm.</td>
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<td>Marketing</td>
<td>ISFJ</td>
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<td>Mgt.</td>
<td>ESTJ</td>
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<td>ENTP</td>
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<td>Asst. Purch. Agent</td>
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<td>K03</td>
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<td>K11</td>
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**a** 0 - No data
1 - Over $500 m Annual Sales
2 - $100 m to $500 m Annual Sales
3 - $50 m to $100 m Annual Sales
4 - $10 m to $50 m Annual Sales
5 - $5 m to $10 m Annual Sales
6 - Under $5 m Annual Sales

**b** 1 - $5,000 to $8,000 per Year
2 - $8,000 to $11,000 per Year
3 - $11,000 to $14,000 per Year
4 - $14,000 to $17,000 per Year
5 - $17,000 to $20,000 per Year
6 - $20,000 to $25,000 per Year
<table>
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<th>How Entered Purchasing</th>
<th>Area Moved From</th>
<th>Education</th>
<th>Major</th>
<th>MBIT</th>
<th>Adj. Equity Per Share</th>
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<td>Accounting</td>
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</table>

c1 - Directly from school or service.
2 - Moved from another functional area.

d1 - High School
2 - College Degree - Technical
3 - College Degrees - Non-Technical
4 - Master's Degree
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