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AN EXPERIMENT
IN A PHENOMENOLOGICAL APPROACH
TO THE STUDY OF BUSINESS DECISION-MAKING

presented by

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has been accepted towards fulfillment
of the requirements for

DOCTORAL degree in BUSINESS ADMINISTRATION

A handwritten signature in cursive script, reading "J. M. Farland". The signature is written in dark ink and is positioned above a horizontal line.

Major professor

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ABSTRACT

AN EXPERIMENT IN A PHENOMENOLOGICAL APPROACH TO THE STUDY OF BUSINESS DECISION-MAKING

by Richard Allan Norman

Business behavior is often considered to be a direct function of the business environment: specific changes in the environment cause managers to make specific decisions. An alternative approach is to consider the business decision-maker as an active element in the process, organizing and interpreting environmental changes and choosing appropriate action according to his own definition of the situation. This work reports the results of an exploratory experiment designed to discover some of the problems and opportunities to be found in applying the latter model to business decision-making.

A business game was the research vehicle. The decision behavior of nine teams of undergraduate business students competing in a common "business environment" was used to test the notion that each team would develop a unique definition of the business situation as a basis for its game decisions. An opening series of plays under stable game conditions provided a basis for the development of the team's definition of the situation. Then a drastic change in the game conditions presented a new challenge. The resulting team decisions conformed reasonably well to the

previously developed patterns; each team responded differently, in terms of its own definition of the situation and in the predicted direction.

This model of business decision behavior deserves further research and development. While the present study was confined to the problem of detecting and describing models of the situation without regard to where they came from or how they were formed, while the test situation was vastly over-simplified, and while the method of analysis was primitive, the results suggest that it may be possible to develop understanding of the relationship between a businessman's definition of his business situation and his business behavior. Not only would such understanding have considerable business value, but also it could contribute significantly to the development of a general theory of the firm.

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By

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PART I

THE ISSUE

CHAPTER I

INTRODUCTION

Objectives of the Research

Decision--the choice of some specific act from a set of possible acts--lies at the heart of the systems of human activities we call businesses. This study was designed to find out something about the business decision-making process: to test an approach to the problem of determining why a decision-maker in a particular business situation chooses one course of action rather than another. The study is based on the premise that a decision-maker makes his choice on a basis of his own definition of the situation;¹ he decides on a basis of the present and future possibilities that he perceives in the situation rather than the "facts" of the situation as others might see them. If this is so, then to explain or predict an individual decision-maker's

¹This phrase, used throughout the paper, is taken from the work of W. I. Thomas. In a sense, this research is based on the Thomas theorem which asserts "If men define situations as real, they are real in their consequences." W. I. Thomas, "The Methodology of Behavior Study," Social Behavior and Personality, ed. Edmund H. Volkhart (New York: Social Science Research Council, 1951), p. 81. The phrase is used and the concept discussed in the organization context in James G. March and Herbert A. Simon, Organizations (New York: John Wiley and Sons, Inc., 1958) pp. 151-7.

choice in a particular situation one must know something about how he perceives, organizes and evaluates the elements of that situation as well as how his definition of the situation relates to his decision behavior. The problem this poses is how to go about finding what a decision-maker's definition of his business situation is and how it operates in determining his business behavior. This study provided an experiment in a general approach to that problem; its purpose was to explore the difficulties and opportunities such an approach presents to the study of business decision-making.

The Conceptual Foundation for the Research

The general class of human activity we call business is such a pervasive part of modern life that its significance as a subject of research can be asserted without argument. This particular research addresses those special systems of human behavior we call "businesses." Throughout the study these systems are treated as the cybernetician would view them: not as things, but as ways of behaving.² In addressing a business, the researcher does not ask "what is this thing?" but rather "what does it do?" It supposes that this pattern of activity we call a business could take many forms and it asks why it takes the particular form it does. Why does it deal in the products it does? Why does it make one

²W. Ross Ashby, An Introduction to Cybernetics (New York: John Wiley and Sons, Inc., 1957), pp. 1, 2.

component and buy another? Why does it raise prices instead of lowering them? In short, why is a business what it is? Sooner or later the answers to these questions go back to decisions of the people of the business. To find out what makes a business what it is we must find out something about how people make their business decisions and why they choose one action rather than another. This question is the basic concern of this research.

The decision problem can be attacked from two quite different and in some ways mutually exclusive standpoints: the "objective" or "external" and the "perceptual" or "phenomenological."³ The objective standpoint is located outside of the decision situation. It is the viewpoint of an observer who has access to all of the past and present as well as some of the future "facts" not only of a particular situation but also of many similar situations and who seeks to explain the decision-maker's behavior in the light of all of those observed facts. Oppositely the locus of the phenomenological approach is the decision-maker himself. Metaphorically speaking, the observer seeks to see the situation through the decision-maker's eyes, taking into

³For treatments of the differences between these approaches see Donald Snygg, "The Need for a Phenomenological System of Psychology," The Phenomenological Problem, ed. Alfred E. Kuenzli (New York: Harper and Brothers Publishers, 1959), pp. 3-27; R. B. Macleod, "The Role of Phenomenological Analysis in Social Psychological Theory," Current Perspectives in Social Psychology, ed. E. P. Hollander and Raymond G. Hunt (New York: Oxford University Press, 1963), pp. 28-41.

account his interpretation, organization and evaluation of the situation, seeking an explanation of his decision in the facts which were pertinent to him at the moment of decision. These two approaches deal with quite different sets of facts; they accordingly tend to yield quite different and sometimes quite contradictory explanations of the same decision behavior.

Much of the past research of business decision-making, whether focused on the business as such or on the individual in the business situation, has favored the objective viewpoint. One general class of approach has been to study actual behavior in terms of explicit or implicit standards of what business behavior should be, based on certain ascribed objectives and standards, and then to search out causes and corrections for the deviations. An opposite class of approach starts with various factors which might tend to influence the decision-maker's behavior in particular ways. Still a third approach uses a kind of averaging process to determine how most decisions usually are made in certain general classes of situations. These approaches are nomothetic: they seek general laws applicable to general cases.⁴ While they provide valuable insights to the decision process and speak with authority on what should, could or might happen in general classes of situations, they do not seek

⁴For a discussion of nomothetic and ideographic approaches to this class of research see Gordon W. Allport, The Use of Personal Documents in Psychological Science (New York: Social Science Research Council, 1942), pp. 53-64.

to explain what did happen or predict what will happen in any specific case.

The laws of the general case are of undeniable importance to our understanding of business, but if one assumes free will, the actual behavior of the individual decision-maker is also of crucial importance to both the business practitioner and the business researcher. He is the one who determines what will happen in the "real" case. Whether one assumes business to be a convergent phenomenon seeking equilibrium in a closed system or assumes it to be an emergent phenomenon seeking new directions of growth in an open system,⁵ the actual performance of the operating unit must be explained in terms of the choices of the individual. His decisions, whether they are considered to be creative or deviant, information or noise, determine what the business is. And to understand something of them requires an idiographic approach, an approach that deals with the individual case and that is centered on the decision-maker as the independent variable, the active agent in the situation. This research explores the possibilities of such an approach.

⁵For discussions of these differences see Irving Langmuir, "Science, Common Sense and Decency," Science, Vol. 97, No. 2505 (January, 1943), pp. 107, and R. Boguslaw, The New Utopians (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1965). With regard to decision theory, see Charles F. Wilson and Marcus Alexis, "Basic Frameworks for Decisions," Journal of the Academy of Management, Vol. 5, No. 2 (August, 1962), pp. 150-164.

The Problems Addressed by the Research

The basic problems this research addresses are (1) how to find out what a business decision-maker's definition of a situation is and (2) how to relate that definition of the situation to his decision behavior.

The underlying postulates are these:⁶

1. Business decisions are purposeful; they are not random or capricious.
2. Business decision's are determined by the decision-maker's current definition of his business situation: the present facts and future possibilities that he perceives in the existing situation.⁷
3. The decision-maker's definition of his business situation has properties such as these:
 - a. Discriminable elements: it is made up of the set of elements he differentiates in the situation.
 - b. Organization: the elements are related to one another and to the whole in some way that is meaningful to the decision-maker.
 - c. Fluidity: the content and organization of the definition of the situation is subject to change.

⁶These are partially derived from Arthur W. Combes and Donald Snygg, Individual Behavior (revised edition; New York: Harper and Row, Publishers, 1959), pp. 16-36.

⁷Kurt Lewin, "Field Theory and Learning," Field Theory in Social Science, ed. Dorwin Cartwright (New York: Harper and Row, Publishers, 1964), pp. 60-84.

d. Stability: the rate at which the definition of the situation can change is limited.

4. Although each person's definition of his situation is a unique product of his particular background, it is taken to be grounded in some common "reality;" thus it is possible for one person to understand enough of another's definition of his situation at a given point in time to explain and predict some aspects of his behavior in that situation and at that time. (Note that this study is concerned with what an individual's definition of his situation is at the time of decision and how it relates to his decision; it is not concerned with where his definition of the situation comes from or why he defines it in the particular way he does. For our purposes of the moment this is considered as a separate field of study.)

These postulates assert that while the decision of the individual is quite unique, people share certain general approaches to perceiving and organizing present facts and future possibilities.⁸ The central task is to find out something about these general approaches--to find out in a general way

⁸For a discussion of some of the concepts underlying these postulates see George H. Mead, Mind, Self and Society (Chicago: The University of Chicago Press, 1934) and Herbert Blumer, "Society as Symbolic Interaction," Human Behavior and Social Process, ed. Arnold M. Rose (Boston: Houghton Mifflin Company, 1962), pp. 179-192.

how people go about defining their individual business situations.⁹ How do they perceive, differentiate and categorize its elements? How do they relate those elements one to another in terms of some over-all direction or purpose? What internal consistency is required? Then how do they modify their definition of the business situation? How do they change it and at what rate can they change it? How much consistency must be maintained over time? And then what is the relationship between the decision-maker's definition of the situation and his actual decision behavior? If one can reconstruct a decision-maker's definition of his business situation, can he use it to define the set of alternatives the decision-maker will consider in a particular case? Can he use it to predict the direction and magnitude of the decision-maker's response in a given situation?

But one must seek answers to these general questions at the level of the individual decision-maker. How does one go about finding what a particular person's definition of a specific business situation is in a given instance? How does he detect and measure its changes? And how does one relate his understanding of an individual's definition of his situation to actual decision behavior in specific cases? If one seeks the answers to these questions by the direct approach of asking the subject, the question tends

⁹For a discussion of this general problem see Jerome S. Bruner, Jacqueline J. Goodnow and George A. Austin, A Study of Thinking (New York: Science Editions, Inc., 1956).

to destroy its own purpose by changing the subject's perception of the situation. The alternative approach of non-directive observation either throws the observer back into a behavioral approach or, what amounts to the same thing, invites the researcher to interpret the subject's statements and actions in terms of the researcher's own definition of the situation. This study did not set out to resolve these basic problems of research methodology but to explore pragmatically the feasibility and utility of a specific way of gaining experience with the general conceptual framework provided by the phenomenological approach in a business setting. In short it attempted to test a way of finding out what a business decision-maker's definition of a business situation is and how that definition of the situation relates to business behavior.

The Research Approach

This research explored the concept that a business decision-maker has what to him is a satisfactorily consistent, coherent, stable over-all picture of his business situation. It assumed that his specific statements about the operating details of his business as well as his specific day-to-day business actions are all inter-related bits and pieces of a single total picture. Hence if one were to collect a wide variety of such bits and pieces--such things as discussions of specific operating rules and limitations, explanations of policies, arguments for specific decisions,

and actual decisions as they occur in the context of actual operating conditions--one should be able to fit them into a more or less accurate and useful over-all approximation of the decision-maker's total picture: his definition of the business situation. While one would expect such a construct to be subject to continual change, one might also anticipate that its basic configuration will not change so fast as to destroy its usefulness as a subject of research.

A business game served as a laboratory for a controlled experiment in the use of the phenomenological frame of reference in the study of business decision-making; it provided not only a business-like situation, but also one that could be suitably observed and controlled for the purposes of the research. Teams of college students served as decision-making units; each team was considered as an individual decision-maker.¹⁰ The written plans and strategy statements of the team members, their individual forecasts and decision recommendations and the team decision discussions provided the raw data for reconstructing the team's definition of its situation. After an opening series of team decisions had provided an opportunity to develop an understanding of each

¹⁰This use of the term decision-maker is the same as that expressed by R. Duncan Luce and Howard Raiffa, Games and Decisions (New York: John Wiley and Sons, Inc., 1957), p. 13: "Any decision-maker--a single human being or an organization--which can be thought of as having a unitary interest motivating its decisions can be treated as an individual . . ." The concept is discussed in more detail in Chapter III, p. 48.

team's basic mode of approach, a drastic change was introduced in order to find out how each team would respond to new conditions and how its responses related to its previously established definition of the situation. After a subsequent series of plays the accumulated data were analyzed not only from the standpoint of characterizing each team's unique approach to the problem, but also from the standpoint of finding out something about how the teams went about selecting, organizing and using their definitions of the situation. Although each team exhibited the expected highly individual decision behavior, they all appeared to follow the same general approach to the problem, using similar techniques to deal with the game's uncertainties and ambiguities.

The General Conclusions

These experiments indicate that this general avenue of research is worth pursuing. The basic concept of the phenomenological approach--that is, the idea of viewing business decision-making from the standpoint of the decision-maker--promises to provide an effective approach to explaining why an actual decision is what it is and thereby to afford insights to the mechanisms that make a business the unique system of behavior it is. The inductive approach of fitting a large number of specific bits and pieces of information together to form a more or less consistent and stable decision framework appears to offer a practical

approach to applying the concept to actual situations, provided a more rigorous and systematic method of handling the data can be developed. But the most challenging and potentially rewarding problems revealed by the research center on the study of the processes the decision-maker uses to construct and modify his definitions of business situations. Decision-makers appear to have certain basic ways of approaching and dealing with the highly complex, uncertain, ambiguous situations found in business. They seem to choose a focus of attention¹¹ or a direction of change which serves to give meaning to the elements of the situation and around which the elements of the situation can be organized. They seem to use various coding devices for simplifying the situation by reducing the number of alternatives that need to be considered at any one time to a "manageable" number and by suppressing confusing uncertainties or unwanted variations.¹² If we can find out something about how these processes apply to the practice of business decision-making, we may be able to increase not only our understanding of the operation of the business organism, but also our ability to use it effectively for human good.

¹¹March and Simon, loc. cit., p. 152.

¹²George A. Miller, "The Magical Number Seven, Plus or Minus Two: Some Limits on our Capacity for Processing Information," The Psychological Review, Vol. 63 (March, 1956), pp. 81-97.

The Organization of the Thesis

The foregoing has set the general background for the research: its objectives, its conceptual foundations, the nature of the problem it addressed, the way it attacked that problem and the possible contributions that might arise from the study. The following chapters report the research findings and conclusions. Chapter II discusses the ways in which the phenomenological approach may serve to supplement some of the more usual approaches to the decision problem. Chapter III discusses some of the difficulties of the phenomenological approach and the details of how this particular research approach was laid out. Chapter IV treats the research design: it describes the game, how it was played and how the play was observed and recorded to provide the desired data. Chapter V reports the findings of the research: how each team perceived the game situation, the focal point it chose as a basis for organizing its approach and the resulting decision patterns. Chapter VI discusses the implications of the experiment: the general conclusions that may be drawn and the future possibilities that flow out of this particular definition of the definition of the situation.

CHAPTER II

THE DECISION PROBLEM

This research addresses the basic question of what makes a business what it is: why, out of all the forms it might take, a business takes the particular form it does. It seeks to attack this problem through the study of decision-making: why does a business decision-maker in a particular situation choose one course of action rather than some other possible courses of action? A review of past work in this area reveals that much of it has sought understanding of decision processes from an objective viewpoint, seeking to classify relationships between objectively observable conditions or events and associated actions. While these approaches have produced a considerable body of significant and highly useful knowledge, they tend to leave a part of the problem untouched: the part of the decision-maker as such, as an active agent capable of evaluating alternatives and making real choices. This chapter seeks to show how this problem fits into some of the more usual approaches to decision-making and how the phenomenological method may serve to supplement those approaches in developing our understanding of the decision-making process.

The Mechanistic Approach

The term mechanistic is used to refer to all those approaches to the study of business that consider a business as a system of activity that is fundamentally determined by its environment. In this viewpoint a business is taken as a member of a closed system; its operating conditions and its goals are determined by the greater system of which it is a part and thus its behavior can be fully explained in terms of its responses to the demands imposed on it by the forces of that greater system. These approaches tend to consider business to be a convergent phenomenon; they search for the general laws that govern all business behavior. Their methods tend to be quite objective: they take the viewpoint of an omniscient outside observer who sees the system as a whole; then they seek to associate the stimuli they perceive in the environment with the responses of the businesses, searching for central tendencies and averages in large numbers of cases.¹

The underlying model that provides the conceptual framework for most of these studies is the economist's concept of the perfect firm in the perfectly competitive market. In this viewpoint a business is considered to be a completely rational profit maximizing mechanism that converts inputs to outputs by some set production function in response to

¹A number of writers have reviewed and categorized the varieties of approaches to the study of business. See for example and for references Joseph W. McGuire, Theories of Business Behavior (Englewood Cliffs, N. J., Prentice-Hall, Inc., 1964).

whatever conditions are imposed on it by its factor and product markets. It has complete information about its environment, its goals are defined and its operating mechanism is essentially fixed. Its central task is to adjust its rate and mix of inputs and outputs to meet the demands and conditions determined for it. In short, the business is a determinate machine; it is completely determined by its environment.²

This model, like the concept of the frictionless engine or the noiseless communication channel, is not intended to represent actual business conditions but to serve as a conceptual device, an abstraction of certain operating tendencies, a logical construct representing how a business should (and presumably could) operate under ideal conditions. While it does not purport to represent how a business can or does operate under actual conditions, it is often taken as a desirable theoretical objective, a goal for which businessmen should and do strive. And as such, it is often taken as a bench-mark for the analysis of actual operations; economic efficiency becomes a norm against which actual operations

²These basic concepts are expressed in most currently used economics texts. See for example Kenneth E. Boulding, Economic Analysis (3d ed.; New York: Harper and Brothers, 1955), pp. 491-503; Milton Friedman, Price Theory (Chicago: Aldine Publishing Company, 1962), pp. 93-94; Richard H. Leftwich, The Price System and Resource Allocation (New York: Holt, Rinehart and Winston, 1960), pp. 12, 107; H. H. Liebtrofsky, The Nature of Price Theory (Homewood, Ill.: The Dorsey Press, Inc., 1963), pp. 216-246; Tibor Scitovsky, Welfare and Competition (Chicago: Richard D. Irwin, Inc., 1951), pp. 109-113.

should be measured. Thus in this conceptual framework, the problem of understanding business decision-making becomes one of understanding what choices should be made according to the dictates of the economic model as well as how and why actual business choices differ from what they should have been.

The problem of the differences has been approached in decision theory.³ Where the pure economic model supposes that the decision-maker has complete information as a basis for his choices, decision theory considers the cases where he does not have such information. It still considers the firm as a determinate machine with goals that either are or can be objectively defined or ranked, but it considers how the business should operate in the presence of uncertainty or risk or both and seeks to define the rules and procedures the decision-maker should follow to accomplish his purposes under such conditions. Probability theory, operations research, game theory, utility theory and a variety of other related disciplines and techniques treat different aspects of the problem, but all within the conceptual framework of

³Some general reviews of the bases for varieties of decision theory are Stephen H. Archer, "The Structure of Management Decision Theory," Academy of Management Journal, Vol. 7, No. 4 (December, 1964), pp. 269-287; William J. Gore and Fred S. Silander, "A Bibliographic Essay on Decision-Making," Administrative Science Quarterly, Vol. IV, No. 1 (June, 1959), pp. 97-121; Martin Shubik, "Studies and Theories of Decision-Making," Administrative Science Quarterly, Vol. 3, No. 3, pp. 289-306.

the determinate machine. The system is taken to have an objectively knowable goal; it operates on a basis of certain objectively determinable facts. The basic problem is not really a problem in decision at all; it is one of designing a program or procedure that will make the best possible use of the information available in achieving a specified objective or result. Discrepancies between actual and ideal performance are to be expected because of random variations in the phenomena themselves or because of lack of knowledge, but such discrepancies can be accounted for and controlled by appropriate techniques. Basically, decision theory addresses a problem of machine design.

Other students of business decision-making processes seek to explain the differences between what a business is and what it should be in terms of human factors. These approaches either explicitly or implicitly accept the business as a determinate machine; they focus on the causes and corrections of inefficiencies resulting from human errors, human limitations and human nature. For example the scientific management of Frederick Winslow Taylor was based on an acceptance of the existence of a "one best way" and devoted itself to the technical problems of finding and effecting it.⁴ Likewise the so-called human relations

⁴Frederick W. Taylor, "The Principles of Scientific Management," Classics in Management (New York: American Management Association, 1960), pp. 82-113. (Originally in Scientific Management [Hanover, N. H.: Dartmouth College, 1912], pp. 22-55).

approaches that followed scientific management accepted the notion of determinable organizational standards and goals; it measured performance against such standards and concerned itself with the problems of getting people to accept and conform to the objectives of the firm.⁵ Many of the more recent empirical studies of organization behavior also take the general mission of the business and its standards of performance as an externally imposed, immutable framework and describe individual behavior in terms of that framework either as conforming to it or rebelling against it or twisting and distorting it.⁶ In all of these views the actual behavior of the business--what the business is--is explained in terms of an implicit or explicit norm and the deviant behavior of the individuals who take part in it.

A variation of this approach again accepts the theoretical existence of the perfect business mechanism but seeks to explain the actual in terms of human limitations. By this view men would achieve the ideal of the economists if they could but they cannot because of the limitations of their

⁵For example, Rensis Likert, New Patterns of Management (New York: McGraw-Hill Book Company, Inc., 1961) or Douglas McGregor, The Human Side of Enterprise (New York: McGraw-Hill Book Company, Inc., 1960).

⁶Chris Argyris, Interpersonal Competence and Organizational Effectiveness (Homewood, Illinois: The Dorsey Press, Inc., 1962); Victor A. Thompson, Modern Organization (New York: Alfred A. Knopf, 1961).

physiological equipment.⁷ They are simply not capable of gathering all available information nor are they capable of processing and evaluating all that they can gather. Hence while the ideal of what a business should do holds as a basic objective and action framework, what a business does do or can do is considered to be determined by the information handling capabilities of the decision-makers. This line of reasoning suggests that the core problem centers on devising means of extending the individual's data processing capacity by the use of computers and self-regulating equipment: to minimize if not eliminate human intervention in the business mechanism.⁸

In all of these concepts business decision-making in the sense of a free choice between different possible and desirable alternatives does not exist in any positive sense.⁹ Risk may exist, but the mechanisms of choice are reducible

⁷Herbert A. Simon, Administrative Behavior (2d ed. with new introduction; New York: The Macmillan Company, 1957); Richard M. Cyert and James G. March, A Behavioral Theory of the Firm (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1963).

⁸Herbert A. Simon, "The Corporation: Will It Be Managed by Machines?" Management and Corporations, ed. Melvin Anshen and Gary Leland Bach (New York: McGraw-Hill Book Company, Inc., 1960), pp. 17-55; Harold J. Leavitt and Thomas L. Whisler, "Management in the 1980's," Harvard Business Review, November-December, 1958, pp. 41-48.

⁹Charles K. Ramond, "Theories of Choice in Business," The Frontiers of Management Psychology, ed., George Fisk (New York: Harper and Row, Publishers, 1964), pp. 3-17.

to rational rules of behavior. Uncertainties may exist, but they too are reducible to mathematical formulae, at least in theory. Supposedly there are ways of determining some "best" course of action in any given business situation with any given amount of information.

Limitations of the Mechanistic Approach

The mechanistic approach to business decision-making seeks first to show how a business mechanism responds to certain given inputs of information under certain given goal conditions. It attempts to describe the business's sensing apparatus, its automatic transformation mechanisms and its internal regulating devices. Then it seeks to detect and describe the possible sources of inefficiencies or noise in the system and to prescribe means of reducing and controlling such unwanted variations. However this entire structure rests on the "givens": the information inputs on which it operates and the output goals which regulate its operation. Thus while it may be able to prescribe how certain information should be processed to achieve selected goals or to describe what information might usually be expected to be selected and processed in developing and arriving at generally accepted goals, it has difficulty explaining or predicting what decision an individual actually makes in a given situation. The central reason for this difficulty is that his inputs to the decision mechanism are uniquely his own; they are functions of his perception and interpretation of the world and his relationship to it. Hence

even though the decision-maker uses impeccable logic in his decision processes, taking advantage of all available correction factors and regulating devices, the output--his choice of action--will be largely determined by his inputs: the facts which he sees as significant to his situation.

While relatively little work has been done in exploring the nature of the inputs to business decision-making processes, students have long recognized the crucial role of people's systems of beliefs and values in probability theory. The so-called subjectivist school of statistical decision theory¹⁰ "holds that probability measures the confidence that a particular individual has in the truth of a particular proposition. . . ." ¹¹ According to Lord Keynes, "The term certain and probable describe the various degrees of rational belief about a proposition which different amounts of knowledge authorize us to entertain. . . . To this extent, therefore, probability may be called subjective."¹² These statements serve to highlight the concept that decision theory deals more with people's knowledge and beliefs about the real

¹⁰Frank P. Ramsey, The Foundations of Mathematics and Other Logical Essays (New York: Harcourt, Brace and Co., 1931); Leonard J. Savage, The Foundations of Statistics (New York: John Wiley and Sons, Inc., 1954); Robert Schlaifer, Probability and Statistics for Business Decisions (New York: McGraw-Hill Book Company, Inc., 1959).

¹¹Savage, op. cit., p. 3.

¹²John Maynard Keynes, A Treatise on Probability (New York: Harper and Row, Publishers, Harper Torchbook edition, 1962).

world than about objective facts of the real world: that it measures "confidence in the truth of a particular proposition," "degrees of rational belief;" it centers on a "state of mind."¹³ This is not to say that probability is subject to human caprice. As Keynes points out, "A proposition is not probable because we think it so. When once the facts are given which determine our knowledge, what is probable or improbable in these circumstances has been fixed objectively, and is independent of our opinion."¹⁴ However, the key phrase is "when once the facts are given." What facts? Given by whom?

R. Duncan Luce, in the introduction to Individual Choice Behavior, states the problem as follows:

So far, there seems to have been an implicit assumption that no difficulty is encountered in deciding among what it is that an organism makes its choices. Actually, in practice, it is extremely difficult to know, and much experimental technique is devoted to arranging matters so that the organism and the experimenter are (thought to be) in agreement about what the alternatives are. All of our procedures for data collection and analysis require the experimenter to make explicit decisions about whether a certain action did or did not occur, and all of our choice theories--including this one--begin with the assumption that we have a mathematically well-defined set, the elements of which can be identified with the choice alternatives. How these sets come to be defined for organisms, how they may or may not change with experience, how to detect such changes, etc., are questions that have received

¹³Nicholas Georgescu-Roegen, "The Nature of Expectation and Uncertainty," Expectations, Uncertainty, and Business Behavior, ed. Mary Jean Bowman (New York: Social Science Research Council, 1958), p. 12.

¹⁴Keynes, op. cit., p. 4.

but little illumination so far. There are limited experimental results on these topics, but nothing like a coherent theory. Indeed, the whole problem still seems to be floundering at a conceptual level, with us hardly able to talk about it much less to know what experiments to perform.¹⁵

In other words, while the decision system itself may be logical and internally consistent, it is not independent and it is not closed. It depends on certain inputs of "amounts of knowledge" and "states of mind;" these are the raw materials with which it works. As these inputs change, the outputs will change, so that in many respects choice lies not at the output end but at the input both with respect to the information and the decision system used. Hence, to explain a particular decision, it is not enough to account for the rational processes that a decision-maker could or should use in a particular situation; it is also necessary to know something of his "amount of knowledge" and "state of mind;" we must know how he defines the situation.

But the problem extends beyond knowledge of possible states of the world. Choice of action depends not only on one's expectations--his beliefs about alternatives and probable outcomes--but also on his preferences in the specific situation in which he finds himself. The problem of utility measurement is of equal significance to decision theory as is the problem of expectations.¹⁶ In the business

¹⁵R. Duncan Luce, Individual Choice Behavior (New York: John Wiley and Sons, Inc., 1959), pp. 3-4.

¹⁶For a discussion of the place of utility theory in

situation, the simple notion of profit maximization seldom, if ever, presents a useful, clean-cut, unambiguous goal suitable for decision purposes. Rather, it is but one member of a set of goals, hedged by all manner of considerations ranging from government regulations to the company president's self-image. There is no need to review utility theory here;¹⁷ suffice it to say that currently the closest approach to a means of objectively defining or measuring utility seems to be to have the subject express his preferences in terms of an imaginary lottery that may be compared with the real choice situation,¹⁸ and even this approach is hedged in by somewhat questionable assumptions of transitivity and localization of effects. All this is not to say that utility theory does not play an important and useful part in decision theory. However, the problems that have been encountered in treating individual preferences objectively lend emphasis to the vital

decision problems, see Chapter 2, R. Duncan Luce and Howard Raiffa, Games and Decisions (New York: John Wiley and Sons, Inc., 1957), pp. 12-38.

¹⁷The basic problem is discussed by R. Duncan Luce and Howard Raiffa, Ibid. Among the classic reviews of the problem are Kenneth J. Arrow, "Alternative Approaches to the Theory of Choice in Risk Taking Situations," Econometrica, Vol. XIX (October, 1951), pp. 404-437; Ward Edwards, "The Theory of Decision-Making," Psychological Bulletin, Vol. 51, No. 4 (July, 1954), pp. 380-417; and Mary Jean Bowman (ed.), Expectations, Uncertainty, and Business Behavior (New York: Social Science Research Council, 1958).

¹⁸Robert Schlaifer, Probability and Statistics for Business Decisions (New York: McGraw-Hill Book Company, Inc., 1959), pp. 24-48.

role of the individual--his definition of the situation, his expectancies and his preferences--in the decision process.

Thus the classical approach to business decision-making leaves us with the problem of the givens. Any business situation provides an almost infinitely large number of possibilities for organization and interpretation. What facts are pertinent in a given situation? What elements are to be differentiated and categorized? How are they to be organized and related to one another? And to what purpose? What is the underlying principle of organization, the direction of change that gives meaning and connectedness to the various elements of the situation? The bare elements of the situation have no meaning or organization by themselves; they derive their significance and their interconnectedness from someone's definition of the situation. So "what a business is" is dependent on the particular arrangement of facts which the decision-maker considers to be applicable within the framework of his individual system of attitudes and values; these are the "givens," the inputs to the decision system. While the mechanistic approach may be able to tell us what actions should be taken or can usually be expected to be taken under various assumed or conventionalized definitions of the situation, it has difficulty in telling us what actions will be taken in situations that are subject to the actor's definition, and this appears to be the important case in business.

Behavioral Approaches

Another general avenue of attack on the problem of business decision-making starts at the other end of the sequence: the possible factors that may cause an individual to define a situation and respond to it in some particular way. These approaches range from studies of linguistics and cultural anthropology through sociology and social psychology to experimental and clinical psychology. They combine to show us that in any situation the individual's behavior is subject to an extraordinarily complex array of conscious and extra-conscious influences.¹⁹ They also show us that different individuals in objectively similar situations may define those situations quite differently, depending on what present or past influences are effective in their individual cases. A vast amount of work has been directed toward isolating and measuring behavioral relationships. For the business decision-making problem, the results have been an embarrassment of riches: any past decision may be ascribed to a wide variety of causes and any future decision may be projected in a number of different directions depending upon what influencing factors are considered and how they are arranged and weighted. While it is undeniable that these studies provide invaluable insights to what factors might be at work in a particular instance or what typical results one might expect from certain

¹⁹An inventory of such findings running over 600 pages may be found in Bernard Berelson and Gary A. Steiner, Human Behavior (New York: Harcourt, Brace and World, Inc., 1964).

causal factors, by themselves they are not intended nor can they be expected to help us explain the unique situation or predict the individual decision. To do this we cannot start with all possible causes and move toward the resulting effect; if anything we must start with the effect and work backward to understand its causes. To use W. I. Thomas's phrase, "We must first understand the past from the present."²⁰

The Phenomenological Approach

The phenomenological approach to the question of what makes a business what it is centers on the decision-maker. It asserts that at least to some extent the business is what he decides it shall be. It assumes that a business is an open system,²¹ capable of growth in itself, and a part of a larger open system which also is capable of growth. The business is considered to be capable of organizing and increasing its internal order and of exchanging energy and information with its environment. While the larger system presents the business with its conditions of survival and growth, in surviving and growing the business helps shape the larger system of which it is a part. Thus the behavior

²⁰Thomas, "The Need for A Social Science," loc. cit., p. 37.

²¹For discussions of the concept of the open system, see Ludwig von Bertalanffy, Problems of Life (New York: Harper and Brothers, 1952); Gordon W. Allport, "The Open System in Personality Theory," Journal of Abnormal and Social Psychology, Vol. 61 (1960), pp. 301-11; and Boguslaw, loc. cit.

of the business must be explained in terms of the volitional activity of people: people who go beyond the search for stability; people who conceive and act to realize new possibilities. As such the significant aspects of its behavior are not to be found in the anonymous, convergent, equilibrium-seeking tendencies of the closed system, but in the unique, creative, emergent departures of the dynamic, growing system. These concepts lead to an idiographic rather than a nomothetic approach; a search for meaning, direction and connectedness in the individual creation rather than in the general case. Accordingly its method is to seek the viewpoint of the decision-maker, to try to see the situation as he perceives it in terms of his purposes and goals rather than to approach the problem as an outside observer with a prepared point of view of what the business "should" do.

The initial problem of this approach centers on perception: "the processes by which people select, organize and interpret sensory stimulation into a meaningful and coherent picture of the world."²² In any given situation the decision-maker has before him an almost infinite variety of stimuli. Which ones he responds to and how he organizes

²²Berelson and Steiner, loc. cit., p. 88. For a comprehensive review of theories of perception see Floyd H. Allport, Theories of Perception and the Concept of Structure (New York: John Wiley and Sons, Inc., 1955); Jerome S. Bruner, "On Perceptual Readiness," The Psychological Review, LXIV (1957), pp. 123-152, presents a statement of the problem together with extensive references.

them into a meaningful and coherent picture of the world may depend on a wide variety of factors ranging from immediate physiological conditions--say a state of hunger--to more remote psychological factors going back into his childhood.²³ While it is of undoubted importance to understand what these factors are and how they operate, for purposes of the moment it is sufficient to note that this variety exists: that a decision-maker may perceive a situation in many different ways depending on his current perceptual field--his "life space" in Lewin's terms.

The elements of a situation an individual perceives is to some extent dependent upon the categorizing system which he brings to the situation.²⁴ He has ways of discriminating between some aspects and grouping others as equivalents; in other words, he has a coding system which enables him to reduce the infinite variety of surrounding stimuli to some manageable and useful number of classes. To follow the general line of reasoning developed by George Herbert Mead,²⁵ the coding system may be thought of as a way of imparting meaning to a collection of stimuli. According to Mead, "language does not simply symbolize a situation or object which is already there in advance; it

²³For a review of research in this area, see Bruner, op. cit.

²⁴Bruner, Goodnow and Austin, loc. cit.

²⁵Mead, loc. cit.

makes possible the existence or the appearance of that situation or object, for it is a part of the mechanism whereby that situation or object is created."²⁶ Thus in this view, "Man lives in a symbolic environment as well as a physical environment and can be stimulated to act by symbols as well as by physical stimuli."²⁷ And in rationally considering future action (as opposed to instinctive response), he tends to deal with some sort of symbolic representations of what might be in order to determine his course of action. The processes by which an individual develops his coding system appear to range from linguistic and cultural forces to highly personal learning experiences; these need not concern us here. It is important to note, however, that there are grounds for believing (1) that such coding systems are of the nature of pragmatic classification schemes invented by men to deal with the practical problems of existence,²⁸ (2) while the individual's coding system is largely the product of cultural and social forces, it can and does vary within that framework,²⁹ and (3) while the individual's coding

²⁶Ibid., p. 78.

²⁷Arnold M. Rose, Human Behavior and Social Processes (Boston: Houghton Mifflin Company, 1962), p. 5.

²⁸For an analysis of the psychological processes involved, see Bruner, Goodnow and Austin, loc. cit. For an analysis of the mechanical processes, see W. Ross Ashby, Design for a Brain (2d ed. rev. New York: John Wiley and Sons, Inc., 1960).

²⁹Bruner, Goodnow and Austin, loc. cit.

system may change with change in his experience, the rate at which it changes tends to be limited.³⁰

In extending this conceptual framework to the analysis of business decisions, one is led to the conclusion that to understand a businessman's choice of action, one must understand the unique system of symbolization which he as an individual uses to represent the present and possible business situations he faces: the coding system which he uses to select, organize and interpret the sensory stimulation of his business situation into a meaningful and coherent picture of the world. In other words, one needs to know the processes by which the businessman defines his situation.

Herbert Blumer views the basic problem as follows:

Insofar as sociologists or students of human society are concerned with the behavior of acting units, the position of symbolic interaction requires the student to catch the process of interpretation through which they construct their actions. This process is not to be caught merely by turning to conditions which are antecedent to the process. Such antecedent conditions are helpful in understanding the process insofar as they enter into it, but . . . they do not constitute the process. Nor can one catch the process merely by inferring its nature from the overt action which is its product. To catch the process, the student must take the role of the acting unit whose behavior he is studying. Since the interpretation is being made by the acting unit in terms of objects designated and appraised, meanings acquired, and decisions made, the process has to be seen from the standpoint of the acting unit. It is the recognition of this fact that makes the research work of such scholars as R. E. Park and W. I. Thomas so notable. To try to catch the

³⁰L. Festinger, A Theory of Cognitive Dissonance (New York: Row, Peterson, 1957); Roger Brown, Social Psychology (New York: The Free Press, 1965), pp. 549-609.

interpretative process by remaining aloof as a so-called "objective" observer and refusing to take the role of the acting unit is to risk the worst kind of subjectivism--the objective observer is likely to fill in the process of interpretation with his own surmises in place of catching the process as it occurs in the experience of the acting unit which uses it.³¹

Thus to determine the decision-maker's definition of his situation in the individual case one must somehow put himself in the decision-maker's situation and discover what he is trying to accomplish, what his intentions are. This basic direction of change may be taken as the independent variable in the situation; it gives relevance to the parts. The differentiated elements of the environment become dependent variables, deriving their meaning and their interconnectedness from this central direction. From the standpoint of the decision-maker their very existence is dependent upon that relationship. That which exists for him exists in terms of its bearing on his intentions; conversely, anything which has no bearing on his intentions has no sensible existence for him.

Conclusion

The decision problem--the problem of what makes a business what it is--can be approached from many standpoints, all of which help increase our understanding of decision-making and business. Both the mechanistic and the behavioral

³¹Blumer, "Society as Symbolic Interaction," in Rose, op. cit., p. 188.

approaches, essentially nomothetic in orientation and objective in method, tell us a great deal about the general structures of business decision-making processes: the factors that tend to limit and channel business decisions, the central tendencies within those channels and the rules of good decision practice. A phenomenological approach, idiographic in orientation, based on discovering the viewpoint of the decision-maker as an independent individual, may be capable of opening another dimension of understanding of the decision-making process; one which may lead to an ability to explain and predict the direction and magnitude of the individual decision.

CHAPTER III

THE RESEARCH PROBLEM

Underlying Problems of Phenomenological Research

The underlying problems of applying the phenomenological model to the study of business decision-making revolve around the nature of the basic datum itself: a person's conception of a total situation of which he is a central part.¹ To discover this conception it is necessary to know something other than how that person observes the situation; it is necessary to know how he experiences it--perhaps how he creates it as an experience. Not only is such datum inaccessible to direct observation, but the very process of observing the process tends to change it. And to further complicate the problem, this elusive, highly personal conception that is the subject of the research is itself continually changing. While it may have certain stable, continuing properties, at the same time it is in a constant state of flux as it perceives and responds to new aspects of its environment. To the researcher who would scientifically explore other people's perceptions of the world, these

¹The general problem is explored in depth by Stephen Strasser, Phenomenology and the Human Sciences (Pittsburg, Pa.: Duquesne University Press, 1963).

properties present extraordinarily difficult problems. But the existence of these problems in and of themselves need not invalidate the underlying concept nor destroy its usefulness. On the contrary, they represent basic challenges to the ingenuity of those who would develop such an approach to business phenomena.

The first general class of research problem is data collection: what information can one get? And how can he get it? Insofar as one cannot observe the subject's experiencing processes directly, he must work with some sort of representation of those processes, some secondary manifestation or explanation of how the decision-maker perceives the situation in which he finds himself. Regardless of the form that representation takes, the translation will cost information: the expression of the idea will be less than the idea itself. And in addition to those distortions, the process of finding out what the representation is presents further opportunities for error. Suppose one elects a direct approach: in one way or another he asks the subject how he defines his business situation. The effect is something like Stephen Potter's Gamesmanship ploy of asking a golfing opponent how he holds his club; as soon as you call his attention to it, he no longer knows how he holds his club, nor can he soon again hold it as he does in his usual play of the game. Similarly if you ask a business man to define his situation you are likely to get back not a report of how he actually experiences his situation, but

an "outsider's" account of how he observes himself experiencing the situation. This is the problem of introspection, a problem that has had a long history in the study of psychology and one that continues to represent a serious obstacle to the securing of accurate and reliable phenomenological data.² On the other extreme, however, the researcher seeking to explain a decision-maker's behavior entirely on a basis of "objective" observations of that behavior may tend toward what Blumer calls the "worst kind of subjectivism": an unwitting tendency to accumulate, organize and interpret data in accordance with the researcher's own preconceived ideas by the use of a Procrustean framework that distorts or completely destroys the decision-maker's actual point of view.³ Neither of these dangers can be entirely eliminated. On the one hand, the researcher must to some extent rely on what the decision-maker says about his situation. He needs to listen to how the decision-maker explains his choices even though the validity of the explanation itself may be suspect. On the other hand the researcher must also use some sensible scheme to differentiate and organize the data he collects in his observations even though his system of organization may

²For a review of the basic problem see Edwin G. Boring, "A History of Introspection," Psychological Bulletin, Vol. 50, No. 3 (May, 1953), pp. 169-89.

³This problem is analyzed in Herbert Blumer, Critiques of Research in the Social Sciences: I (New York: Social Science Research Council, 1939) in which Thomas and Znaniecki's use of personal documents in The Polish Peasant in Europe and America is discussed in depth.

fail to parallel and may possibly distort the subjects point of view. But he must use both kinds of data for there appear to be no other kinds. Any they must be used with full recognition of their weaknesses and limitations.⁴

The second general class of problem of the phenomenological approach is a companion piece to the first: having accumulated the data and assembled them into some sort of representation of the decision-maker's definition of his situation, how can one know that it is valid? How does one know that the mosaic he has constructed out of bits and pieces of observations is a reasonable representation of what the subject actually experienced in the situation? How does one test it? Because the basic datum is not accessible to direct observation, one can only validate his representation of it by comparing different manifestations of the same phenomenon--direct and indirect statements and actions--searching out apparent consistencies and contradictions. And to the extent that the decision-maker's definition of the situation is itself continually changing, the researcher is faced with the problem of knowing how the various manifestations and representations he is checking against each other fit together at particular points in time.

⁴The problem is discussed at length in Allport, The Use of Personal Documents in Psychological Science, loc. cit. This was partially in reply to Blumer's criticism of Thomas and Znaniecki's work.

To attack these problems with any hope at all, one must start by assuming that a decision-maker is a rational being; that he does in fact have a current definition of his situation which to him is internally consistent and logical, that the rate at which he changes his definition of the situation is limited, and that he normally acts and speaks on a basis of his current definition of his situation. By this line of reasoning the various elements of the decision-maker's definition of his situation derive their meaning and their interconnectedness from the total direction of his intentions; they exist and have meaning to the extent they relate to his over-all conception of his current and future situation. If all this is so, then the task of the researcher is to reconstruct the decision-maker's definition of his situation by assembling all of the bits and pieces of data he can gather into some sort of internally consistent pattern; his job is to develop an internally consistent theory of the case that will accommodate and explain the evidence he has at hand. This resolves itself to a "cut and try" approach of erecting a trial framework, fitting the bits and pieces of available data into position, modifying the framework where the evidence will not fit, trying more pieces, and so on, always changing the framework to fit the data rather than the reverse.⁵ Over a series of such "fittings" it is to be hoped

⁵Lewin, "Field Theory and Experiment in Social Psychology," loc. cit., pp. 130-154.

that certain stable underlying configurations may begin to emerge not only with respect to the interconnectedness of the elements of the picture, but also with respect to the way the total picture itself changes with new experience. As one approaches an over-all pattern that consistently accommodates the available evidence, it may then be considered to be a representation of the way in which the subject tends to define his situation.

General Guidelines for the Research

Consideration of the above general problems of phenomenological research led to the formulation of certain guidelines for the design of the specific experiment reported herein. While these were largely based on an intuitive analysis of the problem, it is to be hoped that these ideas or ones like them may be developed and tested by further experiments in order to provide some useful general principles for research in this conceptual framework.

A business decision-maker's definition of his business situation can probably best be constructed by amassing a large number of objective, undirected observations of specific statements, explanations and actions in the context of actual business operations at a number of points in time. It would appear that the more the researcher can deal with specific concrete information in the context of "real" action-demanding situations, the more he can avoid the danger of distortions due to introspection. For example, a business

man's decision either to incur costs or not to incur costs for the sake of protecting product quality speaks with more authority than his general policy statements on the subject. Also the more that such observations are derived from the normal on-going operation of the business rather than from the questions of a researcher, the more such observations are likely to reflect the primary concerns of the subject rather than the preconceived notions of the researcher. For example a question about quality will almost certainly draw forth a concerned answer, even though quality may seldom be a real consideration in normal operating decisions. Thus as a general principle of data collection it would appear that to the extent possible research of this kind should center on observations of actual operations in on-going situations and should seek to collect highly specific data-- comments, discussions, documents, decision records--generated in the situation itself as a basis for reconstructing a decision-maker's definition of his situation. Such an approach should help to minimize the effects of both the observer and the observed on the data.

Turning to the question of validation, the basic problem of constructing a unified, consistent model of the decision-maker's definition of his situation centers on developing an over-riding form and direction out of the decision-maker's individual statements and acts that ties those individual acts together into a unified whole. The research must somehow find a theory of the case that

accommodates the diversity of behavior displayed by the decision-maker. The validation of this model--as well as its application--rests on the demonstration of its inner consistency: the extent to which its elements can be related to each other and to the whole without internal contradictions and inconsistencies, and the extent to which those elements are predictable in terms of the whole. This problem suggests that the research should be designed to collect a wide variety of samples of the decision-maker's behavior in many different situations at different points in time. And to the extent possible, the research should be designed to collect rich samples that catch the full import of the decision situation in all of its immediacy in a form that lends itself to detailed analysis and study on the theory that it is in the complexities of the actual situations that the underlying unity of the decision-maker's conceptual framework is revealed.

To sum up the above considerations, it appears desirable to base research in this area on a relatively large number of objective, non-directed observations of decision-makers' behavior in a wide variety of specific operating situations at a number of time periods. To catch and hold all of the nuances of the immediate situation, some system of recording the actual conversations and discussions about the decision as well as the actual decision data itself would be highly desirable. Then one requires some means of organizing these data into internally consistent patterns

from which an over-riding definition of the situation can be derived by a process of inductive reasoning and which in turn can be substantiated by a process of deductive reasoning and prediction.

The Basis for the Research Approach

The general concepts discussed in the foregoing suggest that an exploratory experiment might be based on observing the decision behavior of a number of different subjects operating in the same situation. Presumably each one would tend to define the situation differently and respond to it differently. If the experimentor could find a means of reconstructing the decision-makers definition of the situation he should be able to explain and predict their decisions as well as account for the differences between them.

The conditions for such an experiment include first a means of placing a number of decision-makers in a common situation where they are confronted with a number of possible choices of actions and the necessity of making certain specific decisions. The conditions should be similar to those encountered in actual business decision situations but sufficiently simplified and controlled to meet the needs of the research. Next the experiment requires an action mechanism: a system for recording and effecting the decision-maker's choices and for reporting back the results of his decisions. The third requirement is a means of

discovering and recording the subjects' interpretations and analyses of the situation: a mechanism that will generate spontaneous, voluntary explanations of the reasons for their decisions without appreciably affecting the subjects attitudes or evaluations. Ideally these data should center on specific action aspects of the decision situations and should be sufficiently varied and numerous to provide a basis for analyzing their inter-relationships at each decision period as well as over a series of decisions.

A business game provided the desired research tool: a common controlled business-like situation within which the decision behavior of a number of individual decision-makers could be observed. While the game was a vastly simplified model of real business operations, it did present many of the characteristic elements of business decision situations, requiring the participants to make concrete, specific choices based on typically ambiguous, incomplete, ill-structured information in a competitive situation under relatively severe time restrictions. At the same time, the game provided a limited and controlled situation objectively the same for all participants, providing a basis for observing how the individual decision-makers differed in their interpretation of the common environment. And the game provided a convenient mechanism for obtaining the subjects' decisions in concrete, specific form, for effecting those decisions, and for reporting the results back as a basis for further decisions, thus providing relatively complete data about the

observable facts of the situation. The use of the teams as decision-making units provided a unique means of obtaining relatively complete information about the reasons for specific decisions without interference by the researcher. Tape recording the proceedings of the meetings in which the team decisions were argued out provided data that was something like what one might obtain if he could listen to an individual decision-maker talk to himself about the pros and cons of the various courses of action he perceives in a given situation. To obtain these data, the decision meetings were organized so that each member of the decision-making unit had an opportunity to present and explain a complete set of decision recommendations based on his analysis of the situation. After all members presented their individual recommendations, a consensus was developed in open discussion. The entire proceedings were recorded on tape for later study and analysis. Additional information about the bases for decisions was obtained from written strategy statements prepared by the individual participants at a number of points during the play of the game. In effect, the game provided a small scale business laboratory for observing decision behavior. The outputs included series of sets of decisions by a number of different decision-making units operating in a controlled situation over a period of time, the results of those decisions as received by the decision-making units, and extended statements and discussions about the reasons for those decisions. These data were used as a basis for

reconstructing the conceptual models that were used in developing those decisions.

Limitations

This general approach is subject to criticism on a number of scores. The game itself is not a real business situation and is missing some highly critical aspects of the real life situation. The participants were college students not businessmen; their background of experience and knowledge was restricted and their sense of commitment to the game was somewhat limited. The data collection method of recording the decision discussions may or may not have successfully elicited the "real" reasons behind the decisions. While these and many other avenues of question deserve serious thought and attention in the future development of this general approach, the experiment reported herein was not intended to draw specific conclusions about how real businessmen operate in real business situations, nor did it set out to provide a definitive relationship between the subjects' comments about decision situations and their actual decision behavior. This research attempted to explore the utility of a general conceptual approach to the decision problem; it used a highly simplified and contrived situation to test that model to discover the nature of the problems attendant to its use and the kinds of things which might have to be isolated and measured to make it useful. Hence the questions which should be asked of the research pertain to the extent

to which it sheds light on what we mean by the phenomenological approach to decision-making and how we define such concepts as the definition of the situation in operational terms.

One may also question the use of a team as a decision-making unit arguing that it is always the individual who must decide and, as a team is no more than a group of such elementary decision units, one must go back to the individual and his unique personal definition of the situation in order to understand his decisions. This argument has undeniable merit, but perhaps it points the way to further research more than it invalidates the experiment reported here. The focal point of this research is the decision: the overt, accomplished act of choice. This is the datum on which all else is built. It was taken to be a manifestation of some particular definition of a situation. The research undertook to reconstruct that definition. The use of the team as a decision-making unit--a definer of the situation--not only provides research advantages, but to some extent simulates actual business decision mechanisms. Even though a business decision must finally be made by an individual, one may also think of it as a "team" decision, made in the context of a team's definition of the situation. To be effective as a business decision, it must have some degree of understanding and acceptance throughout the organization.⁶

⁶Simon, Administrative Behavior, pp. 123-171.

The problem which lies at the heart of the study centers on the analysis of the data. How can one go about the task of fitting the bits and pieces of comments, discussions and decisions together to form an understandable, unified, consistent framework that not only contains the data at hand, but explains the underlying interconnectedness and direction of those data? How can one develop an orderly and generally useful approach to discovering and reconstructing a decision-maker's definition of his situation? Even under the simplified and controlled conditions of the game, this problem proved to be extremely complex. The cases were too few and the data too varied to provide a basis for the application of any highly sophisticated techniques and so it was necessary to use a somewhat intuitive approach to the analysis of the data and the reconstruction of the decision-maker's definition of his situation. While such an approach leaves a great deal to be desired, it served the basic purposes of the research: it indicated the feasibility and applicability of the general conceptual framework as well as the opportunities and problems it presents.

PART II

THE EXPERIMENT

CHAPTER IV

THE RESEARCH DESIGN

The Research Vehicle: The Executive Game

The principal research instrument was a version of The Executive Game,¹ a business game developed by Richard C. Henshaw, Jr., Professor of Quantitative Methods, Michigan State University, and James R. Jackson, Professor of Business Administration, University of California at Los Angeles, and used by the Department of Management of Michigan State University in an introduction to business course at the undergraduate level. This game represents the operation of an industry in which nine firms, all starting from the same position, compete with one another in the production and sale of a single product. The players "manage" the different firms, deciding the price at which they want to offer their product, the amounts they want to spend on marketing, research and development, and maintenance, the number of units to be produced, investments to be made in additional capacity and raw materials inventory and the dividends to be paid out. An electronic computer, programmed to simulate

¹For a complete description of the game, see Richard C. Henshaw and James R. Jackson, The Executive Game (2d ed. rev., Department of Management, Michigan State University, 1966, Mimeographed).

firm and industry interactions, determines the results of these decisions for each firm and industry as a whole, and prepares reports of each firm's activities for its managers. This information provides the basis for a new set of decisions which are then fed into the computer to determine a new set of results. In the particular program used for this research, after an introductory practice play the participants made a series of eight such decisions representing four quarterly decisions for each of two years. Overall performance was measured on a basis of the rate of return earned by each firm.

In the play of the game, all firms start from the same point with the same basic data: a statement of the company's current situation along with the complete results of its operation in the three months just ended (see Table 1). Essentially these data include, first, normally available competitive information such as market prices, unit sales, reported profits and dividends declared; second, operating figures for the previous period such as number of units produced, sold and on hand; third, a profit and loss statement for the quarter; fourth, a cash flow statement; and, finally, a balance sheet as of the beginning of the game. Each firm's management then makes the following decisions for the first game period:

Price of Product	Production Volume Schedule
Marketing Budget	Investment in Plant and
Research and Development	Equipment
Budget	Purchase of Materials
Maintenance Budget	Dividends Declared

TABLE 1.--Game data sheet.

Line Numbers	Titles	Data (For Period 0 Actual)
0	Price	6.40
00	Average Price	6.40
000	Economic Index	103
1	Seasonal Quarter	AMJ
2	Total Industry Sales	3,910,959
3	Market Potential	434,551
4	Sales Volume	434,551
5	Percent Share of Industry Sales	11
6	Production This Quarter	400,000
7 a&b	Labor Cost per Unit/Materials	
	Cost per unit	\$1.43/1.58
8	Inventory Finished Goods	65,449
9	Plant Capacity Next Quarter	415,000

10	INCOME (and expense) STATEMENT	
11	Receipts, Sales Revenue	\$2,781,124
12	Expenses: Labor (original cost/ unit Ex. Overtime 1.43)	573,939
13	Materials (original cost/unit 1.58)	630,667
14	Reduction Finished Goods Inventory	103,652
15	Administration	278,000
16	Marketing	240,000
17	Research & Development	150,000
18	Maintenance	75,000
19	Depreciation	200,000
20	Miscellaneous	229,725
21	Total Expenses	2,480,983
22	Profit Before Income Tax	300,141
23	Addition to Income Tax Fund	144,068
24	Net Profit After Income Tax	156,074
25	Dividends Paid	50,000
26	Addition to Owners' Equity	106,074

TABLE 1.--(Continued)

Line Numbers	Titles	Data (For Period 0 Actual)
27	<u>CASH FLOW</u>	
28	Receipts, Sales Revenue	2,781,124
29	Disbursements: Cash Expense	1,546,664
30	Addition to Inc. Tax Fund	144,068
31	Dividends Paid	50,000
32	Investment in Plant	500,000
33	Purchase of Materials	1,000,000
34	Total Disbursements	3,240,732
35	Addition to Cash Assets	-459,608
36	<u>BALANCE SHEET</u>	
37	Assets: Net Cash Assets	1,040,392
38	Inventory Value, Finished Goods	196,348
39	Inventory Value, Materials	1,169,333
40	Plant Net Book Value	8,300,000
41	Equities: Owners' Equity of Capital	10,706,074

The decisions for all teams are processed by the computer, not only to determine the immediate results for each firm, but also to register the longer term effects of its decisions. Statements of each firm's quarterly performance and status are prepared in the same form as the initial data described above. (For an example of the actual computer output, see Table 2.)

The game program is designed to simulate the kinds of inter-relationships and interactions one finds in business operations, albeit in highly simplified and standardized form.² The size of the total industry market is determined by the level of economic activity during the quarter, the industry's seasonal pattern of demand, and the actions of the firms in the industry in developing, marketing and

²The description of the main relationships of the game which follows this point provides an illustration of the main thrust of this research. The writer has chosen a particular scheme of organization and a particular sequence for describing the elements of the game. In so doing, he expounds his own model of the situation: how the elements should be grouped, which come first and so on. When he places one element before another, he tends to imply (not without awareness, let us hope) that it "comes before" in the sense of being determined before and hence being of the nature of an independent variable to that which it precedes--which may or may not be the case. For example, this particular model starts with the market and works toward the firm's activities. One might just as well start with the firm and work toward the market; the stated relationships would be the same, but the implications for action would be quite different. In the cases studied, some teams started with the market and others started with the firm; hence their decision patterns were different.

TABLE 2.--Computer statement.

EXECUTIVE GAME

		END OF FISCAL YEAR 1		AVERAGES PER QUARTER FOR FISCAL YEAR 1 ONLY								
		INVENTORY	INVENTORY	PLANT	OWNERS	MARKETING	R AND D	SALES	NET	RATE OF		
		VALUE	VALUE	VALUE	EQUITY	(\$)	(\$)	VOLUME	PROFIT	RETURN*		
		FIN. GOODS	MATERIALS	(\$)	(\$)			(UNITS)	(\$)	(PERCENT)		
		(\$)	(\$)	(\$)	(\$)							
71	255318	217213	1022767	10099718	11084380	300000	200000	505451	113329	1.044	3	
72	721319	416083	995119	10114339	11004222	328750	153750	502939	80790	0.748	9	
73	32019	0	780046	10282343	11094408	343750	281250	613815	105836	0.975	5	
74	345217	511947	835466	9012032	10914228	262500	166250	417681	89541	0.832	6	56
75	1507341	776851	1621358	10158243	11049111	360000	200000	601311	85763	0.792	8	
76	699450	137322	1605528	9954613	10998013	265000	160000	476169	87987	0.815	7	
77	357753	24464	953120	9904534	11239871	331250	300000	530131	133451	1.224	1	
78	264252	239280	1289822	9285512	11078866	350000	170000	456010	110699	1.021	4	
79	1315570	223025	1052492	8423447	11014534	292500	175000	446861	127117	1.175	2	

* RANK AND RATE OF RETURN ARE BASED UPON DIVIDEND PAYOUT FOR ALL 4 PERIODS
AND OWNERS EQUITY AT THE END OF FISCAL YEAR 1

pricing their products. For example, if the industry average price goes down, the market tends to be larger than it would have been at the higher price. The market potential of any individual firm depends upon the relationship between its policies and those of its competitors. A lower price will attract more customers. Greater marketing effort has a strong immediate effect but one which diminishes over time. A more rigorous research and development program does not have the same immediate effects as marketing, but has greater long-term influence on market position. While these factors contribute to the firm's market potential--its orders received, so to speak--the firm must have sufficient product available from production and inventory in order to turn those orders into sales. If it runs short, it not only loses sales in the current period, but also it loses a portion of its customers.

The quantity produced each quarter is determined by the firm's managers but within the limits of the firm's production capacity and the raw materials available for production at the beginning of the period. Production capacity is determined by total investment in plant. While plant depreciates at the rate of $2\frac{1}{2}\%$ per quarter, the manager can maintain or increase capacity by adding new investment in plant. This not only requires capital expenditures, but also involves current expenses associated with the acquisition and installation of added facilities. In addition, increased size of plant results not only in

increased depreciation expense, but in increases in other miscellaneous expenses as well. Thus while too little capacity may limit a firm's ability to serve, too much capacity results in excessive costs. Capacity must be built prior to the quarter in which it is used. With payment of overtime to labor, the manager can operate up to $1\frac{1}{2}$ times the nominal capacity of his plant; if he schedules production beyond that point it will not be made.

Production may also be limited by the amount of raw material available; a firm can only produce to the extent of the material on hand at the beginning of the quarter. The manager can order each period for subsequent periods; while each order entails an ordering charge, encouraging him to buy ahead for more than one period, materials in inventory result in carrying charges varying with the quantity on hand. Part of the manager's task is to balance these opportunities while at the same time being sure that he has enough on hand to produce what he wants.

Within the limits of capacity and materials inventory, the firm may produce any quantity it chooses. If it under-produces, it may lose sales in the current period and some potential customers in future periods; if it over-produces, however, it must pay carrying charges on its finished goods inventory.

Direct costs of production include labor and materials. Costs per unit will be affected by the levels of expenditures on research and development and maintenance: a

vigorous R & D program will result in some reduction in costs; if maintenance budgets are not adequate for the quantity of production scheduled, unit costs may rise. As indicated above, when the plant is scheduled beyond its nominal capacity, overtime premium must be paid on labor for the additional units at one-half the normal straight time cost. Overtime also involves additional administrative expenses.

Cash may also be a significant factor in the game. A sizeable balance is provided at the outset. If the firm's managers exhaust this balance, they are permitted to continue to operate with a deficit, but must pay financing charges (which are included in miscellaneous expenses in the income statement). If their deficit exceeds \$3,000,000, however, they are declared bankrupt and the business is thrown into the hands of "receivers."

Profits and taxes are computed in the usual fashion. The managers may declare dividends if they so desire. Such payments are included in the calculation of the firm's earned rate of return as described below. The balance of profit after dividends is added to (or subtracted from) owners' equity.

The stated goal of the game--and the basis for performance measurements--is "maximization of the rate of return earned on the beginning owners' equity. . . . The discounted rate of return earned on beginning owners' equity will be calculated for each team and used as an objective

measure of each team's performance."³ The formula for calculating discounted rate of return is

$$O.E._o = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \dots + \frac{D_n + O.E._n}{(1+r)^n}$$

where: $O.E._o$ = owners' equity as of period o.

$O.E._n$ = owners' equity as of period n.

D_1 = dividend paid in period 1, $i = 1, 2, \dots$, etc.

r = discounted rate of return on beginning owners' equity ($O.E._o$).

The computer is used to find the value of r for each firm.⁴

The Research Program: The Collection of Data

Twenty-seven undergraduate students organized into nine teams of three members each provided the basic data for the study as a part of their regularly assigned work for a course entitled, "Introduction to Business." In this course, general lectures by leading College of Business faculty members are supplemented by small discussion and review meetings. The business game is used in the discussion sessions as an integrating device to present the student with some of the problems of relating the various functions of business to one another in a competitive environment. The writer was the coordinator for the course and an instructor of one

³Henshaw and Jackson, loc. cit., pp. 17-18.

⁴Ibid., p. 27.

of the discussion sections. The students in that section were the subjects of this study.

The students were first introduced to the game in the opening lecture, at which time they were also given a detailed written description of the game. At the first section meeting following the lecture, the students participating in this study were arbitrarily assigned to teams, the game instructions were reviewed and discussed in detail and the purpose and method of the study was described. (The information given the students may be found in Appendix A.) The students were shown how to prepare worksheets for recording their individual forecasts and decision recommendations as well as their team results throughout the game. Their first assignment was to develop a complete forecast and set of decision recommendations for a practice play in the following class period. They were instructed to come to class prepared to discuss the reasons for their recommendations.

For the following section meeting nine tape recorders were set up for use by the teams. After a general discussion, the members of each team met around their own machine to make the necessary decisions for their firm's operation in the practice period. Each team member explained his individual decision recommendations, after which all of the team members discussed alternatives and agreed upon a set of decisions for the firm. When agreement was reached, the team decision sheet was turned in for delivery to the computer

center and each team member's detailed decision recommendation and forecast was turned in for use in the study.

The computer results of the practice period decisions were returned to the students at the following lecture period. The students were asked to analyze these results and to prepare a new forecast and a new set of decision recommendations for the first actual period of the game to be discussed and turned in at the following section meeting. This was the general procedure followed throughout the game. The students would prepare their individual decision recommendations and forecast in advance, explain the reasons for them and agree on team decisions at tape recorded section meetings, receive the results of the team decisions at the following lecture period and use those results as a basis for a new forecast based on a new set of decision recommendations for the next section meeting. This procedure was used for one practice session and seven "actual" decision sessions, periods 7 and 8 being combined because of time limitations.

No particular effort was made to control the information available to the student. The study was not concerned with what information he had or where he obtained it; it was concerned with what information he used.

The game conditions were left stable until the end of the fourth period. At that time each student received an announcement that materials requirements would be cut in half effective immediately. The announcements were

addressed to the team's individual firm name and were signed by the firm "purchasing agent," but no other effort was made to have the teams think that the change applied to them alone, and almost all students quickly realized that the change probably applied to all. With the return of the results for the sixth period, another change was introduced: the cost of labor was increased 20%.

The basic output of data consisted of some 240 individual forecast and decision recommendations made up of nine for each of the 27 class members (less missed assignments), 81 sets of team decisions made up of nine sets of decisions for each of the nine teams, 81 team results again consisting of nine computer runs for each of the nine teams, two year-end reports, and some 26 hours of recorded discussions. This information was supplemented by two brief written statements of strategy by each student, one prepared at the time of the first period after the practice period results had been received and the other prepared for the fifth period, after the materials change had been announced.

The Analysis of Data

The focal point of the analysis of the data was the development of each team's model of the business situation, the reconstruction of the ideas and concepts which gave rise to the team's specific decisions. In essence, the approach was to start with a team's decisions and ask, "Why were these specific decisions made? Out of all the possible

actions that might have been chosen, why were these taken? What choices did the team members perceive and what did they expect to happen as a result of those choices? What were their underlying concepts and beliefs about the game? In short, what was the model of the business situation that was manifested in their decisions?"

Each team's decisions for each period were analyzed using the individual forecast and decision recommendation details, the taped discussions and the team decisions against the background of the preceding industry and team results to build an understanding of the bases for the new decisions. For example, the stated reason for a price decrease might be to increase volume because of an expected increase in the market and this, in turn, might be supported by an increase in marketing, etc., all of which taken together implies a certain set of relationships, possibilities and goals. Another team might take quite different actions for the same reasons or the same actions for a totally different set of reasons, revealing a basically different model of the business situation, but one which appears equally logical and consistent to its proponents.

In spite of the presence of much fascinating material, no attempt was made to treat the interpersonal aspects of the teams' decision processes. However, the presence of disagreement and conflict between different approaches was highly useful in bringing out and crystallizing the reasons for particular choices of action; it forced the team members to be explicit in their statements and explanations.

No formal method for depicting the structures of the various models was developed largely because attempts to do so indicated that, at least at the present stage, an approach structured around an arbitrarily designed "common language" would destroy the very properties of individuality that were the subject of the study.

At the end of the fourth game period, each team's entire decision performance to date was analyzed sequentially to develop understanding of the present state of its model of the business situation as well as understanding of how it had evolved to that state. From this longitudinal analysis of the five sets of decisions (including the practice period), predictions were made as to how each team would respond to the previously described change in game conditions. At game's end, all of the data for each team were again analyzed in an attempt to develop the underlying patterns of actions and statements that might provide understanding of the basic structure of the teams' decision processes. Again, no formal or standardized method of analysis was developed; rather, the process was an inductive one of building a series of models out of the evidence at hand.

CHAPTER V

THE RESEARCH RESULTS

The Decision Environment

The game started at the end of June of fiscal year 0, the conclusion of a quarter in which the industry had been relatively stable and successful. The economic index stood at 103, slightly higher than the forecasted 100. The industry had sold 3,911,000 units at an average price of \$6.40 for a total of \$25,029,000. All firms had the same prices and had realized the same sales; all were operating at close to nominal one shift capacity. Each firm had finished goods and raw materials on hand as well as a reasonably large cash balance. The conditions of each firm together with the history of its operation for the period just ended is shown in Table 1.

The general course of the industry throughout the two years of the game is shown in Table 3. Year end results are shown in Tables 4 and 5. The first significant event was the severe drop in industry sales volume that occurred in period #3, the January, February, March quarter of the first fiscal year, resulting from the combination of the normal seasonal decline with poor general economic conditions.

TABLE 3.--Price, sales and profit data available to all firms.

	Period P JAS	Period 0 AMJ	Period 1 JAS
Economic Index: Forecast	105	100	105
Actual	106	103	108
<u>Total Industry Data:</u>			
Sales in thousands of dollars	\$27,580	\$25,029	\$28,801
Sales in thousands of units	4,477	3,911	4,643
Average price per unit	\$6.16	\$6.40	\$6.20
<u>Individual Firm Data</u>			
Firm 1--Widgets, Ltd.			
Price	\$6.10	\$6.40	\$6.25
Sales volume	545,449	434,551	480,449
Net profit	\$154,773	\$156,074	\$138,283
Firm 2--GAS Industries, Inc.			
Price	\$6.15	\$6.40	\$6.30
Sales volume	495,449	434,551	505,449
Net profit	\$131,256	\$156,074	\$193,596
Firm 3--Aurora Co.			
Price	\$6.30	\$6.40	\$6.35
Sales volume	465,449	434,551	465,449
Net profit	\$179,262	\$156,074	\$178,582
Firm 4--BHM Electrical			
Price	\$6.50	\$6.40	\$6.50
Sales volume	460,729	434,551	458,344
Net profit	\$146,830	\$156,074	\$196,345
Firm 5--Exacta Corp.			
Price	\$6.00	\$6.40	\$6.00
Sales volume	565,449	434,551	641,618
Net profit	\$120,687	\$156,074	\$239,322
Firm 6--NAMCO			
Price	\$6.20	\$6.40	\$6.20
Sales volume	495,449	434,551	480,449
Net profit	\$175,387	\$156,074	\$167,725
Firm 7--Slater Co.			
Price	\$6.40	\$6.40	\$6.40
Sales volume	480,449	434,551	515,449
Net profit	\$223,385	\$156,074	\$181,964
Firm 8--Universal Industries			
Price	\$6.70	\$6.40	\$6.50
Sales volume	408,563	434,551	505,449
Net profit	\$121,310	\$156,074	\$120,459
Firm 9--Spartan Iron Co.			
Price	\$6.25	\$6.40	\$6.40
Sales volume	480,449	434,551	510,407
Net profit	\$175,653	\$156,074	\$193,738

Period 2 OND	Period 3 JFM	Period 4 AMJ	Period 5 JAS	Period 6 OND	Period 7 JFM	Period 8 AMJ
95 98	90 92	100 98	115 114	120 121	115 116	105 108
\$31,835 5,051 \$6.30	\$24,418 3,827 \$6.38	\$29,223 4,760 \$6.14	\$37,514 6,553 \$5.72	\$40,644 6,774 \$6.00	\$35,976 5,820 \$6.18	\$32,768 5,295 \$6.20
\$6.20 650,000 \$266,123	\$6.45 393,878 -\$16,497	\$6.20 497,478 \$65,408	\$5.80 722,404 \$502,902	\$6.00 783,541 \$703,027	\$6.25 604,187 \$405,085	\$6.30 529,401 \$293,857
\$6.40 470,000 \$109,894	\$6.20 489,954 -\$4,486	\$6.15 546,352 \$24,157	\$5.75 654,411 \$340,683	\$5.85 750,000 \$579,967	\$6.15 600,000 \$344,244	\$6.00 550,000 \$250,029
\$6.30 629,243 \$199,674	\$6.35 487,169 -\$88,025	\$5.50 873,398 \$133,114	\$5.45 771,176 \$393,934	\$5.75 809,646 \$644,055	\$6.00 541,270 \$311,330	\$6.20 542,237 \$367,847
\$6.55 454,230 \$202,509	\$6.55 348,467 -\$40,631	\$6.40 409,682 -\$61	\$5.50 666,251 \$407,389	\$6.00 743,568 \$680,062	\$6.00 670,551 \$406,401	\$6.00 569,100 \$366,258
\$6.00 645,706 \$240,751	\$6.15 487,784 -\$127,312	\$6.10 630,136 -\$9,709	\$5.20 1,020,818 \$56,848	\$6.00 817,821 \$606,708	\$6.20 818,001 \$639,656	\$6.20 788,459 \$528,449
\$6.20 600,000 \$245,615	\$6.25 391,186 -\$22,608	\$6.30 433,040 -\$38,786	\$5.50 790,774 \$442,110	\$5.60 780,400 \$477,996	\$6.00 800,000 \$516,388	\$6.10 703,973 \$396,633
\$6.25 600,000 \$166,173	\$6.50 469,761 \$25,742	\$6.35 535,312 \$159,926	\$6.25 658,155 \$561,832	\$6.25 700,000 \$602,757	\$6.35 700,000 \$420,305	\$6.30 538,690 \$232,758
\$6.50 500,000 \$155,054	\$6.50 419,652 \$129,837	\$6.50 398,938 \$37,445	\$6.40 616,852 \$477,222	\$6.40 712,908 \$528,747	\$6.40 485,852 \$236,130	\$6.40 493,806 \$151,494
\$6.50 502,176 \$258,927	\$6.60 339,057 -\$50,978	\$6.40 435,805 \$106,782	\$6.10 651,811 \$551,567	\$6.25 675,996 \$625,228	\$6.35 600,466 \$428,667	\$6.25 579,274 \$330,668

EXECUTIVE GAME
PERIOD 8 ANJ ECONOMIC INDEX 10A

MODEL 1

INFORMATION ON COMPETITORS

	PRICE	DIVIDEND	SALES VOLUME	NET PROFIT
FIRM 1	\$6.30	\$ 0	529401	\$ 293857
FIRM 2	\$6.00	\$ 1	550000	\$ 250029
FIRM 3	\$6.20	\$ 4000	542237	\$ 367847
FIRM 4	\$6.00	\$ 4000	569100	\$ 366258
FIRM 5	\$6.20	\$ 0	788459	\$ 528449
FIRM 6	\$6.10	\$ 0	703973	\$ 396433
FIRM 7	\$6.30	\$ 10000	538690	\$ 232758
FIRM 8	\$6.40	\$ 5000	493804	\$ 151494
FIRM 9	\$6.25	\$ 5000	579274	\$ 330668

FIRM 79

OPERATING STATEMENTS

MARKET POTENTIAL	579274
SALES VOLUME	579274
PERCENT SHARE OF INDUSTRY SALES	11
PRODUCTION THIS QUARTER	625000
INVENTORY FINISHED GOODS	100260
PLANT CAPACITY NEXT QUARTER	439100

INCOME STATEMENT

RECEIPTS, SALES REVENUE	\$ 3620465
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EXPENSE

LABOR/COST/UNIT EX OVERTIME	1.720	\$ 1236218
MATERIALS/COST/UNIT	0.790	491081
REDUCTION FINISHED GOODS INV.		-137177
ADMINISTRATION		340423
MARKETING		375000
RESEARCH AND DEVELOPMENT		150000
MAINTENANCE		88000
DEPRECIATION		219411
MISCELLANEOUS		221610
PROFIT BEFORE INCOME TAX		2984566
ADDITION TO INCOME TAX FUND		635899
NET PROFIT AFTER INCOME TAX		305232
DIVIDENDS PAID		330668
ADDITION TO OWNERS EQUITY		50000
CASH FLOW		280668

RECEIPTS, SALES REVENUE

DISBURSEMENTS	2411251
CASH EXPENSE	305232
ADDITION TO INCOME TAX FUND	50000
DIVIDENDS PAID	225000
INVESTMENT IN PLANT	500000
PURCHASE OF MATERIALS	
ADDITION TO CASH ASSETS	

BALANCE SHEET

ASSETS

NET CASH ASSETS	3110366
INV. VALUE FINISHED GOODS	300779
INVENTORY VALUE, MATERIALS	557518
PLANT NET BOOK VALUE	8782010
OWNERS EQUITY	12750672

SCHEDULE OF MISCELLANEOUS EXPENSES	
RAW MATERIALS CARRYING COSTS	27430
FINISHED GOODS CARRYING COSTS	50130
PLANT INVESTMENT EXPENSES	5063
FINANCING CHARGES	0
ORDERING COSTS	50000
SUNDRIES	88988
TOTAL	221610

TABLE 4.--Year #1 results.

TABLE 5.--Year #2 results.

EXECUTIVE GAME

END OF FISCAL YEAR 2				AVERAGES PER QUARTER FOR FISCAL YEAR 2 ONLY							RANK*
FIRM NET CASH		INVENTORY	INVENTORY	PLANT	OWNERS	MARKETING	R AND D	SALES	NET	RATE OF	
NO.	ASSETS	VALUE	VALUE	VALUE	EQUITY	(\$)	(\$)	VOLUME	PROFIT	RETURN*	
(\$)	FIN. GOODS	MATERIALS	(\$)	(\$)	(\$)	(\$)	(UNITS)	(\$)	(PERCENT)		
71	1308605	499235	501406	10600000	12909246	331250	150000	659883	476218	2.534	2
72	1239362	0	513192	10766585	12519139	425000	105000	638603	378731	2.005	9
73	1085170	0	688005	10883391	12656566	287500	237500	666082	429292	2.314	7
74	2336622	0	307212	9920518	12654352	292500	165000	662368	465028	2.408	4
75	660986	94774	644348	11460670	12880778	612500	212500	861275	457915	2.339	6
76	537462	138081	482994	11672618	12831155	382500	210000	768787	458282	2.359	5
77	802203	0	350000	11905316	13057519	412500	225000	649211	454413	2.513	3
78	1428260	0	566937	10127267	12122464	543750	201250	577355	348398	2.017	8
79	3110366	300779	557518	8782010	12750673	363750	150000	626887	484033	2.643	1

* RANK AND RATE OF RETURN ARE BASED UPON DIVIDEND PAYOUT FOR ALL 8 PERIODS
AND OWNERS EQUITY AT THE END OF FISCAL YEAR 2

This market collapse left many of the firms with negative incomes and large stocks of finished goods. In the following period a severe price change took place: one firm, team #3--Aurora Incorporated--cut its product price sharply below the going industry level. This break in prices came at the same time as the previously described announcement of a drastic change in direct costs. This change, introduced by the researcher as a means of testing the teams' response patterns, took effect at the beginning of period #5. Time limitations made it necessary for the teams to make their decisions for periods #7 and #8 at the same time. The change in labor cost introduced at the beginning of period #7 had little effect on the decision patterns.

How the individual teams responded to these general conditions and changes is described below. While the models presented tend to oversimplify the teams' decision deliberations and performance patterns, it is believed they catch the essence of each team's orientation and definition of the situation.

Team #1--Widgets, Ltd.: The Response Model

The history of Widgets, Ltd's performance is detailed in Table #6. This management team revealed their general model of the firm in the contrast between their decisions for the game's second period and for the third period. In approaching the second period, the seasonal high quarter of October, November, December, their comments went along the following lines:

TABLE 6.--Game performance--Team #1--Widgets, Ltd.

	Practice Period	Period 0
Price (\$)	6.10	6.40
Average industry price (\$)	6.29	6.40
Economic index	106	103
Seasonal quarter (months)	JAS	AMJ
OPERATING DATA (thousands of units)		
Total industry sales	4,477	3,911
Market potential	623	435
Sales volume	545	435
Percent share of industry sales	12%	11%
Production this quarter	480	400
Labor cost per unit (\$)	1.43	1.43
Materials cost per unit (\$)	1.56	1.58
Inventory finished goods	0	65
Plant capacity next quarter	435	415
INCOME STATEMENT (thousands of dollars)		
Receipts: Sales revenue	3,327	2,781
Expenses: Labor	733	574
Materials	750	631
Reduct. fin. goods inv. val.	196	104
Administration	332	278
Marketing	300	240
Research and development	200	150
Maintenance	80	75
Depreciation	208	200
Miscellaneous	229	230
Total expenses	3,029	2,481
Profit before income tax	298	300
Addition to income tax fund	143	144
Net profit after income tax	155	156
Dividends paid	35	50
Addition to owners' equity	120	106
CASH FLOW (thousands of dollars)		
Receipts: Sales revenue	3,327	2,781
Disbursements: Cash expenses	1,875	1,547
Addition to income tax fund	143	144
Dividends paid	35	50
Investment in plant	600	500
Purchase of materials	1,300	1,000
Total disbursements	3,953	3,241
Addition to cash assets	-626	-460
BALANCE SHEET (thousands of dollars)		
Assets: Net cash assets	414	1,040
Inventory value, finished goods	0	196
Inventory value, materials	1,719	1,169
Plant net book value	8,693	8,300
Owners' equity	10,826	10,706

NOTE: Figures may not add due to rounding.

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8
6.25	6.20	6.45	6.20	5.80	6.00	6.25	6.30
6.32	6.32	6.39	6.21	5.77	6.01	6.19	6.19
108	98	92	98	114	121	116	108
JAS	OND	JFM	AMJ	JAS	OND	JFM	AMJ
4,643	5,051	3,827	4,760	6,553	6,774	5,820	5,295
575	687	394	497	768	901	604	529
480	650	394	497	722	784	604	529
11%	13%	10%	10%	11%	12%	10%	10%
415	650	464	500	650	784	700	600
1.43	1.42	1.42	1.41	1.41	1.41	1.70	1.70
1.56	1.55	1.55	1.54	.77	.77	.78	.79
0	0	70	72	0	0	96	166
435	464	487	505	522	530	530	530
3,003	4,030	2,540	3,084	4,190	4,701	3,776	3,335
592	1,074	656	715	1,018	1,285	1,333	1,080
649	1,009	717	771	500	602	546	473
196	0	-210	-8	217	0	-287	-212
283	339	348	356	362	367	370	370
300	325	275	300	325	325	325	350
200	200	200	200	200	200	100	100
80	110	85	90	100	115	100	100
208	217	232	244	252	261	265	265
229	243	268	291	248	194	246	244
2,737	3,518	2,572	2,959	3,223	3,349	2,997	2,770
266	512	-32	126	967	1,352	779	565
128	246	-15	60	464	649	374	271
138	266	-16	65	503	703	405	294
0	0	50	25	30	50	0	0
138	266	-66	40	473	653	405	294
3,003	4,030	2,541	3,084	4,190	4,701	3,776	3,335
1,684	2,292	1,833	1,951	2,253	2,486	2,474	2,244
128	246	-15	60	464	649	374	271
0	0	50	25	30	50	0	0
600	800	700	600	600	414	265	265
1,300	0	1,200	500	800	0	800	0
3,712	3,337	3,767	3,137	4,147	3,599	3,913	2,780
-709	692	-1,227	-52	43	1,102	-136	555
331	1,023	-203	-255	-212	890	754	1,309
0	0	210	217	0	0	287	499
1,821	811	1,294	1,023	1,322	720	974	501
8,693	9,275	9,743	10,100	10,447	10,600	10,600	10,600
10,844	11,110	11,044	11,084	11,557	12,210	12,615	12,909

"This is the biggest quarter of the year--our chance to sell more and make more."

"We should lower our price and try to sell more because this is supposed to be one of the more productive periods."

"If we are trying to sell more, our marketing budget must go up. It's the big period; there's going to be lots of competition."

Their decisions reflected these comments. They lowered their product price, raised their marketing budget and scheduled an increase in production to take advantage of the seasonal opportunity. And as it turned out, they were successful not only in selling their entire production, but also in realizing the best profits in the industry.

In discussing their decisions for the following quarter, the normally low January, February, March period, their statements took a different direction:

"This is the worst quarter of the year. The economic index is expected to be down and seasonal demand is considerably lower in this period. Our sales are going to be down. We should raise our price in order to increase revenue from what [little] we do sell this period."

"Our market potential has been more than we could make, probably because we have been spending a lot on marketing. We are not going to sell as many this quarter so marketing should be reduced."

In accordance with these comments, Widgets, Ltd., raised price, reduced marketing expenditures and cut production back to one shift capacity to match the anticipated drop in orders. The drop that occurred in sales was even more severe than they had anticipated.

As the game progressed the Widgets, Ltd., managers continued to operate with this general model, seeking to sell more in good periods by lowering the price of their product and increasing their marketing efforts and trying to protect themselves in poor periods by raising price and curtailing expenses. When the team was confronted with the drastic changes of period 5--and the effect of the break in the market price and the reduction in material costs was compounded by their own heavy finished goods inventory position--they discussed the situation largely in terms of the effects of these changes on the total industry market.

"Everyone's price will go down because of the material cost cut. These price decreases along with the increase in the economic index will raise the total market potential."

"There's going to be a lot bigger market. Some people will drop [the price] way down. I can't see the point of that. [If we drop our price by about half the material cost saving] the cut in our price will not give us an increase in percentage of the market, but it's going to be a much bigger market."

The outcome of these discussions was that the Widgets, Ltd., managers decided to reduce their product price by a

moderate amount as indicated, to increase marketing and to schedule a higher level of production to be able to hold their position in the expected "bigger market." In subsequent periods of the game, Widgets, Ltd., followed the same general pattern, keying their operations to the expected changes in the market.

This team's approach to the game has been termed "the response model" because the team members appeared to visualize the business primarily in terms of a response mechanism, the primary function of which was to adapt to the conditions provided by the market. They took the state of the market as the basic elemental "fact" of the situation; their job was to adjust the business's operations to take advantage of that fact. They believed that in a period of high industry sales, the business should strive "to sell more and to make more;" such a period was a time to compete aggressively for more sales by lowering price and increasing marketing efforts. When the total market demand was down, however, the firm could not expect to sell very much; in such periods production should be cut back and expenses curtailed and insofar as sales were limited anyway, one might just as well raise the price of the product in order to increase the revenue from whatever sales could be made.

This general approach had some of the elements of a self-fulfilling prophecy: when a sales increase was projected, action was taken to increase sales; when a down-turn was predicted, the firm's decisions tended to bring about a

change in that direction. As a result, Widgets, Ltd.'s share of the market tended to move with the market, increasing in high periods and decreasing in low periods and as a result the firm's variations in sales volume tended to be greater than the total industry variations. The managers were aware of this and while they discussed the "mistake" they had made in raising their product price in the January, February, March period of the first fiscal year of the game, they subsequently made the same set of moves in the corresponding period of the second fiscal year, and for the same reasons as they had expressed before. In their view, the market was the independent variable in the situation; all of their decisions depended on what they expected the market to do.

Team #2--GAS Industries: The
"Best" Sales Volume Model

The history of GAS Industries' performance is detailed in Table 7. At the outset of the game the GAS Industries management team was concerned about pricing the firm's product too low; they wanted to avoid generating more orders than they could fill and they also wanted to avoid the extra costs of overtime production. Their comments were along these lines:

"We should hold the price up so as to get not so much market but a better profit."

"If our price is too low we cannot make all the sales we might. It's better to stay at a higher price and make a profit."

TABLE 7.--Game performance--Team #2--GAS Industries.

	Practice Period	Period 0
Price (\$)	6.15	6.40
Average industry price (\$)	6.29	6.40
Economic index	106	103
Seasonal quarter (months)	JAS	AMJ
OPERATING DATA (thousands of units)		
Total industry sales	4,477	3,911
Market potential	573	435
Sales volume	495	435
Percent share of industry sales	11%	11%
Production this quarter	430	400
Labor cost per unit (\$)	1.43	1.43
Materials cost per unit (\$)	1.57	1.58
Inventory finished goods	0	65
Plant capacity next quarter	440	415
INCOME STATEMENT (thousands of dollars)		
Receipts: Sales revenue	3,047	2,781
Expenses: Labor	626	574
Materials	675	631
Reduct. fin. goods inv. val.	196	104
Administration	333	278
Marketing	260	240
Research and development	175	150
Maintenance	80	75
Depreciation	208	200
Miscellaneous	242	230
Total expenses	2,795	2,481
Profit before income tax	252	300
Addition to income tax fund	121	144
Net profit after income tax	131	156
Dividends paid	50	50
Addition to owners' equity	81	106
CASH FLOW (thousands of dollars)		
Receipts: Sales revenue	3,047	2,781
Disbursements: Cash expenses	1,716	1,547
Addition to income tax fund	121	144
Dividends paid	50	50
Investment in plant	700	500
Purchase of materials	1,000	1,000
Total disbursements	3,587	3,241
Addition to cash assets	-540	-460
BALANCE SHEET (thousands of dollars)		
Assets: Net cash assets	500	1,040
Inventory value, finished goods	0	196
Inventory value, materials	1,494	1,169
Plant net book value	8,793	8,300
Owners' equity	10,787	10,706

NOTE: Figures may not add due to rounding.

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8
6.30	6.40	6.20	6.15	5.75	5.85	6.15	6.00
6.32	6.32	6.39	6.21	5.77	6.01	6.19	6.19
108	98	92	98	114	121	116	108
JAS	OND	JFM	AMJ	JAS	OND	JFM	AMJ
4,643	5,051	3,827	4,760	6,553	6,774	5,820	5,295
515	523	490	546	866	1,085	743	723
505	470	490	546	654	750	600	550
11%	9%	13%	11%	10%	11%	10%	10%
440	470	600	575	516	750	600	550
1.43	1.42	1.42	1.42	1.43	1.43	1.72	1.72
1.57	1.56	1.57	1.58	.80	.80	.80	.80
0	0	110	139	0	0	0	0
440	464	493	516	516	516	538	538
3,184	3,008	3,038	3,360	3,763	4,388	3,690	3,300
648	690	951	876	736	1,242	1,105	956
691	734	943	907	410	598	481	443
196	0	-330	-86	416	0	0	0
333	341	348	358	315	365	365	372
240	275	350	450	500	400	400	400
175	185	125	130	100	120	100	100
80	90	100	95	85	95	90	90
208	220	232	247	258	258	258	269
242	262	328	337	287	194	229	190
2,812	2,797	3,046	3,314	3,108	3,272	3,028	2,819
372	211	-9	46	655	1,115	662	481
179	101	-4	22	314	535	318	231
194	110	-5	24	341	580	344	250
25	0	0	0	0	0	0	0
169	110	-5	24	341	580	344	250
3,184	3,008	3,038	3,360	3,763	4,388	3,690	3,300
1,718	1,843	2,202	2,246	2,024	2,416	2,289	2,108
179	101	-4	22	314	535	318	231
25	0	0	0	0	0	0	0
700	700	820	700	260	260	700	275
1,000	500	800	800	100	450	450	450
3,621	3,144	3,818	3,768	2,698	3,661	3,757	3,063
-437	-136	-780	-408	1,065	726	-67	237
603	467	-313	-721	344	1,069	1,003	1,239
0	0	330	416	0	0	0	0
1,479	1,245	1,102	995	685	537	506	513
8,793	9,273	9,861	10,314	10,316	10,319	10,761	10,767
10,875	10,985	10,980	11,004	11,345	11,925	12,269	12,519

"We want a smaller share of the market at a higher price so we can keep inventory on hand for sales next period."

In the opening period the managers set production at what they believed to be single shift capacity with no overtime. However they were divided as to how they should handle marketing. One team member wanted to "hold down marketing expenditures in order to limit sales potential and avoid having 'unhappy customers,'" while another wanted to increase marketing in order to "equalize the price increase." They finally agreed to hold the budget to the previous level without change. In effect both price and marketing decisions were based on the production figure: they were set at points calculated to sell almost but not quite all of the units that could be produced without overtime during the quarter.

GAS Industries over-shot the mark in the first period and entered the following quarter--the seasonal peak period of October, November, December--with no inventory. Again production was set at what was believed to be one-shift capacity. Because they had no finished stock on hand, the product price was increased. One of the team members commented, "As it is, our inventory is wiped out. By raising price we can make a bigger profit. \$6.45 will get as much of the market as we can produce for." At the same time, however, it was agreed that marketing must be increased "to support the higher price . . . to get demand for the product."

They again sold out their entire production and as a result decided to modify their general approach by going into overtime production in the following quarter. They agreed that they "should have produced more and sold more last time . . . We can't go on having a larger potential than we can sell. We have been running inventory completely out. We are going to have to produce more." At the same time, however, they recognized that "since this is the low period, [the January, February, March quarter] everybody else is going to go for the market, so we are going to have to raise marketing expenditures a good deal." Accordingly they agreed to reduce price and increase marketing in order to be sure to sell the increased volume of output. As it turned out, they were unsuccessful in selling their output during the January, February, March period, but they continued with the policy of "high volume-low price" supported by increased marketing expenditures in the following quarter.

They, too, entered period 5--the experimental period--with a heavy inventory of finished goods. The changes caused a general review of their approach.

"Our previous policy was low price and high volume, but with this material change we need a new policy: we should hold price up and take lower volume."

"Everyone else will be cutting price. Lowering ours won't do that much for us. If we can keep marketing high enough we'll still make enough revenue."

Their decisions were to reduce price by a relatively small amount, to drop production back to a one shift operation, and to increase their marketing efforts. They were successful in cleaning out their inventory and for the remainder of the game they continued to operate at a relatively high level of production, but less than capacity, and at relatively low prices.

An overall analysis of the GAS Industries decision discussions and performance indicates that this team's primary goal was a "best" sales volume figure for the given market each period: a level of sales which appeared to be obtainable without excessive cost in price and marketing expense, but a level which would also provide enough volume for efficient operations. The underlying concept seemed to be that any reasonable sales volume could be realized by pricing and marketing. If the market was expected to be down, price must be reduced and marketing increased; if the market was up, the opposite tack could be taken. The primary decision task of the managers was to select a sales goal each period which they could expect to realize with a relatively high degree of assurance and without excessive costs in price reductions or marketing expenditures, and then to gear all of their decisions to that goal. This is what is meant by terming their approach "the 'best' sales volume model."

It is interesting to note that while GAS Industries usually produced at more than one shift capacity, it never

produced at maximum capacity. It usually priced its product just below the market median. Although the managers always planned on building a small finished goods inventory reserve, the firm actually sold its entire production in all but two periods.

Team #3--Aurora, Inc.: The Market Share Model

The history of Aurora's performance is detailed in Table 8. Aurora started out with a two-stage plan:

"[The first step of] the strategy [is] to keep the price consistent with the competition's average price . . . and to keep both research and development and marketing at a high rate so that our team can keep roughly between 11% and 14% of the market. The key point [at this stage] is to sink most of our profit into plant investment . . . to build capacity to handle the eventual rush of demand. The next step is to lower our price far below that of competition. The increase in our profit will come mainly from a vastly increased percentage of the market. The theory is to cut price very low thus taking a very large percentage of the market. Competition will try to fight this by also lowering price. However our long-run build-up should enable us to out-produce them and leave us open to further [decreases] in price."

The team pursued the first stage of this strategy until the fourth period of the game, when they elected to activate the second step. In the April, May, June quarter

TABLE 8.--Game performance--Team #3--Aurora, Inc.

	Practice Period	Period 0
Price (\$)	6.30	6.40
Average industry price (\$)	6.29	6.40
Economic index	106	103
Seasonal quarter (months)	JAS	AMJ
OPERATING DATA (thousands of units)		
Total industry sales	4,477	3,911
Market potential	509	435
Sales volume	465	435
Percent share of industry sales	11%	11%
Production this quarter	400	400
Labor cost per unit (\$)	1.43	1.43
Materials cost per unit (\$)	1.57	1.58
Inventory finished goods	0	65
Plant capacity next quarter	430	415
INCOME STATEMENT (thousands of dollars)		
Receipts: Sales revenue	2,932	2,781
Expenses: Labor	573	574
Materials	630	631
Reduct. fin. goods inv. val.	196	104
Administration	283	278
Marketing	245	240
Research and development	160	150
Maintenance	75	75
Depreciation	208	200
Miscellaneous	218	230
Total expenses	2,588	2,481
Profit before income tax	345	300
Addition to income tax fund	165	144
Net profit after income tax	179	156
Dividends paid	50	50
Addition to owners' equity	129	106
CASH FLOW (thousands of dollars)		
Receipts: Sales revenue	2,932	2,781
Disbursements: Cash expenses	1,554	1,547
Addition to inc. tax fund	165	144
Dividends paid	50	50
Investment in plant	500	500
Purchase of materials	1,000	1,000
Total disbursements	3,270	3,241
Addition to cash assets	-337	-460
BALANCE SHEET (thousands of dollars)		
Assets: Net cash assets	703	1,040
Inventory value, finished goods	0	196
Inventory value, materials	1,540	1,169
Plant net book value	8,592	8,300
Owners' equity	10,835	10,706

NOTE: Figures may not add due to rounding.

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8
6.35	6.30	6.35	5.50	5.45	5.75	6.00	6.20
6.32	6.32	6.39	6.21	5.77	6.01	6.19	6.19
108	98	92	98	114	121	116	108
JAS	OND	JFM	AMJ	JAS	OND	JFM	AMJ
4,643	5,051	3,827	4,760	6,553	6,774	5,820	5,295
503	629	487	907	1,039	1,183	809	665
465	629	487	873	771	810	541	542
10%	12%	13%	18%	12%	12%	9%	10%
400	652	570	768	771	810	541	542
1.43	1.42	1.41	1.40	1.40	1.40	1.68	1.68
1.57	1.54	1.51	1.49	.74	.75	.75	.76
0	23	106	0	0	0	0	0
435	474	512	514	540	541	543	544
2,956	3,964	3,094	4,804	4,203	4,655	3,248	3,362
573	1,083	870	1,256	1,260	1,325	910	911
628	1,005	861	1,145	573	603	406	409
196	-68	-248	317	0	0	0	0
283	339	352	364	365	373	323	324
250	325	400	400	350	300	250	250
170	275	340	340	300	250	200	200
75	90	90	90	90	90	90	90
208	217	237	256	256	270	271	271
229	314	326	380	251	205	199	199
2,612	3,580	3,263	4,548	3,445	3,417	2,649	2,654
344	384	-169	256	758	1,239	599	707
165	184	-81	123	364	595	287	339
179	200	-88	133	394	644	311	368
10	0	0	25	35	40	40	40
169	200	-88	108	359	604	271	328
2,956	3,964	3,094	4,804	4,203	4,655	3,248	3,362
1,580	2,426	2,414	2,830	2,615	2,544	1,972	1,974
165	184	-81	123	364	595	287	339
10	0	0	25	35	40	40	40
600	1,000	1,000	300	770	300	300	300
750	1,000	1,000	500	550	500	400	450
3,105	4,610	4,333	3,778	4,334	3,978	2,999	3,103
-149	-646	-1,239	1,026	-131	677	248	259
891	245	-994	32	-99	578	827	1,085
0	68	317	0	0	0	0	0
1,291	1,286	1,425	780	757	654	647	688
8,693	9,475	10,238	10,282	10,795	10,825	10,855	10,883
10,875	11,074	10,986	11,094	11,453	12,057	12,329	12,656

they dropped their price severely, catching all of their competitors by surprise, as planned. While they "hoped to get more than 17% of the market from the surprise effect," they actually generated orders for a considerably larger portion of the market. Their inventory and production was only enough for 18% of the market, however. While the move was profitable, it did not yield the overwhelming advantage they had originally expected.

In considering their decisions for the following period--the experimental period in which the material requirements were changed--the team members were primarily concerned with the fact that they had not been able to meet the demand they had created in the previous quarter. "Demand last time was over 900,000 units; we could only sell 870,000. We will only have about 770,000 to sell this time." (770,000 was their maximum plant capacity and their inventory of finished stock was, of course, fully depleted). They agreed that "everyone is going to be dropping price, but not as radically as we did." That, coupled with their product limitations, led them to decide on a further price decrease of only \$.05. And with anticipated demand greater than capacity, they decided that a decrease in the level of marketing expenditures was advisable.

In the following period they again sold out and the team members again concerned themselves with "lowering market potential" because of the firm's continued inability to meet demand even at capacity production.

"We should figure on getting 12% of the market. Our market potential is way too high . . . We are actually losing customers by not being able to meet demand." They decided to again raise their product price; along with that, "the best way to lower our market potential is to lower our R&D and marketing." They continued "cutting down market potential" by raising price and reducing marketing expenditures on into January, February and March of the second fiscal year, but in that period they also cut production back to a one shift operation on the grounds that "total industry sales will drop better than a million units [in the coming quarter and] it is not possible to coup (sic) any more than 12% or 15% of the market."

A review of Aurora's overall performance indicates that almost invariably the team members constructed their models around market share. Their initial plans were based on the idea that if one could capture a larger share of the market than anyone else, he would automatically make more money than anyone else. When this program proved less than a total success, they revised their approach, but with their attention still centered on market share. Rather than the biggest share of the market, they sought the "right" share: they attempted to get a percentage of the market that was reasonably obtainable from the marketing standpoint and that also was consistent with the firm's production capabilities. Thus while their plans changed, the construction of their basic model remained the same.

In reviewing the team's performance at the end of the game, one of the managers expressed this opinion: "The way [the leading firm] does it is by assuring themselves of a certain percentage of the market. They spend a lot of time figuring out what the industry sales will be, assume they will get approximately 12% of it, and charge accordingly."

Team #4--BHM Electrical: The Operating Efficiency Model

The history of BHM Electrical's performance is detailed in Table 9. BHM started off in the first period of the game scheduling production at one-shift capacity because "overtime creates losses." At the same time it raised its product price, its marketing budget and its plant investments. Entering the next period, the October, November, December quarter, it again scheduled production at one shift capacity and again raised its price because "this is the period when you sell the most units." Marketing was held at the prior level, however, on the grounds that "we can't afford to increase marketing; we don't have enough units to sell. Our inventory is low and we are running at capacity." At the end of the quarter they had sold out their entire production and inventory, so going into the January, February, March period they again scheduled one shift capacity production, holding price and marketing expenditures at the previous quarter's level. This time, with the seasonal drop in industry sales, they were left with a sizeable inventory. As a result, the team members agreed

TABLE 9.--Game performance--Team #4--BHM Electrical.

	Practice Period	Period 0
Price (\$)	6.50	6.40
Average industry price (\$)	6.29	6.40
Economic index	106	103
Seasonal quarter (months)	JAS	AMJ
OPERATING DATA (thousands of units)		
Total industry sales	4,477	3,911
Market potential	461	435
Sales volume	461	435
Percent share of industry sales	10%	11%
Production this quarter	445	400
Labor cost per unit (\$)	1.44	1.43
Materials cost per unit (\$)	1.57	1.58
Inventory finished goods	50	65
Plant capacity next quarter	435	415
INCOME STATEMENT (thousands of dollars)		
Receipts: Sales revenue	2,995	2,781
Expenses: Labor	660	574
Materials	701	631
Reduct. fin. goods inv. val.	47	104
Administration	333	278
Marketing	275	240
Research and development	160	150
Maintenance	75	75
Depreciation	208	200
Miscellaneous	254	230
Total expenses	2,712	2,481
Profit before income tax	282	300
Addition to income tax fund	136	144
Net profit after income tax	147	156
Dividends paid	50	50
Addition to owners' equity	97	106
CASH FLOW (thousands of dollars)		
Receipts: Sales revenue	2,995	2,781
Disbursements: Cash expenses	1,757	1,547
Addition to income tax fund	136	144
Dividends paid	50	50
Investment in plant	600	500
Purchase of materials	1,250	1,000
Total disbursements	3,793	3,241
Addition to cash assets	-798	-460
BALANCE SHEET (thousands of dollars)		
Assets: Net cash assets	242	1,040
Inventory value, finished goods	149	196
Inventory value, materials	1,719	1,169
Plant net book value	8,692	8,300
Owners' equity	10,802	10,706

NOTE: Figures may not add due to rounding.

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8
6.50	6.55	6.55	6.40	5.50	6.00	6.00	6.00
6.32	6.32	6.39	6.21	5.77	6.01	6.19	6.19
108	98	92	98	114	121	116	108
JAS	OND	JFM	AMJ	JAS	OND	JFM	AMJ
4,643	5,051	3,827	4,760	6,553	6,774	5,820	5,295
458	468	348	410	821	843	671	604
458	454	348	410	666	744	671	569
10%	9%	9%	9%	10%	11%	12%	11%
415	432	454	475	496	744	744	496
1.43	1.43	1.42	1.42	1.42	1.43	1.71	1.71
1.57	1.57	1.57	1.56	.78	.78	.78	.78
22	0	105	171	0	0	73	0
432	454	475	496	496	496	496	496
2,979	2,975	2,282	2,622	3,664	4,461	4,023	3,415
594	616	646	675	704	1,238	1,488	847
653	678	710	742	388	582	581	387
130	66	-316	-196	512	0	-220	220
283	288	295	302	309	359	359	309
260	260	260	270	270	300	300	300
160	165	170	170	150	170	170	170
80	85	85	85	85	90	90	85
208	216	227	237	248	248	248	248
234	211	284	336	215	168	225	145
2,602	2,586	2,361	2,622	2,881	3,154	3,242	2,710
378	389	-78	0	783	1,308	782	704
181	187	-37	0	376	628	375	338
196	203	-41	0	407	680	407	366
50	50	50	0	0	40	40	40
146	153	-91	0	407	640	367	326
2,979	2,975	2,282	2,622	3,664	4,461	4,023	3,415
1,611	1,625	1,739	1,838	1,733	2,324	2,632	1,856
181	187	-37	0	376	628	375	338
50	50	50	0	0	40	40	40
550	650	650	650	250	250	250	250
1,100	0	1,350	0	800	0	700	0
3,492	2,512	3,752	2,488	3,159	3,242	3,997	2,484
-513	463	-1,469	134	505	1,220	26	931
527	990	-479	-345	160	1,380	1,406	2,337
66	0	316	512	0	0	220	0
1,616	938	1,579	835	1,247	666	784	397
8,643	9,077	9,500	9,912	9,914	9,916	9,918	9,921
10,852	11,005	10,914	10,914	11,321	11,962	12,328	12,654

upon a reduction in price and an increase in marketing. In the words of one of the members, they "hoped to sell all the inventory piled up from the period before. We are short of cash, but we have to raise marketing to increase sales. If we raise the marketing budget we can sell all we can make as well as our inventory." Production was still scheduled at one shift capacity. "We don't want to go on overtime because it costs too much, but we want to produce at capacity. We are still paying depreciation on our plant even if we aren't producing at plant capacity so by lowering our price and increasing our marketing we hope to get sales volume over plant capacity, thereby cutting into our large inventory." BHM Electrical was not successful in selling their production in this period; hence they entered period #5--the period of the material cost change--with an even larger inventory of finished goods than in the previous period.

Their response to the change in material requirements was to drop their product price by an amount that was greater than the material cost saving. The argument went like this: "If [the others] can drop their price [by the amount of the cost saving] and make the same money [as before], they are going to do it; since we are high, we must go lower than the rest because we want to sell our inventory . . . We've got to get out of the red. Four other firms are in the red and will think the same way. Inventory carrying costs are high. We will have to be low to clear out inventory."

Marketing expenditures were left at the same level as before on the grounds that "we can't afford to raise them while we are in the red." Production was continued at one shift capacity.

With this aggressive pricing, BHM Electrical succeeded in generating more orders than it could fill from its current production and inventory. So in approaching the following period--the October, November, December quarter of the second fiscal year of the game--the managers discussed the advantages of raising prices and holding to single shift operations as in the past in comparison with setting a lower price and operating at full overtime capacity. They decided with a good season coming they could raise their price from the previous period's extremely low level and, with an increase in marketing expenditures, sell their maximum capacity output. For the first time they went into overtime production, but with the comment that "to do it at a profit we must go all the way." They continued to operate at full capacity in the following period, dropping back to the level of one-shift operations in the final quarter of the game.

The BHM Electrical managers seemed to build their decisions throughout the game around plant capacity. Their model of the situation appeared to call for operating the firm at some maximum efficiency level--either a full one shift operation without overtime or a maximum capacity operation with all-out overtime--and then making whatever

price and marketing decisions that were necessary to sell the available product. In their scheme of things, success depended on matching the market to their production capability.

Team #5--Exacta Corp.: The Maximum
Volume Model

The history of Exacta's performance is detailed in Table 10. Early in the game the Exacta Corporation management decided on a strategy of "an ever-lowering price coupled with an ever-expanding market;" as they saw it, the key to success was "underpricing and overselling competitors." In the opening period they set their product price below everyone else in the industry saying, "We know that at \$6.00 there is a tremendous market. All we have to do is produce. If [this potential] can be filled, we needn't raise price to make extra profit." To support this strategy they scheduled production at maximum capacity and raised their marketing budget moderately. Research and development was maintained at the previously established level simply to "keep abreast of the market." Their avowed intention was to compete on a basis of price rather than product differentiation. "We want to stay at the bottom of the market [in price]" they said--and they were successful in doing so for the first two quarters.

In going into the third period, the January, February, March quarter of the first fiscal year, the Exacta managers expressed concern about other firms that had higher prices

TABLE 10.--Game performance--Team #5--Exacta Corp.

	Practice Period	Period 0
Price (\$)	6.00	6.40
Average industry price (\$)	6.29	6.40
Economic index	106	103
Seasonal quarter (months)	JAS	AMJ
OPERATING DATA (thousands of units)		
Total industry sales	4,477	3,911
Market potential	661	435
Sales volume	565	435
Percent share of industry sales	13%	11%
Production this quarter	500	400
Labor cost per unit (\$)	1.43	1.43
Materials cost per unit (\$)	1.57	1.58
Inventory finished goods	0	65
Plant capacity next quarter	455	415
INCOME STATEMENT (Thousands of dollars)		
Receipts: Sales revenue	3,393	2,781
Expenses: Labor	773	574
Materials	787	631
Reduct. fin. goods inv. val.	196	104
Administration	333	278
Marketing	320	240
Research and development	150	150
Maintenance	100	75
Depreciation	208	200
Miscellaneous	293	230
Total expenses	3,161	2,481
Profit before income tax	232	300
Addition to income tax fund	111	144
Net profit after income tax	121	156
Dividends paid	50	50
Addition to owners' equity	71	106
CASH FLOW (thousands of dollars)		
Receipts: Sales revenue	3,393	2,781
Disbursements: Cash expenses	1,969	1,547
Addition to income tax fund	111	144
Dividends paid	50	50
Investment in plant	1,000	500
Purchase of materials	1,000	1,000
Total disbursements	4,131	3,241
Addition to cash assets	-738	-460
BALANCE SHEET (thousands of dollars)		
Assets: Net cash assets	302	1,040
Inventory value, finished goods	0	196
Inventory value, materials	1,382	1,169
Plant net book value	9,093	8,300
Owners' equity	10,777	10,706

NOTE: Figures may not add due to rounding.

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8
6.00	6.00	6.15	6.10	5.20	6.00	6.20	6.20
6.32	6.32	6.39	6.21	5.77	6.01	6.19	6.19
108	98	92	98	114	121	116	108
JAS	OND	JFM	AMJ	JAS	OND	JFM	AMJ
4,643	5,051	3,827	4,760	6,553	6,774	5,820	5,295
642	646	488	630	1,667	1,328	958	788
642	646	488	630	1,021	818	818	788
14%	13%	13%	13%	16%	12%	14%	15%
623	616	660	700	762	818	818	820
1.43	1.43	1.42	1.41	1.41	1.41	1.69	1.69
1.58	1.58	1.55	1.53	.76	.76	.76	.77
46	17	189	259	0	0	0	32
430	456	482	508	545	545	547	573
3,850	3,874	3,000	3,844	5,308	4,907	5,072	4,888
1,039	1,013	1,081	1,142	1,252	1,345	1,616	1,621
981	971	1,023	1,073	580	624	625	627
57	88	-517	-210	777	0	0	-95
333	337	346	354	363	374	375	375
280	280	380	500	1,000	500	450	500
150	150	250	250	250	200	200	200
100	100	100	100	100	100	100	100
208	215	228	241	254	273	273	273
241	256	354	411	623	323	203	270
3,389	3,411	3,245	3,862	5,199	3,740	3,841	3,872
460	463	-245	-19	109	1,167	1,230	1,016
221	222	-118	-9	52	560	590	488
239	241	-127	-10	57	607	640	528
0	0	0	0	0	0	0	0
239	241	-127	-10	57	607	640	528
3,850	3,874	3,000	3,844	5,308	4,907	5,072	4,888
2,144	2,137	2,511	2,758	3,588	2,843	2,944	3,066
221	222	-118	-9	52	560	590	488
0	0	0	0	0	0	0	0
500	750	750	750	1,000	275	300	800
900	1,100	1,000	1,500	0	300	550	650
3,764	4,209	4,143	4,999	4,640	3,978	4,384	5,004
85	-335	-1,143	-1,155	668	929	688	-115
1,125	790	-353	-1,507	-840	89	776	661
139	51	567	777	0	0	0	95
1,088	1,217	1,195	1,621	1,041	717	642	664
8,593	9,128	9,650	10,158	10,904	10,907	10,934	11,461
10,945	11,186	11,059	11,049	11,105	11,713	12,352	12,881

but were making more sales and profits than they were. While Exacta was second highest in sales in the prior period, they had some unsold inventory left over. The lowest competitive price had been \$6.20 compared with Exacta's \$6.00 price. They decided "Low price alone is no longer going to give us a corner on the market. We are going to have to start increasing our research and development and our marketing. We lost considerable market last time to companies with a higher price because we have not been investing enough. "Those teams must be putting more money in marketing. That's what we should do. They will undoubtedly stay at \$6.20. We need all the income we can get if we are going to raise our marketing budget. We must raise price, but we want to stay under those others." So the Exacta management raised the product price to \$6.15, made sizeable increases in both research and development and marketing, and scheduled production at close to their maximum capacity.

The results of these decisions were most unsatisfactory. The firm failed to sell its output and incurred severe losses. However the Exacta team members agreed they were "not going to panic because we lost a lot of money last quarter. We still think low price and large volume sales is the key to success." They decided to hold to their \$6.15 price--still the lowest in the industry--and to maintain marketing at the increased level set in the previous period. "This [level of marketing expenditures] saved us from greater

disaster last time. Since the economic and seasonal factors are turning up, this level of marketing expense should expand our market considerably; perhaps we can pick up a larger percentage of the total." Production was again scheduled close to full capacity "to increase our inventory to be ready for later periods."

Exacta entered period 5--the period of the material cost change--with a very heavy inventory of finished goods and a cash deficit of serious proportions. Their price of \$6.10, while still low compared with the others, was considerably higher than Aurora's new price of \$5.50. Their failure to sell their output not only cost them profits, but seriously depleted their cash. The discussion went along these lines:

"With lower material costs, everybody is going down [in price] . . . We must get under Firm #3, [Aurora], to sell units. They sold 873,000. They are probably out of inventory. If so, they can only sell what they make this time . . . and it won't be that much. If we had been low at \$6.10 last time, we could have sold [that many]. We must be low man! . . . If anybody is going below \$5.50, they will go to \$5.25, so we should go to \$5.20 this time! Next time we will have to go down even more."

Turning to their marketing bedget, they decided to double their already high level of expenditure. "We must excel here. We have to take chances. We can only blow it once so we might as well go out in style." And to support

this general attack production was scheduled at maximum capacity with the comment, "We are either going to go broke or make a lot." In essence, the Exacta managers used the newly introduced material cost savings as a means of intensifying their basic low price, high volume strategy.

As a result of these moves, Exacta created a much higher level of demand than it could satisfy; it sold its entire output and inventory. While the firm's cash position was eased considerably, profits for the period were quite low; in fact, they were the poorest in the industry. In planning for the following period, one of the managers said, "It's time to give up trying to get in front of the rest of the industry. It's time to save the company. We are no longer in a position to face the cut-throat competition of low price. We must get the company back on its feet. We must be a follower until we improve our cash position and can be a leader again." (My emphasis.) So they raised their price to what they believed the industry average would be, reduced marketing expenditures to the previous level and again scheduled maximum capacity production. They continued this approach throughout the remaining plays of the game.

Throughout the game, Exacta focused on producing and selling as many units as possible every period. While price was initially considered the most effective instrument to accomplish these results, marketing was also emphasized at a later stage of the game. As the Exacta managers

approached the problem, the magnitude of both price and marketing depended on their estimates of competitive action, with emphasis on overshooting rather than undershooting the mark. They supported this attack with maximum production in all but two periods as well as with a heavy plant investment program designed to build more and more capacity. They sustained their level of plant investment even when they were in serious cash difficulties. In keeping with their low price, high volume strategy, R&D and maintenance expenses were held at relatively low levels. Product differentiation and unit costs were not of primary concern to the Exacta management; volume was.

Team #6--NAMCO: The Model-Less Model

The history of NAMCO's performance is detailed in Table 11. If the NAMCO management started with any kind of organized conceptual model of their business situation, it was not evident. At the outset, the managers simply followed the previously established patterns of decision for the firm. Typical team comments were like these:

"My strategy [is] to keep my prices a little lower than the expected average price each quarter, yet high enough to cover total costs per unit and thus allow for some profit."

"I believe we should keep our price relatively stable, varying it no more than 20¢."

"Marketing should be kept at an average to keep up with competition, yet because it is an expense it must be kept from extremes."

TABLE 11.--Game performance--Team #6--NAMCO.

	Practice Period	Period 0
Price (\$)	6.20	6.40
Average industry price (\$)	6.29	6.40
Economic index	106	103
Seasonal quarter (months)	JAS	AMJ
OPERATING DATA (thousands of units)		
Total industry sales	4,477	3,911
Market potential	540	435
Sales volume	495	435
Percent share of industry sales	11%	11%
Production this quarter	430	400
Labor cost per unit (\$)	1.48	1.43
Materials cost per unit (\$)	1.58	1.58
Inventory finished goods	0	65
Plant capacity next quarter	430	415
INCOME STATEMENT (thousands of dollars)		
Receipts: Sales revenue	3,072	2,781
Expenses: Labor	626	574
Materials	679	631
Reduct. fin. goods inv. val.	196	104
Administration	333	278
Marketing	250	240
Research and development	140	150
Maintenance	85	75
Depreciation	208	200
Miscellaneous	218	230
Total expenses	2,735	2,481
Profit before income tax	337	300
Addition to income tax fund	162	144
Net profit after income tax	175	156
Dividends paid	50	50
Addition to owners' equity	125	106
CASH FLOW (thousands of dollars)		
Receipts: Sales revenue	3,072	2,781
Disbursements: Cash expenses	1,652	1,547
Addition to income tax fund	162	144
Dividends paid	50	50
Investment in plant	500	500
Purchase of materials	1,150	1,000
Total disbursements	3,514	3,241
Addition to cash assets	-442	-460
BALANCE SHEET (thousands of dollars)		
Assets: Net cash assets	598	1,040
Inventory value, finished goods	0	196
Inventory value, materials	1,641	1,169
Plant net book value	8,593	8,300
Owners' equity	10,831	10,706

NOTE: Figures may not add due to rounding.

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8
6.20	6.20	6.25	6.30	5.50	5.60	6.00	6.10
6.32	6.32	6.39	6.21	5.77	6.01	6.19	6.19
108	98	92	98	114	121	116	108
JAS	OND	JFM	AMJ	JAS	OND	JFM	AMJ
4,643	5,051	3,827	4,760	6,553	6,774	5,820	5,295
552	606	391	433	897	1,155	846	704
480	600	391	433	791	780	800	704
11%	12%	10%	9%	12%	12%	14%	13%
415	600	450	420	745	780	800	750
1.43	1.43	1.43	1.42	1.42	1.41	1.68	1.67
1.57	1.58	1.57	1.56	.78	.77	.77	.77
0	0	59	46	0	0	0	46
435	455	476	498	520	542	564	584
2,979	3,729	2,445	2,728	4,349	4,370	4,800	4,294
593	977	642	596	1,232	1,286	1,564	1,412
653	946	708	657	579	604	615	574
196	0	-176	39	137	0	0	-138
283	339	296	302	359	366	374	380
250	270	240	300	340	370	400	420
160	140	160	180	200	200	220	220
85	90	85	85	100	110	120	120
208	217	228	238	249	260	271	282
229	268	307	405	302	254	243	261
2,656	3,248	2,488	2,803	3,499	3,451	3,807	3,531
323	472	-43	-75	850	919	993	763
155	227	-21	-36	408	441	477	366
168	246	-23	-39	442	478	516	397
40	20	0	0	0	0	0	0
128	226	-23	-39	442	478	516	397
2,979	3,720	2,445	2,728	4,349	4,370	4,800	4,294
1,600	2,084	1,729	1,868	2,534	2,587	2,921	2,814
155	227	-21	-36	408	441	477	366
40	20	0	0	0	0	0	0
600	625	650	670	700	700	700	680
1,300	1,000	1,100	0	0	300	500	450
3,695	3,956	3,459	2,503	3,642	4,028	4,597	4,310
-716	-236	-1,014	226	708	342	203	-16
324	89	-925	-699	8	350	553	537
0	0	176	137	0	0	0	138
1,817	1,871	2,263	1,606	1,026	722	607	483
8,693	9,100	9,523	9,955	10,406	10,846	11,274	11,673
10,834	11,059	11,037	10,998	11,440	11,918	12,435	12,831

The team members tended to approach each decision period and each decision as an isolated, independent event, except for an attempt to control total expenses by trading off funds between marketing and research and development.

In going into the low January, February, March period, they decided to raise their product price.

"We are going into a poor quarter. We are not going to produce as much so we should raise price to try to get a little money."

At the same time, they lowered marketing.

"We do not plan to advertise during this period because it is going to be a very poor period."

However they continued to increase their investment in plant, and in spite of the fact that they had a very large inventory of raw materials on hand, they increased their purchases of materials.

As a result of these decisions, in the fourth period they found themselves operating at a loss, with a very serious cash deficit, and with an enormous supply of raw materials: enough to run for more than six months at maximum capacity. They also had a relatively large inventory of finished goods on hand. All of these factors combined to focus the managers' attention on the need to sell more goods.

"We must get a market for our product. These other firms are outselling us."

"The figures from past periods show that we just don't have a big enough market."

"We take a very small percentage of the market . . . It is very important to get our market higher."

This led to what the team felt was a substantial increase in marketing expenditures. At the same time, however, they agreed that "we can jump our price up five cents and still be way below the average." They decided that no additional material was needed for the quarter, but they again raised their investment in plant.

NAMCO entered the period of the materials requirement change with its cash deficit and its inventories somewhat reduced, but both were still of significant proportions. The management team's attention remained focused on increasing the firm's sales as much as possible. To accomplish that they decided to cut their price to \$5.50 and increased their marketing budget by "redistributing the materials savings." At the same time, on the strength of the forecast of improved economic conditions and an expected seasonal increase in sales, they scheduled production at maximum capacity. This combination of moves was successful in getting them out of the difficulties they had been in; for the balance of the game they continued to focus on realizing a high sales volume through low prices and heavy marketing expenditures.

Unlike the other teams, the early NAMCO decision discussions showed no systematic organization or focal point.

Each decision was treated in more or less general terms as an independent item for discussion. Initially the team members looked to the previously established pattern of operation as a basis for their decisions. Later they looked to competitive action for guidance. Where this was not to be had, as in the case of materials purchases, their choices tended to be aimless. Their discussions only began to take form when they found themselves in difficulty; then they had something on which to focus: a problem that had to be solved. The obvious move was to increase sales by following competition in price cutting and marketing. After a faltering start, they pursued this approach with some success. By the end of the game their decision discussions began to have form and to make sense.

Team #7--Slater Company: The Efficient Price Model

The history of Slater Company's performance is detailed in Table 12. The Slater Company management started out by estimating the effects of different price levels on profits. Based on the results of the practice play, they decided to hold their product price stable for the first quarter while raising both marketing expenditures and production. Some of their comments at that time were as follows:

"Let's hold to a stable price. We sold enough in the trial period."

"To raise or lower price would be stupid. We wouldn't make any money."

TABLE 12.--Game performance--Team #7--Slater Co.

	Practice Period	Period 0
Price (\$)	6.40	6.40
Average industry price (\$)	6.29	6.40
Economic index	106	103
Seasonal quarter (months)	JAS	AMJ
OPERATING DATA (thousands of units)		
Total industry sales	4,477	3,911
Market potential	481	435
Sales volume	480	435
Percent share of industry sales	11%	11%
Production this quarter	415	400
Labor cost per unit (\$)	1.43	1.43
Materials cost per unit (\$)	1.56	1.58
Inventory finished goods	0	65
Plant capacity next quarter	415	415
INCOME STATEMENT (thousands of dollars)		
Receipts: Sales revenue	3,075	2,781
Expenses: Labor	592	574
Materials	649	631
Reduct. fin. goods inv. val.	196	104
Administration	283	278
Marketing	240	240
Research and development	200	150
Maintenance	80	75
Depreciation	208	200
Miscellaneous	108	230
Total expenses	2,645	2,481
Profit before income tax	430	300
Addition to income tax fund	206	144
Net profit after income tax	223	156
Dividends paid	0	50
Addition to owners' equity	223	106
CASH FLOW (thousands of dollars)		
Receipts: Sales revenue	3,075	2,781
Disbursements: Cash expenses	1,593	1,547
Addition to income tax fund	206	144
Dividends paid	0	50
Investments in plant	210	500
Purchase of materials	800	1,000
Total disbursements	2,809	3,241
Addition to cash assets	266	-460
BALANCE SHEET (thousands of dollars)		
Assets: Net cash assets	1,306	1,040
Inventory value, finished goods	0	196
Inventory value, materials	1,321	1,169
Plant net book value	8,303	8,300
Owners' equity	10,929	10,706

NOTE: Figures may not add due to rounding.

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8
6.40	6.25	6.50	6.35	6.25	6.25	6.35	6.30
6.32	6.32	6.39	6.21	5.77	6.01	6.19	6.19
108	98	92	98	114	121	116	108
JAS	OND	JFM	AMJ	JAS	OND	JFM	AMJ
4,643	5,051	3,827	4,760	6,553	6,774	5,820	5,295
532	660	470	535	692	918	740	691
515	600	470	535	658	700	700	539
11%	12%	12%	11%	10%	10%	12%	10%
450	600	513	500	650	700	700	539
1.43	1.41	1.40	1.40	1.40	1.41	1.69	1.68
1.55	1.50	1.50	1.49	.75	.76	.75	.75
0	0	43	8	0	0	0	0
430	459	487	495	495	523	585	595
3,299	3,750	3,053	3,399	4,113	4,375	4,445	3,394
666	966	757	706	1,020	1,129	1,329	905
698	903	768	747	489	530	528	406
196	0	-130	106	24	0	0	0
333	337	347	356	358	359	367	337
300	275	400	350	400	400	400	450
250	400	275	275	200	200	250	250
80	85	90	90	90	95	95	95
208	215	229	244	248	248	261	292
218	250	267	218	203	256	406	211
2,949	3,430	3,004	3,092	3,033	3,216	3,637	2,946
350	320	50	308	1,080	1,159	808	448
168	153	24	148	519	556	388	215
182	166	26	160	562	603	420	233
0	0	0	0	0	0	0	0
182	166	26	160	562	603	420	233
3,299	3,750	3,053	3,399	4,113	4,375	4,445	3,394
1,847	2,313	2,136	1,995	2,272	2,438	2,847	2,248
168	153	24	148	519	556	388	215
0	0	0	0	0	0	0	0
500	800	800	400	250	800	1,500	500
500	700	1,000	700	400	200	400	350
3,015	3,966	3,960	3,243	3,440	3,995	5,135	3,313
284	-216	-906	156	673	380	-690	81
1,324	1,108	201	358	1,031	1,411	721	802
0	0	130	24	0	0	0	0
971	769	1,000	953	864	534	406	350
8,593	9,178	9,748	9,905	9,907	10,459	11,698	11,905
10,888	11,054	11,080	11,240	11,802	12,404	12,825	13,058

"It always helps to advertise. The more advertising we do the more we can sell . . . But if you raise marketing expenditures too much, the law of diminishing returns sets in."

While they were not unsuccessful in the first period, in the following period they elected to lower their price.

"Everybody is lowering price; \$6.32 was the average last quarter. Our price [which had been \$6.40] has to be low enough to sell, but high enough for profit . . . But it must not be so low as to develop more potential than we have units [of finished product available for sale].

At the same time they decided to reduce their level of marketing expenditures.

"With lower price we won't need as much marketing. The lower the price, the lower the marketing expense should be."

They also decided to increase production. In purchasing materials for the next period, however, they inadvertently under-ordered, limiting the quantity that could be produced in the January, February, March quarter. The combination of an over-sold situation in the previous quarter, an expected slow upcoming market, and limited product availability led them to increase their price again, supporting the move with a heavy increase in their marketing budget. While their price turned out to be well above the market average price, the firm's overall results were relatively satisfactory.

Going into the next quarter with a sizeable finished goods inventory, the managers elected to drop their price. As one team member put it, "I feel that our firm should keep the price at about \$6.35 so we stay near the average. This way we do not over- or under-price our product and will always be able to appeal to the largest segment of the market." Marketing was decreased moderately and the production schedule reduced to match the anticipated demand.

This, of course, was the period when Aurora slashed its price to \$5.50. The Slater Company, with its price at about average, not only managed to sell its entire production and most of its inventory, but it also realized a considerably higher profit than Aurora. Hence in receiving the announcement of the reduction in material requirements, the Slater managers were not anxious to lower their product price.

"We made more money than [Aurora did] at \$5.50 last quarter. The economic index is predicted to be up quite high next period so our market potential should be up. The other firms are going to cut their prices down. If we don't sell at this price [\$6.25] we can get rid of the units next time. We will have inventory for the Christmas season."

The material cost reduction was estimated at \$.75 per unit, but the Slater Company managers finally decided to reduce their price by only \$.10. They recognized that this price would probably be the highest in the industry and agreed to increase their marketing expenditures to offset

the lower prices of their competitors. They were in some disagreement as to whether to increase production to 720,000 or 650,000 units; they finally settled on the smaller figure.

With the second highest price in the industry--a price substantially above some of their competitors--they were successful in selling out their entire production and inventory. Accordingly, they held to this general price, production and marketing pattern for the remaining plays of the game.

In reviewing the history of the Slater Company's performance, one is struck by their concentration on price as the crucial variable for their operation. The team members seemed to see their central task in terms of setting a relatively high price compared to competition, but a price sufficiently low to sell an "adequate" volume: something more than one shift capacity. Only once did they indicate that they wanted to set the highest price in the industry; they usually managed to keep their price about the second highest, relying on a relatively high, constant level of marketing effort to insure the desired sales volume. Slater Company seemed to seek an "efficient" price: one that would provide a generous gross margin but also permit high volume production and sales.

Team #8--Universal Industries:
The High Price Model

The history of Universal Industries' performance is detailed in Table 13. In the opening practice period of the game Universal Industries increased their product price substantially. They guessed (correctly) that most of the other teams would lower price. They wanted to see what would happen as the result of a move in the opposite direction. While the results were not entirely satisfactory, their initial test set a pattern for their operations. In their opening game decisions they again raised price, but by a lesser amount, supporting the move with a very substantial increase in marketing "to help boost demand and sales of products so that we can sell what we make," and a relatively small increase in production. This move was more than successful in generating business; they repeated it in the following period but with a reduction in the marketing budget; the managers felt they "threw a little money away" in this area in the previous quarter. In spite of this reduction however, they again sold out. Although they recognized that industry volume could be expected to be down in the next period--the usually slow January, February, March quarter--the team members agreed to continue to hold their price.

"Although we are 20¢ higher than the average price, there is no sense in fluctuating. The customers are used to paying this price. If we reduce it, sales won't increase

TABLE 13.--Game performance--Team #8--Universal Industries.

	Practice Period	Period 0
Price (\$)	6.70	6.40
Average industry price (\$)	6.29	6.40
Economic index	106	103
Seasonal quarter (months)	JAS	AMJ
OPERATING DATA (thousands of units)		
Total industry sales	4,477	3,911
Market potential	409	435
Sales volume	409	435
Percent share of industry sales	9%	11%
Production this quarter	415	400
Labor cost per unit (\$)	1.44	1.43
Materials cost per unit (\$)	1.57	1.58
Inventory finished goods	72	65
Plant capacity next quarter	430	415
INCOME STATEMENT (thousands of dollars)		
Receipts: Sales revenue	2,737	2,781
Expenses: Labor	597	574
Materials	652	631
Reduct. fin. goods inv. val.	-19	104
Administration	283	278
Marketing	290	240
Research and development	175	150
Maintenance	65	75
Depreciation	208	200
Miscellaneous	254	230
Total expenses	2,504	2,481
Profit before income tax	233	300
Addition to income tax fund	112	144
Net profit after income tax	121	156
Dividends paid	30	50
Addition to owners' equity	91	106
CASH FLOW (thousands of dollars)		
Receipts: Sales revenue	2,737	2,781
Disbursements: Cash expenses	1,664	1,547
Addition to income tax fund	112	144
Dividends paid	30	50
Investment in plant	500	500
Purchase of materials	1,000	1,000
Total disbursements	3,306	3,241
Addition to cash assets	-569	-460
BALANCE SHEET (thousands of dollars)		
Assets: Net cash assets	472	1,040
Inventory value, finished goods	216	196
Inventory value, materials	1,517	1,169
Plant net book value	8,593	8,300
Owners' equity	10,797	10,706

NOTE: Figures may not add due to rounding.

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8
6.50	6.50	6.50	6.50	6.40	6.40	6.40	6.40
6.32	6.32	6.39	6.21	5.77	6.01	6.19	6.19
108	98	92	98	114	121	116	108
JAS	OND	JFM	AMJ	JAS	OND	JFM	AMJ
4,643	5,051	3,827	4,760	6,553	6,774	5,820	5,295
574	604	420	399	617	958	763	795
505	500	420	399	617	713	486	494
11%	10%	11%	8%	9%	11%	8%	9%
440	500	445	454	600	650	486	494
1.43	1.44	1.43	1.42	1.42	1.41	1.67	1.60
1.57	1.57	1.56	1.56	.78	.77	.77	.77
0	0	25	80	63	0	0	0
436	445	454	464	473	486	494	506
3,285	3,250	2,728	2,593	3,948	4,563	3,109	3,160
649	764	635	644	946	1,040	813	820
691	784	696	708	467	503	374	378
196	0	-75	-164	51	189	0	0
333	339	292	295	349	351	305	358
500	350	250	300	500	700	425	550
170	170	170	170	180	200	200	225
75	75	85	90	100	115	115	120
208	218	222	227	232	236	243	247
232	252	203	251	206	211	179	171
3,054	2,952	2,478	2,521	3,030	3,546	2,655	2,869
232	298	250	72	918	1,017	454	291
111	143	120	35	441	488	218	140
120	155	130	37	477	529	236	151
30	0	15	25	50	100	100	100
90	155	115	12	427	429	136	51
3,285	3,250	2,728	2,593	3,948	4,563	3,109	3,160
1,958	1,950	1,635	1,750	2,280	2,617	2,038	2,244
111	143	120	35	441	488	218	140
30	0	15	25	50	100	100	100
620	400	400	440	400	500	400	500
2,000	0	0	1,000	0	1,000	0	0
4,720	2,493	2,170	3,250	3,171	4,706	2,756	2,984
-1,434	757	558	-657	777	-143	353	176
-394	363	921	264	1,041	898	1,252	1,428
0	0	75	239	189	0	0	0
2,478	1,694	998	1,290	823	1,319	945	567
8,713	8,895	9,072	9,286	9,453	9,717	9,874	10,127
10,797	10,952	11,066	11,079	11,506	11,935	12,071	12,122

that much, taking into consideration the period of the year. Market potential has been very high compared with production the last two periods. Maybe we can build some inventory."

They also decided to reduce marketing and cut production back to one shift capacity on the basis that "less would be stupid; more would be expensive."

In this period they sold most of what they produced and they earned considerably more money than anyone else in the industry. Only one other firm made a profit in the quarter and it was a relatively small amount; all the others suffered losses. These results tended to fortify Universal Industries' price program for the following period, but at the same time competition was forced to take aggressive action. Most of them not only dropped price--Aurora going as low as \$5.50--but they also increased their marketing efforts substantially. As a result, Universal Industries' market and profit position dropped severely. Their market share went from 11% to 8% and they entered the next period--period #5--with a large inventory of finished goods.

After much deliberation about the effects of the material cost change, the management team of Universal Industries decided to drop their price from \$6.50 to \$6.40 and at the same time to raise their marketing expenditures substantially in order to get more sales volume. They also went into overtime production, planning to sell the additional output in the upcoming fall quarter if it did not move in the current period. While their price proved

to be the highest in the industry, they still managed to sell slightly more than they produced. In the following periods they continued to hold their price at the \$6.40 level "as a matter of policy" and it continued to be the top price in the industry. Marketing expenditures and production schedules were varied according to their market forecasts.

Throughout the game Universal Industries' operations were keyed to a stable, high price. Their price was the highest in the industry for six of the eight periods. They used marketing expenditures as the primary means of keeping sales volume up to at least one shift production capacity. This central focus on price was dramatized in the firm's response to the changes presented in period #5. With one competitor priced a full dollar below its price and indications that other firms would follow toward that level, and with industry costs down as much as \$.78 per unit, Universal Industries elected to reduce their selling price only \$.10 per unit--their only price change of the game.

Team #9--Spartan Iron Company: The Control Model

The history of Spartan Iron's performance is detailed in Table 14. Spartan Iron Company's model of the situation may have developed more by accident than by design. In the opening period they chose to hold their product price to \$6.40, the prior level, and to increase marketing to offset

TABLE 14.--Game performance--Team #9--Spartan Iron Co.

	Practice Period	Period 0
Price (\$)	6.25	6.40
Average industry price (\$)	6.29	6.40
Economic index	106	103
Seasonal quarter (months)	JAS	AMJ
OPERATING DATA (thousands of units)		
Total industry sales	4,477	3,911
Market potential	556	435
Sales volume	480	435
Percent share of industry sales	11%	11%
Production this quarter	415	400
Labor cost per unit (\$)	1.43	1.43
Materials cost per unit (\$)	1.58	1.58
Inventory finished goods	0	65
Plant capacity next quarter	420	415
INCOME STATEMENT (thousands of dollars)		
Receipts: Sales revenue	3,003	2,781
Expenses: Labor	595	574
Materials	654	631
Reduct. fin. goods inv. val.	196	104
Administration	283	278
Marketing	300	240
Research and development	150	150
Maintenance	77	75
Depreciation	208	200
Miscellaneous	202	230
Total expenses	2,665	2,481
Profit before income tax	338	300
Addition to income tax fund	162	144
Net profit after income tax	176	156
Dividends paid	50	50
Addition to owners' equity	126	106
CASH FLOW (thousands of dollars)		
Receipts: Sales revenue	3,003	2,781
Disbursements: Cash expenses	1,607	1,547
Addition to income tax fund	162	144
Dividends paid	50	50
Investment in plant	300	500
Purchase of materials	1,015	1,000
Total disbursements	3,134	3,241
Addition to cash assets	-131	-460
BALANCE SHEET (thousands of dollars)		
Assets: Net cash assets	909	1,040
Inventory value, finished goods	0	196
Inventory value, materials	1,530	1,169
Plant net book value	8,393	8,300
Owners' equity	10,832	10,706

NOTE: Figures may not add due to rounding.

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8
6.40 6.32 108 JAS	6.50 6.32 98 OND	6.60 6.39 92 JFM	6.40 6.21 98 AMJ	6.10 5.77 114 JAS	6.25 6.01 121 OND	6.35 6.19 116 JFM	6.25 6.19 108 AMJ
4,643 510 510 11% 500 1.43 1.58 55 410	5,051 502 502 10% 450 1.43 1.58 3 412	3,827 339 339 9% 430 1.43 1.56 94 417	4,760 436 436 9% 417 1.43 1.55 74 421	6,553 652 652 10% 600 1.43 .78 23 436	6,774 787 676 10% 653 1.43 .78 0 437	5,820 600 600 10% 655 1.72 .78 55 439	5,295 579 579 11% 625 1.72 .79 100 439
3,267 778 788 31 333 300 150 85 208 222 2,894 373 179 194 50 144	3,264 674 709 157 331 300 150 80 204 160 2,766 498 239 259 50 209	2,238 627 672 -272 332 270 200 78 206 224 2,336 -98 -47 -51 50 -101	2,789 594 648 58 283 300 200 77 208 216 2,584 205 99 107 50 57	3,976 986 468 155 335 350 150 85 211 175 2,915 1,061 509 552 50 502	4,225 1,092 512 68 339 380 150 90 218 174 3,023 1,202 577 625 50 575	3,813 1,314 514 -164 340 350 150 90 219 175 2,989 824 396 429 50 379	3,620 1,236 491 -137 340 375 150 88 219 221 2,985 636 305 331 50 281
3,267 1,867 179 50 100 1,000 3,196 71	3,264 1,695 239 50 250 0 2,235 1,030	2,238 1,730 -47 50 300 1,700 3,733 -1,495	2,789 1,670 99 50 300 0 2,119 670	3,976 2,081 509 50 500 0 3,140 836	4,225 2,226 577 50 250 990 4,093 132	3,813 2,420 396 50 250 0 3,115 698	3,620 2,411 305 50 225 500 3,491 129
1,111 165 1,381 8,193 10,850	2,141 9 672 8,238 11,059	645 281 1,700 8,332 10,958	1,316 223 1,052 8,423 11,015	2,152 68 584 8,713 11,516	2,284 0 1,062 8,745 12,091	2,981 164 549 8,776 12,470	3,110 301 558 8,782 12,751

the expected competitive price reductions. They also scheduled production at a higher level than the previous one in order to build inventory for the next period. Material purchases were set at the same level as in the pre-game starting report. In entering the second quarter of the game they found themselves with much more than enough materials for period #2 but not quite enough to take them through period #3 at the desired level of production. They wanted to forego purchasing materials in period #2 in order to save the \$50,000 ordering charge, but were also concerned about limiting their ability to produce in period #3. Some of their comments were as follows:

"We worked ourselves into a corner last time; we are going to have to cut this 'real tight.'"

"We had forecast a drop in price, but in view of the dilemma we have gotten ourselves into, we cannot afford to drop our price at this time. We are going to have to raise our price."

They resolved the problem by limiting production for both periods and increasing price in order to raise sales revenue and limit market potential. In effect they took the materials inventory as a fixed point and adjusted the other variables in the situation to accord with it.

After the materials inventory problem was solved, the Spartan Iron Company management found itself with a build-up of finished goods inventory amounting to almost 100,000 units. "We have to get rid of these finished goods

units. But if we lower price too much we won't make enough profit. We want to sell about 500,000 units; that will let us run the plant at its one shift capacity of 416,000 units and sell out most of the inventory." After a discussion of what other firms had apparently been able to sell at different prices, the team members finally settled on a price of \$6.40, a reduction of \$.20 from their previous industry high of \$6.60, with the comment that, "if they don't sell at that price, we'll dump them on the market." They supported this move with a substantial increase in marketing.

In period #4 they succeeded in reducing their inventory by a small amount. In facing the new conditions of period #5, Spartan Iron management decided to reduce price by a relatively small amount and increase marketing and production. Some of the discussion went as follows:

"Everybody is going to have a lower price and a high economic index is predicted."

"We could decrease to \$5.75 and still make the same profit, but we wouldn't have the goods; we would have no carry over [of inventory] for the next period."

"We don't want to go down to market average price. \$6.00 is too low."

"If we don't sell at \$6.10, we will have inventory for next period. This will give us a chance to feel out the market."

"We want to build a large finished goods inventory to have enough for October, November and December."

Actually Spartan Iron managed to sell out in period #5, so in the following quarter they raised their price, held marketing as before and scheduled production at full capacity. At game's end they were still concerned with building their inventory position.

Unlike the other teams, the Spartan Iron Company managers were continually concerned about inventory and repeatedly discussed their decisions in terms of their finished stock position. They looked at inventory as a kind of safety-valve, a cushion for errors in forecasting. They tended to organize their decisions around inventory targets, around either reducing or building their stock of finished goods. Thus when they had excess stocks on hand, they would reduce price and increase marketing to move more goods. But as they pictured the situation, they could afford to limit their changes because if the goods failed to move in the current period, they could take further action in the following period. And oppositely, when they wanted to increase inventories, they not only increased production, but they also raised price and reduced marketing efforts. It is interesting to note that while all of the other firms ran out of finished goods repeatedly, Spartan Iron sold out only once during the game.

Summary of Results

In surveying these data one is first struck by the evidence that although these teams were all playing what to an objective observer would appear to be the same game under the same conditions, each team seemed to "see" a different set of conditions. Each one defined its situation differently and operated in accordance with that definition.¹ Some teams (notably #1 and #3) had an external orientation: they started with the market and sought to fit their operations to the conditions imposed by the market. Other teams (especially #4 and #9) appeared to start with their own operating requirements; they attempted to match their participation in the market to their own business needs. Some teams tended to vary price with the seasonal shifts in the market, increasing their price with an increase in industry sales and decreasing price on the downturns (for example, Team #2), while others moved in exactly the opposite direction (as Team #1 did), and still a third class (Team #8, for instance) priced without considering seasonal changes. And the teams also varied with respect to how they perceived

¹The fact that decisions were based on the definitions of situations rather than the actual situations was demonstrated particularly in instances where decisions were based on erroneous information. For example, Team #2 twice scheduled production at a rate which they believed to be the firm's nominal capacity. Actually their capacity was lower than the scheduled production rate so that overtime charges were incurred. The decision was a function of what the team members believed to be the situation rather than what the situation actually was.

the relationship between price and marketing--whether they should move in the same direction or opposite to one another. One can cite many such differences, but in all such cases one finds that each team's policy was supported by cogent, consistent and justifiable arguments. From the standpoint of this research, the significant point seems to be that these differences were not trivial, random, "irrational" variations, but that while each team's decision behavior differed from the others, it appeared to be based on a definition of the situation.

In arriving at its definition of its situation, each team appeared to select a "focal point" as a center of attention.² While all the teams were striving for the same abstract goal--"to maximize the expected rate of return on the capital invested in the company"³--each one tended to translate that general objective into more specific terms such as market share (Team #3) or some level of operating efficiency (Team #4) or maximum volume (Team #5) or relative price (Team #8). These more tangible, more readily defined, symbolized and communicated goals were used as surrogates for the more abstract, complex, indefinite goal of maximum rate of return. Each team appeared to organize its discussions and decisions around its chosen focus of attention and it was this focus of attention which gave meaning to

²March and Simon, loc. cit., p. 152.

³See Appendix A, pp. 148-149.

the elements of the situation. For an extreme example, observe the behavior of Team #9 at the beginning of the game. It chose to pursue an opportunity to save a materials purchasing charge. This gave them a specific raw materials inventory figure as a "fixed point." From that, their individual decisions on production, price, marketing and the rest took on meaning in terms of the inventory limitations--the amount of production it permitted, the price and marketing program indicated by the resulting level of product availability and so on. These limitations were, of course, self-imposed, flowing out of the original focus on a cost saving, but they served as a basis for organizing the team's decisions in a coherent meaningful framework. Similarly Team #4 focused on efficient levels of operation--either one shift or maximum capacity--and geared all other decisions to whichever production level it chose. Team #9 used price as its center of attention. In all cases--finally even including Team #6, the model-less case--each team developed some kind of central direction of change which served as a means of relating the individual parts of the situation to one another and as a basis for organizing those parts into a coherent whole.

To illustrate the structural aspects of the team's focus, Team #1's decisions to lower price, increase marketing and raise production in a good market season make sense both as individual decisions and as a set of decisions when taken in the context of their focus on market

opportunity as the primary independent variable in the situation. On the other hand Team #2's pattern of moving in exactly the opposite direction is perfectly reasonable in the context of their focus on maintaining an efficient plant load. Team #7 organized their decisions in yet another way. Where both Team #1 and Team #2 chose to raise marketing expenditures when they lowered price and vice versa, Team #7 would support a price increase with additional marketing effort and conversely, let a price decrease sell itself. To that team, price was the central variable; its moves make sense in that context. In all cases, the structural relationships of the various members of the definition of the situation seem to be explainable in terms of how the members support each other in accomplishing the firm's central direction of changes. It is the focus of attention that gives meaning to the parts.

The teams not only differed in the content of their definitions of the situation, but they also exhibited marked differences in the "style" in which they constructed and manipulated their models. Team #4--BHM Electrical--exhibited one extreme: a highly conservative approach. Both their discussions and their decision records reveal a cautious approach in which the range of choices considered was severely limited. At the opposite end of the spectrum, Team #5--Exacta Corporation--operated with a "go-for-broke" approach. Changes which BHM Electrical considered as highly radical were dismissed as insignificant--hardly

worth bothering with--by Exacta. For example while BHM Electrical's marketing expenditures varied between \$260,000 and \$300,000 per period, Exacta's ranged from \$280,000 to \$1,000,000. And as an interesting side-light to the question of style, in estimating competitive actions each team tended to ascribe its own style and scale of operations to all of its competitors. When the industry report for the first fiscal year was issued (Table 4), the Aurora management team was shocked to find its plant capacity was not overwhelmingly greater than its competitors'; what to them had been a massive investment program had been matched and even exceeded by other firms who had invested at a comparable rate as a matter of course.

A factor of major importance for further research is the inertia which the teams exhibited in both the absolute and relative elements of their decision behavior. The term absolute elements of decision behavior is used to refer to the teams' specific decisions: its tendency to carry forward and repeat the same or a large portion of the same decisions from period to period, or considered oppositely, the teams' reluctance to change from past decisions. This was exhibited in the general acceptance and use of the report of the prior decisions provided at the start of the game (Table 1). For the most part they were accepted as "correct;" the team's decisions were not new decisions, but continuations or deviations from the given model. Hence the bulk of the old decisions seem to be carried

forward; the variations--the new information--are a relatively small part of the total. This same tendency is also exhibited in those decision areas which are considered of secondary importance to the team's main direction of change. For example in considering the level of maintenance, time and again the expressed comment was something like "we seem to be doing all right; let's leave it alone." Thus a large portion of a team's decision behavior can be accounted for in terms of default, in terms of the tendency to repeat what has gone before.

The term relative decision behavior is used to refer to the way in which a team relates different decisions to one another and to the team's central focus. The research indicated that when a team has created a particular form of model, it continues to use that same general form, even though it may change the content quite drastically. This was illustrated most vividly in the case of Aurora, Inc. The managers started out with a definition of the situation centered on some ideas about the importance of market share. Their general plan of attack proved unsuccessful and was abandoned. But in developing a new approach, the team members continued to focus their attention on market share. The basic system of relationships that made up their model remained. They no longer equated the biggest share of the market with the goal of maximum return on investment, but they built their new plans around a concept of a "right" share of the market rather than around some totally new

focal point. They continued to organize and evaluate their individual decisions in relationship to the effects of those decisions on their share of the market.

Conclusion

The findings may be summarized as follows:

1. Each team appeared to develop its own unique pattern of decision-making.

2. The evidence at hand indicates that differences between teams' decision behavior correspond with differences in their stated beliefs about the environment and their relationships with it, or, to express the same idea in different words, team decisions appear to correspond with their expressed definitions of the situation.

3. In dealing with the complex, ambiguous and uncertain situation presented by the business game, each team exhibited a tendency to center attention on some particular focal point: a central direction of change which it deemed to be desirable and feasible. In essence, the team's focus was its translation of the general game goal of "maximizing the rate of return" to an action objective around which it could organize its model of the situation in meaningful terms.

4. Each team tended to organize its concepts of the elements of the game around its particular focus in terms of how the individual variables were believed to contribute to or detract from the desired direction of change; in

other words, each team structured its conceptual model of the situation around its focus. The variables in the situation took on meaning, importance and value on a basis of how they related to the team's focus.

5. The team's conceptual model of the situation--its focus and the supporting structure built around that focus--tended to persist. It was initially constructed from certain "givens," including not only the explicit statements about the game and the implicit relationships revealed by the starting information, but also the whole system of linguistics, cultural factors, past experience, etc., etc., which the team members brought to the game, all of which lies beyond the scope of this study. What is significant to this study is that the team model was constructed from "available data," regardless of source, and once constructed, it provided the framework for selecting and organizing new information. It was treated as the "accepted facts" of the situation. Changes were introduced in terms of departures from the original construct. When experience with the "real world" of the game indicated that the conceptual model held by the team members was not fully adequate, the model was not destroyed and replaced by a new one; it was adjusted and modified to accommodate the new knowledge. Structural relationships--for example, the effect of marketing on sales volume--tended to be modified to agree with experience, but with as little change to the total structure of the model as

possible; to use Festinger's term, the models were changed only to the extent necessary to reduce dissonance. Thus while a team's model of the situation changed over a series of decisions and results, it changed as an evolutionary process, carrying certain basic characteristics with it from change to change.

6. Each team also exhibited a "style" of change most markedly revealed in the number and size of its changes. Some teams were ultra-conservative, making very few, relatively small changes. Others were gamblers, making many large changes. These patterns of behavior appeared to persist throughout the game.

The students who participated in this study were not businessmen, the situations were not typical of a real business situation, and the conceptual models they created are not intended to represent the kinds of models that businessmen build of their own business situations. However, the results of this research raise the question of whether or not business managers do have some kinds of models with characteristics such as those described above, whether there are the same kinds of relationships between their models and their decisions as these data reveal, and if this is the case, whether or not one can discover those models and use them to explain and predict decision behavior. The foregoing data indicate that these possibilities are worth investigating.

CHAPTER VI

CONCLUSIONS

General Conclusions

This research set out to explore the feasibility and utility of a phenomenological approach to the study of business decision-making. The study rested on the premise that business decisions are based on the decision-maker's conceptual model of the business situation: his structure of ideas and beliefs about how the business's environment operates and how that environment can be expected to change, about how the business itself operates and how it relates to the environment, about alternative actions the business might take and what outcomes can be expected from such actions, and about the relative desirability of various possible future states. While these ideas, beliefs and goals may not be consciously held in the form of a single, explicit, well-articulated model, it is believed that they function as a more or less consistent, enduring conceptual structure for selecting, organizing and evaluating information about the business's present situation and its future possibilities. Thus the decisions that determine the business do not reflect raw data of the environment, but selected,

codified information organized in the framework of the decision-maker's ideas, beliefs and goals. And hence to understand, explain or predict business decision behavior it is necessary to know something about the decision-maker's model of the business situation.

The model of the business situation is seen as a coding system, a conceptual device constructed by decision-makers to enable them to handle large quantities of information.¹ It serves to simplify and order the complexity of the "real" environment by reducing the number of variables in a given situation to some manageable number. One way it does this is by simply ignoring or suppressing data by classifying them as unimportant. Another way is to categorize data, grouping large numbers of different variables under a common name as we do in everyday language. The number of possible combinations of variables can be reduced by considering relationships between variables to be fixed "for all practical purposes." Still another technique--and one of particular importance to this study--is to hold the entire simplified representation of reality constant, and test different combinations by permitting only one variable to change at a time. All of these strategies are made possible by the use of contrived symbols which can be used to represent various facets of the real situation. The net result

¹Miller, loc. cit.

appears to be that in assessing the situation, evaluating alternatives and arriving at his choice of action, the decision-maker deals not with all possible forms of reality but a highly simplified, limited representation of reality and that he deals with that representation in a highly stylized way.

The model of the business situation, whether manifested in words or numbers or communication systems or programmed behavior patterns, appears to be a heuristic device created by men to offset human limitations and serve human purposes. Although his physiological, cultural, social and organizational background provides certain model-building tools and rules which may limit the characteristics of his model (language, for example), the individual tends to build his own models for his own purposes on a basis of his own perceptions and his own needs and to modify them as his own experience dictates. If this is so, then in so far as he bases his actions on his own model of the situation, it is necessary to understand his model and its limitations in order to understand his choice of action.

The basic purpose of model building and model manipulation--the minimization of variables--makes useful study of the process possible. All of the techniques indicated above serve to minimize change and set up "constants" so that the decision-maker can focus on those variables of the situation which he considers to be important in terms of his definition of the situation. Where he has a number of such

variables, he may be able to manipulate them in sequence or in limited combinations. But this appears to be possible only if he can conceptually hold large segments of the situation constant; otherwise, the information in the system outruns his channel capacity. Thus the very nature of the model of the situation requires it to be a stable structure. Although the model itself is a vehicle for working with change and variations, its primary virtue is as a device for providing a background for change by holding other things constant and as a means of limiting the number of changes that must be considered at any one time. Insofar as it has this characteristic and performs this function, the individual's model of the business situation should be useful for explaining and predicting his behavior.

Thus, if business decisions are grounded in the decision-maker's model of the business situation rather than in the "real" situation, if the model of the business situation contains large elements of "constants" and is limited in its rate of change, and if one can discover and reconstruct a decision-maker's model of the business situation, then it should be possible to understand and explain the set of alternatives which he would consider and to predict the direction and relative magnitude of action he might take in a given situation. In a very tentative and general way, the research tends to answer these "ifs" positively--at least to the extent of indicating that further research in this direction seems to be justified. The general approach

of making comparative studies in depth appears to be a productive avenue of approach not only for laboratory work but also for field research; at least it provides a means for generating a variety of specific hypotheses which can be tested empirically. However, a great deal of exploratory work remains to be done before the concept can be reduced to a useful, measurable, clearly-defined "definition of the situation."

Specific Conclusions

One of the primary problems of using the general conceptual framework described in this thesis is that of discovering and describing a business decision-maker's model of his business situation. Just as most of us are unaware of how the structure of our language limits our view of the world, so the business decision-maker is often unaware of how his model of the business situation determines what "facts" he sees and what ones he ignores. However, even though he is unaware of it, the model is uniquely his; it only exists (if it exists at all) in relationship to his information handling; it is a construct that is only useful in relationship to his behavior processes. The problem is how to get at it, how to get it expressed and how to translate those expressions into behavior-relevant terms.

This research had three major features: (a) a multi-dimensional depth approach, (b) crystallized around series of sets of decisions, and (c) in a controlled situation that

afforded comparisons of different models of the same basic environment. The recorded decision explanations and discussions combined with other data provided a wide array of comments and statements about various aspects of the situation from each decision-maker. The actual decisions provided a focal point around which these bits and pieces of information could be organized into a coherent pattern. Finally, the use of a common controlled environment provided a basis for comparing and contrasting expressions of ideas and decisions with one another and against a common background. While at this stage the approach (it could hardly be called a methodology) was largely based on extemporaneously fitting bits and pieces together as they developed, the results indicate that once the problem has been defined, a more orderly procedure can be developed.

The data accumulated in the actual play of the game--the input information, the recorded discussions, the strategy statements, and the actual decisions--indicated that each team did tend to develop and work with its own model of the situation. Although the teams were working under the same conditions with the same information toward the same general objective, each one tended to select different variables for primary consideration, organizing them differently to achieve different operational goals. In a sense, each team created its own environment and proceeded to operate according to the rules they ascribed to that environment, even though their models sometimes differed significantly from the

"reality" they were supposed to represent. The use of the model as a basis for decision was most vividly demonstrated in those instances where the model was clearly "wrong" (in the sense of the decision-maker's ideas about some of the game relations being directly at variance with the actual game program) but yet was the decisive factor in the actual decision.

The individual teams' models of the situation exhibited internal consistency both vertically and horizontally: vertically in the sense that the members of the set of decisions made at each period were mutually complementary and not contradictory with respect to the team's general framework and horizontally in the sense that decisions from period to period exhibited continuity, fitting into an overall pattern. While each team changed its model with every new set of results, in general it held the overall structure of its model relatively constant, confining its changes to individual relationships within that structure. Even when making a drastic reappraisal of their model, the teams seemed to work from their existing set of ideas to a new structure, rather than abandoning the old model and constructing a totally new one.

The concept of the model as the basis for decision coupled with the above stability characteristics provided a basis for explaining and predicting how the individual teams would react to a severe change in environmental conditions.

While the results left a great deal to be desired, they did indicate that the general approach may be capable of producing useful results if it is further developed.

The business game proved to be a useful research tool in that it provided a well-defined, controlled, common situation somewhat similar to actual business situations, but vastly simplified, thus enabling the researcher to concentrate his attention on the decision-maker as the primary variable. The team decision discussions served to bring out the reasoning behind the decisions; the recordings of these discussions provided the wide variety of statements that are needed to reconstruct the team members' models of the situation. The decision requirements of the game forced the participants to resolve differences and crystallize their models and the feedback of results provided a basis for observing change and evolutionary development of the models. The primary weakness of the approach is that the game is just that; unlike a business, it is basically a closed system, a zero-sum game operating in the context of a fixed set of rules. The over-simplification of the situation coupled with the naiveté and disinterest of the subjects provided a model quite remote from actual business conditions. While this has its disadvantages and dangers, it does serve to provide some research advantages. The overall experience indicates that, while this approach may not produce results directly applicable to business situations, it can not only generate hypotheses but also point the way to the testing of such

hypotheses; in other words, it can itself serve as a model of the decision situation--with all the limitations of such a model.

Future Possibilities: Laboratory Studies

Considerably more laboratory work will be required to identify and measure consistency characteristics both in the so-called vertical and horizontal directions. In working with a set of decisions at a point in time, how many factors are permitted to vary? How much uncertainty can be tolerated? What strategies are used to increase the number? (For example, arbitrarily dividing the set into independent sub-sets or treating variables sequentially are techniques which appear to be used to reduce the number which must be handled at one time.) How are conflicts and contradictions resolved? And in working with successive decisions, how is new information introduced? What factors or relationships are relaxed and what ones held constant? What are the limitations on number and extent of change and how do they operate? What "coding systems" are developed to increase the tolerance for change? How do these systems develop over time? These and other dimensions might be fruitfully studied by the use of the artificial situations made possible by the game, not so much for definitive answers to these questions as for indications of how the conceptual framework might be applied to business situations.³

³See James G. March and Herbert A. Simon, Organizations

Future Possibilities: Business Studies

The initial problem which must be solved if this concept is to be usefully applied to actual business situations is that of determining what a business manager's model of his business situation is. As suggested in the foregoing, many of its elements are so thoroughly internalized that they are of the nature of automatic responses, completely beyond the consciousness of the actor; they are only to be discovered by observing his responses to a variety of specific situations and inferring the common underlying concepts which appear to tie those responses together. Using the research experience as a guide, if a means can be developed by which a manager's responses to a large number of different but related specific business problems could be accumulated--say, by an extended, open-ended interview or observation program centered on specific business practice and business decision questions--one should be able to reconstruct his general model of the situation by a process of induction and test those results against his actual prior and subsequent decision behavior. (Some preliminary experiments in this direction indicate that such an approach is feasible.) Another approach is through the use of the equivalent of "personal documents": The records of past decisions. Again, it appears that one would require an

(New York: John Wiley and Sons, Inc., 1958), pp. 156-158, for other related propositions which might be tested in such studies.

extensive variety of decisions in different situations to build a reliable model of the decision-maker's model.

Another feature of the research program that was useful in reconstructing the team members' model and which could prove useful in business research not only for model building purposes, but as an end in itself, was the comparison of different people's models of the same situation. These comparisons not only helped to reveal the reasons for differences in decisions, but also brought to light some significant ideas and beliefs which otherwise might have been overlooked. Comparisons of the models of the business situation held by members of the same organization could conceivably provide important insights into the overall operation of that organization, showing not only the roots of conflict, but the bases for cooperation and the sources of dynamic growth. An investigation of similarities and differences between competitors' models of their common business situation could also provide important understanding of business operations at another level. While the question of why people tend toward one focus of attention or one style of model-building rather than another opens up vast fields of inquiry far beyond anything considered here, the identification and characterization of these differences is a necessary first step. As such, it leads to such intriguing possibilities as that of exploring the basic

differences between the marketing man's model and the accountant's model.⁴

If techniques can be developed for understanding people's models of their business situations, such knowledge should prove to be highly useful in managing a business with respect to its internal operations as well as its external transactions. A commonly shared definition of the situation is essential to coordinated, integrated action within an organization; techniques for understanding the viewpoints of the members of the organization and for identifying specific areas of difference and disagreement can bring this phase of the management problem into sharp focus. At the same time, differences and change in people's conceptions of what is possible and what can be accomplished is the key to development and growth; the stimulation of controlled departures from the commonly held system of ideas and beliefs is also a critical management problem. Both consistency and inconsistency, the "this is the way it is" and "this is the way it could be," are required for organizational growth and both must be expressed in relationship to a common framework: the model of the situation. One can conceive of a study of the members of an organization designed to reveal the commonly held ideas and beliefs that guide their actions

⁴DeWitt C. Dearborn and Herbert A. Simon, "Selective Perception: A Note on the Departmental Identification of Executives," Sociometry, 21 (June, 1958), pp. 140-145.

and decisions and at the same time to reveal the individual variations from the common conception. It would take the form of a number of different pictures of the same subject, all showing common aspects and all showing areas of differences. Such an analysis, even in crude form, should provide the manager with a much deeper understanding of that part of his task having to do with integrating different people's efforts in a common undertaking.

The same basic problem exists in the firm's relationships with its environment. Consider, for example, a manufacturer marketing his products through a number of distributors of a particular class. While nominally they are all in the "same" business, adhering to the same standards and following the same practice, each one tends to see his particular situation in a different light; he may have different goals or he may define the functions of his business differently or he may perceive his environment in some special way. If the manufacturer bases his predictions of distributor behavior on a viewpoint which he assumes to be common to all distributors, his predictions may be subject to error to whatever degree the individual distributor's definition of his own situation varies from that which was ascribed to him. Oppositely, if the manufacturer would predict his distributor's behavior, he needs to understand the distributor's own model of his business situation.

Future Possibilities: Education Studies

If education for business is concerned with the ability to make business decisions in one form or another and if business decisions are considered to be rooted in one's model of the business situation, then perhaps the educational process should concern itself with the individual's ability to build models: the ability to recognize and develop significant focal points in a given situation, to discriminate between important and unimportant information, and to structure his model of relevant relationships. The research described in the foregoing provided some insights to the ways in which a small number of undergraduate students constructed their models of a situation and how their ability to use their models changed during the play of the game. While no special effort was directed toward studying this aspect of the data, it appeared evident that the general technique of putting subjects into situations where they are forced to make and explain reasoned decisions based on complex, ambiguous data provides a basis for understanding and comparing different "model building processes." If this can be done, then perhaps some understanding of the techniques and skills involved can be developed by comparing subjects with different backgrounds as, for example, undergraduate students and experienced businessmen. Similarly, if such comparisons can be made, then the effectiveness and efficiency of different educational techniques can be tested. Given common data about a business situation, one would

expect a student trained in marketing, for example, to construct quite different and presumably more powerful models than one not exposed to such training. He would be expected to perceive different focal points, to select different variables for attention and to organize his model of the situation differently. Better understanding of the nature of these differences might provide a better focus for educational efforts.

The feedback and correction aspects of the game also provide some understanding of how people modify and adjust their models in response to discrepancies between their envisaged and actual experiences as well as in response to new information. As indicated, these processes seem to be subject to certain constraints which could be usefully studied.

Future Possibilities: Business Theory

Perhaps the most interesting aspect of this general concept, however, has to do with its implications for business theory generally and for a theory of management in particular. If one supposes that the decision-maker's model of the business situation is the crucial element in the decision process (and hence in the determination of what the business is) and if one further supposes that the model of the business situation is a conceptual structure created by the decision-maker as his means of dealing with the situation as he perceives it in terms of his knowledge and goals, then this structure, this set of ideas, beliefs and values,

however they are generated or rooted, becomes the central "independent variable" of the business system. If we consider the business as a system of activities or a pattern of humanly-determined, purposeful behavior, each element of the system takes its meaning and value on a basis of the conceptual model that determines the system. Events which may appear to "exist" in some objective sense to outside parties may not be recognized and hence may not "exist" as far as the decision-maker is concerned--and hence may not "exist" in any meaningful way as far as the actions of the business are concerned. But, oppositely, the decision-maker's beliefs, although completely unverified and unverifiable, may have a very real effect on the determination of the activities that are the business.

The difficulty of business theory--from that of the classical economists to that of the new school of behaviorists⁵--seems to center on an insistence on some kind of independent, non-human, "objective" grounding. The formulae and the rules all seem to depend on the existence of some kind of external, objectively demonstrable goals which can be used to give meaning and order to the relationships they describe. Although the terms of such goals have gradually shifted from sharply defined profit dollars to vaguely

⁵For example, see Cyert and March, op. cit., and particularly Chapter 9, "A Model of Rational Managerial Behavior," by O. E. Williamson.

defined signs of status and power, nevertheless they continue to be considered somehow as knowable goals.

In the final analysis, the approach discussed here suggests the abandonment of the concept of the objective, knowable goal as the foundation of business theory. Rather than start with the assumption of some fixed base or some ultimate value scheme, it proposes to start with uncertainty --to start with the individual's infinite capacity to create values and goals beyond his past or present experience. Starting at that point, the structure which he builds must be understood in terms of its relevance for him in terms of his definition of his own situation. This suggests that the teachings of economics and business theory are basically relative; they take on meaning only with respect to the individual. They say, not that this tool is good and that one is bad, but merely this tool can be used for one purpose and that another purpose requires another tool. This does not make for neat and complete theories of business nor for autonomous self-regulating computer programs, but it may make for more useful and powerful understanding.

APPENDIX A

INSTRUCTIONS FOR THE GAME

Before the first play of the business game, each student was given a copy of a paper¹ describing the game and providing instructions for the participants. As this was the subject's single most important source of information about the game--how it operates, how the elements relate and how performance is measured--the descriptive and instructional portions of this paper are reproduced below.

Management's job in the Executive Game is to employ its company's resources (i.e., cash, plant, employees, inventories of finished goods and raw materials, etc.) in such a way as to maximize the expected rate of return on the capital invested in the company (owners' equity). Efforts to increase sales should be properly related to costs and expenses, in terms of reduced margins and enlarged budgets, and must be correlated with changes in plant capacity and production volume. Investment programs and dividend policies must be geared to profits and available funds. All these factors must be balanced in the face of continually changing competitive and general economic conditions. The necessity for planning is emphasized by the fact that congruous decisions generally produce more profitable results than erratic ones. Information given in the next few paragraphs will be helpful in formulating a profitable course of action.

¹Henshaw and Jackson, loc. cit.

The Market. Total industry market potential is affected by general economic conditions (economic index), seasonal demand, and by the industry wide constellation of policies embracing pricing decisions and expenditures for marketing and research and development. Each firm's potential share of the market is determined primarily by the relationship of its policies to those of its competitors.

The channels of distribution to the final purchaser in the domestic market are via wholesalers to retailers or direct to large retailers and to the foreign market through exporters. The final purchasers are fairly sensitive to price differentials at the retail level which makes wholesale, export and large retail distributors sensitive to price changes made by the manufacturers. Demand is also much influenced by marketing effort and by product improvements made possible by research and development expenditures. Marketing budgets primarily finance direct selling expenses such as advertising and salesmen's commissions. They have relatively intense effects in the quarter in which they are spent and progressively less effects in subsequent quarters. As one would expect, research and development expenditures have little effect in the quarter in which they are spent but a strong cumulative effect in subsequent quarters.

Operating Costs. Production at or below the "capacity" figure listed in Operating Statements is accomplished at nearly fixed direct cost-per-unit, relatively small reductions being a result of vigorous research and development programs. Inadequate maintenance programs lead to an increase in manufacturing costs per unit. Production volume up to an additional 50 percent of capacity can be scheduled in games utilizing Model 1 but at approximately one and one-half times direct labor cost-per-unit plus an increase in overhead administration expense.

Normally the largest non-budgeted, indirect costs are those which are fixed and those, such as depreciation, which depend roughly upon plant size. (The paragraphs on plant expansion and on finances point to possible exceptions.) Marketing, research and development, and maintenance are costs as budgeted. Maintenance, like marketing, and research and development, has effects which extend into subsequent quarters. For good results the maintenance budget should be appropriately geared to the production schedule. Since maintenance

costs are affected by the volume of production scheduled, it is important to be certain that there is sufficient raw material on hand to actually produce the amount of production scheduled. Because of fixed costs, large volume operations tend to have a moderate advantage on a total cost-per-unit basis. Expenses depending upon plant size may levy large penalties for over-expansion. Under-production (in relation to market potential) results in loss of revenue through lost sales, rather than in added costs. Competitors may capture part of the firm's lost sales but, ceteris paribus, approximately 50 percent of a firm's customers whose orders cannot be filled due to stockouts will reorder in the next period. Over-production leads to excessive inventories and correspondingly large carrying charges. Raw materials must be ordered at least one period in advance; sufficient raw material must be available at the beginning of a period to support the production volume scheduled for that period. An ordering expense is incurred each time raw materials are purchased and should be compared with carrying charges for storing raw materials over and above the amounts actually required in the next period in order to devise an optimal ordering policy for raw materials.

Plant Expansion. Plant and equipment depreciate at a rate of 2.5 percent per quarter (approximately 10 percent per annum), and this depreciation is reflected immediately in reduced capacity. To maintain a given capacity it is necessary to reinvest accordingly. Reduction in capacity can be achieved by allowing depreciation to take its course, without reinvestment. New capacity is obtained by investing \$20 in plant and equipment for each unit of quarterly capacity desired over and above the sum needed to offset decreases due to depreciation. Miscellaneous expenses associated with the purchase of plant and equipment are negligible for moderate rates of expansion, become significant when as much as one million dollars is invested in plant and equipment in a single quarter, and grow significantly with larger investments. Plant and equipment, whose purchase is budgeted at the beginning of one quarter, are not available for utilization until the subsequent quarter.

Finances. When net cash assets fall below zero, expenses are incurred for loan negotiation, interest, factoring, etc. Such expenses are insignificant with shortages of a few hundred thousand dollars, but grow to hundreds of thousands

of dollars per quarter if shortages reach the order of magnitude of one million dollars. If the cash deficit exceeds \$3,000,000 the company may be deemed to be insolvent and immediately declared a bankrupt.

Goals. Maximization of the rate of return earned on the beginning owners' equity is the recommended goal for which each team is expected to strive. Different teams may take different tacks--one may concentrate on growth and increased equity, another may be concerned mainly with a large and steady stream of dividends, while a third team may adapt a relatively conservative line as a hedge against possible economic recession. When play begins, each team should determine what course it wishes to pursue, and through what general policies and overall plans. As play proceeds it may seem appropriate to revise concepts of goals, policies and plans. For post game purposes, each team is expected to keep an informal record of the basic guidelines adopted for its firm, and the changes through the successive periods of play.

The discounted rate of return earned on beginning owners' equity will be calculated for each team and used as an objective measure of each team's performance.

OPERATING STATEMENTS. The basic statements [Table 1] are condensed, and in order to understand them and to forecast properly, further explanation is required.

A. PERIOD AND ECONOMIC INDEX. First is indicated the period number and the (quarter) of the year (abbreviated) to which these operating statements pertain. Also on the first line is the actual economic index for the period. The economic index forecast is the same for all teams (firms) and made by the Game Administrator.

B. INFORMATION ON COMPETITORS merely lists competitive information of the type that is readily available in financial papers and the marketplace. These data are useful in analyzing results and formulating decisions to counteract and take advantage of good and bad competitive strategies, respectively.

C. MARKET POTENTIAL is the total orders (in Widgets, i.e., physical units) received by the firm during the period. In the event of a stockout,

market potential will exceed sales volume; in such cases the market potential is the maximum number of units of product which the company could have sold during the period. The total industry market potential is determined by the interaction of the average industry price, the total industry marketing effort (expenditures), the total industry research and development expenditures, the economic index, and the seasonal demand. Then the individual firm's market potential is a function of (depends upon) the individual firm's pricing policy as compared to those of its competitors, the individual firm's R & D expenditures compared to those of its competitors and the individual firm's marketing effort (outlays) compared to its competitors' outlays for marketing.

D. SALES VOLUME is the actual sales (number of units sold) during the period. In forecasting it would on the surface generally appear unwise to make decisions creating a larger market potential than the firm can fulfill.

E. PERCENT SHARE OF INDUSTRY SALES is self-explanatory.

F. PRODUCTION THIS QUARTER is the actual production achieved and may be less than what was scheduled if raw materials on hand were insufficient to produce the scheduled amount.

G. INVENTORY FINISHED GOODS is the current number of units on hand at the end of the period.

H. PLANT CAPACITY NEXT QUARTER is based upon plant size (plant net book value) and states the number of units of product that may be produced during the next period without incurring extra "above capacity" expenses (see "operating costs" above and "expense-labor" below).

INCOME (& EXPENSE) STATEMENT

A. RECEIPTS (TOTAL). SALES REVENUE = Sales Volume in Units of Product TIMES Sales Price per Unit.

B. EXPENSE

1. Labor--at around \$1.43 per unit of output (depending on R & D and maintenance policy) within the range of plant production capacity, and around \$2.15 per unit at overtime rates.

2. Materials--from stocks on hand--A NON-CASH expense--at around \$1.58 per unit of output (depending on R & D and maintenance policy):
 3. Reduction Finished Goods Inventory Value--a NON-CASH expense--Sales Volume in Units of Product MINUS Production Volume in Units of Product TIMES Standard Cost per Unit (\$3.00)--
 4. Administration--a relatively fixed cost, with slight variation depending upon plant size plus overhead cost for overtime operations.
 5. Marketing --as budgeted.
 6. Research & Development (R & D)--as budgeted.
 7. Maintenance--as budgeted.
 8. Depreciation--a direct reflection of deterioration of plant and equipment--a NON-CASH expense = Plant Net Book Value Times 2.5% (per quarter).
 9. Miscellaneous--includes all of the following:
 - a. Inventory carrying charges on raw materials;
 - b. Inventory carrying charges on finished goods;
 - c. Incidental expenses connected with plant investment;
 - d. Financing charges related to cash-deficit operation;
 - e. Ordering cost for each raw material purchase;
 - f. Expenses dependent on Plant size (fixed and semi-fixed; sundries).
- C. PROFIT BEFORE INCOME TAX, which may be negative = Total Receipts MINUS Total Expense.
- D. ADDITION TO INCOME TAX FUND, which may be negative in case of loss = Profit Before Income Tax TIMES 48% (corporate tax rate).

- E. NET PROFIT, AFTER INCOME TAX--Profit Before Income Tax MINUS Addition to Income Tax Fund.
- F. DIVIDENDS PAID--as budgeted. As of period 0 the retained earnings of the firm amounted to \$706,074 and the book value of the capital stock was \$10,706,704 for the Model 1 version. Maximum allowable dividend declarable in any period is limited to the current value of the owners' equity MINUS \$10,000,000 (i.e., the current amount of the retained earnings).
- G. ADDITION TO OWNERS' EQUITY, which may be negative--the net amount of change in the value of the Owners' Equity, or stockholders' interest, as a result of the current period's operation, i.e., the RETAINED portion of the NET PROFIT after dividends have been paid = Net Profit after Income Tax MINUS Dividends Paid.

CASH FLOW STATEMENT

- A. RECEIPTS (TOTAL). SALES REVENUE--same as item A, above (Gross Income)--Cash Inflow.
- B. DISBURSEMENTS--Cash outflow, or outlay.
 - 1. Cash Expense includes:
 - a. Labor expenses;
 - b. Administration expenses;
 - c. Marketing outlay;
 - d. Research & Development (R & D) expenditures;
 - e. Maintenance expenses;
 - f. Miscellaneous expenses.
 - 2. Addition to Income Tax Fund--same as item D above.
 - 3. Dividends Paid--as budgeted--same as item F, above.
 - 4. Investment in Plant--as budgeted.
 - 5. Purchase of Materials--as budgeted--must be adequate to support the planned output of finished goods for the period. Materials whose purchase is budgeted in one quarter are not available for production until the succeeding quarter.

C. ADDITION TO CASH ASSETS, which may be negative.

1. This Addition to Cash Assets figure also represents the net amount of change in the value of the Cash Assets as a result of the current period's operation--it is computed as follows:

$$\begin{aligned} &\text{Total Receipts (Cash Inflow) MINUS} \\ &\text{total Disbursements (Cash Outflow)} \\ &= \text{ADDITION TO CASH ASSETS.} \end{aligned}$$
2. This Addition to Cash Assets figure also represents the actual cash residual resulting from business operations for the period.

BALANCE SHEET (FINANCIAL CONDITION STATEMENT)

A. ASSETS

1. Net Cash Assets: Beginning Cash Balance (Net Cash Assets in the previous period) PLUS Addition to Cash Assets = Ending Net Cash Assets. A negative figure indicates a cash deficit. (It may be worth remarking again that a cash deficit is costly and that financing normally will be unavailable in the Executive Game for cash deficits in excess of \$3,000,000 at the discretion of the Game Administrator).
2. Inventory Value, Finished Goods (Current) = Current Inventory Quantity of Finished Goods TIMES Standard Cost per Unit (\$3.00).
3. Inventory Value, Materials (Current): Beginning Inventory Value, Materials MINUS Materials (Expense) PLUS Purchase of Materials = Ending (Current) Inventory Value, Materials.
4. Plant Net Book Value (& Plant Capacity Next Quarter):
 - a. Beginning Net Book Value of Plant MINUS current Depreciation PLUS current Investment in Plant = Ending Net Book Value of Plant;--and/or
 - b. Plant Capacity Next Quarter TIMES \$20 (Standard Capital Evaluation Basis per Unit of Quarterly Output Capacity) = Plant Net Book Value;

- c. Plant Capacity Next Quarter = Beginning Plant Net Book Value MINUS Depreciation Expense PLUS or MINUS Addition to Owners' Equity = Ending Owners' Equity.

Summary of Instructions for Players

- I. The TOTAL INDUSTRY MARKET for the product is a function of the following five factors--and their interaction:
 - A. ECONOMIC INDEX--an indicator (or barometer) of general economic conditions throughout the nation;
 - B. SEASONAL movements--the usual situation of highest business activity in the October-November-December quarter and lowest business activity, generally in the January-February-March quarter, etc.
 - C. AVERAGE industry PRICE;
 - D. TOTAL industry MARKETING effort (expenditures);
 - E. TOTAL industry R & D expenditures.
- II. The individual FIRM'S MARKET position is a function of the following three factors--and their interaction:
 - A. The FIRM'S PRICING policy;
 - B. The FIRM'S R & D expenditure;
 - C. The FIRM'S MARKETING effort (outlay).
- III. If the FIRM runs out of INVENTORY, it will lose some of its potential share of the INDUSTRY MARKET to its competitors. However, normally about 50 percent of the customers will reorder in the subsequent quarter.
- IV. The rate of return from business operations--DISCOUNTED RATE OF RETURN EARNED ON INITIAL OWNERS' EQUITY--will be calculated for each team (firm) and will be used as:
 - A. An objective evaluation of each team's overall management performance.
 - B. An equating of the initial owners' equity with the ending owners' equity (including all dividends paid during the entire 2-year operating period)--per the following equation:

$$O.E._0 = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \dots + \frac{D_7}{(1+r)^7} + \frac{D_8 + O.E._8}{(1+r)^8}$$

Where: r = discounted rate of return on Initial Owners' Equity.

$O.E._0$ = Initial Owners' Equity.

D_1, D_2, D_3 , etc. = Dividends Paid, by quarters (subscripts);

$O.E._8$ = Owners' Equity, end of 8th quarter;

$\frac{1}{(1+r)^n}$ = Present Value of One Dollar (\$1.00) due at end of n periods, at compound discount.

NOTE: The aggregate change in the components of the OWNERS' EQUITY--i.e. Net Cash Assets, Inventory Value, Plant Net Book Value--plus DIVIDENDS PAID (which comprise a "paid out" portion of earnings) represent the RETURN ON INITIAL OWNERS' EQUITY, i.e. the gross change in the value of the business through the employment of its ASSETS. All earnings are based on (made possible by) the resources of the firm, i.e. the CAPITAL VALUE (investment capital plus working capital) of the firm at the start of its operations--in this case, at the end of period "0" or the beginning of period "1".

Steps in Playing the Executive Game and Formulae for Making the Calculations

Note: See Table 1 for numbers in the formulae with "t" representing the forecast period. Thus "t-1" represents the most recent actual period, etc.

Steps

- #1 Examine results of last period operations on sheet from computer.

- #2 Copy these results in proper "actual" column of your big work sheet.²
- #3 Compare "actual" with your "forecast" and make further tentative plans.
- #4 Fill in following blank spaces in your "actual" column: 0_{t-1} , 00_{t-1} , 000_{t-1} , 1_{t-1} , 2_{t-1} . Compute 00_{t-1} , 2_{t-1} . [See Table 1.]
- #5 Fill in corresponding spaces in "forecast" column. In spaces 00_t and 2_t enter your best predictions after considering the seasonal, economic index and your estimate of total industry marketing and R & D expenditures.
- #6 Compute: $7a_{t-1}$, Labor cost per unit
 $7b_{t-1}$, Materials cost per unit.

Done by the computer (12_{t-1} and 13_{t-1}) but you should know how. Ordinarily to obtain the labor cost of production per unit, divide labor expense by production ($12_{t-1} \div 6_{t-1}$). To obtain materials cost divide materials expense by production ($13_{t-1} \div 6_{t-1}$). However, if you have been producing beyond normal plant capacity, at overtime wage rates in a game utilizing Model 1 this calculation gives you an erroneous answer for labor cost per unit. It is too high because the labor expenses include overtime for the extra production. Hence, to obtain straight time labor cost per unit divide labor expense by production at plant capacity plus 1 1/2 times production in excess of plant capacity.

- #7 Re-examine your general plan--firm image, policy, etc. Remember you are top management making major plans and decisions. Think!
- #8 Your next jobs are (1) to make eight new major decisions and two major estimates and, (2) to make forecast calculations resulting from these decisions and estimates.

²This refers to a work sheet on which the students recorded their forecasts and results each period. The general format was the same as that of Table 1. The item numbers referred to in the following are the same as the line numbers shown in Table 1.

Enter your decisions, estimates, and calculations in the proper spaces in the "forecast" column. Proceed as follows: (Steps #9 and on).

- #9 Your next decisions should be the price you are going to charge; how much you are going to spend on marketing, R & D, and maintenance; how many widgets you hope to sell; and how many you will have to produce, in addition to the inventory of finished goods now on hand, to do this. (Steps #10 to #15 inclusive).
- #10 Decide price, Consult $00t-1$. Note your sales volume and profits at your last price, marketing and R & D expenditures. Demand is quite elastic. At high prices sales fall off sharply. A low price may not cover total cost per unit. Compute your margin. Enter in space 0_t .
- #11 Decide marketing expenditure. It is an expense, so don't waste your money. But remember it is a major weapon in fighting competition for your share of the market and to bring your product to the attention of the public. But don't go to extremes. Law of diminishing returns applies. Large expenditures may bring less than proportionate increases in sales while marketing costs go up proportionally. Beware of a profit squeeze. Enter in space 16_t .
- #12 Decide R & D. Also an expense. But you must keep your product modern and well-designed; your production and sales techniques efficient. So do research and development to keep costs down and quality up. Enter in space 17_t .
- #13. Decide maintenance expense. You must keep your plant operating efficiently. Otherwise labor and materials cost per unit will rise. Correlate maintenance expenditures with charges in production. Enter in space 18_t .
- #14 Estimate, (a) expected market potential and (b) sales volume. It is expensive to create a greater market potential than the volume you can sell. Sales cannot be greater than finished goods on hand plus production. Enter your estimates in spaces 3_t and 4_t .
- #15 Compute your hoped for Percent Share of Industry Sales. ($4_t \div 2_t$). Enter in space 15_t .

- #16 Decide proposed production. Enter in space 6_t . In Model 1 games production cannot be larger than the smallest of: (1) $39_{t-1} \div 7b_{t-1}$ or (2) $1\frac{1}{2} \times 9_{t-1}$. That is, you can't produce more than to use up the raw materials you now have on hand at the beginning of this quarter. Purchases made during the next quarter can't be used until the following quarter. Also, you cannot work your plant farther into overtime than $1\frac{1}{2}$ times normal plant capacity.

Note: you have now made all the major decisions and estimates necessary for this quarter's operations. Two of the three remaining decisions, viz. new investment in plant and purchase of materials, prepare for next quarter's operations. The last, viz., dividend, you may wish to decide after you see how large your expected profits after taxes are and how much cash you have on hand. From now on your work is mostly making computations.

- #17 Compute, Inventory of Finished Goods at end of forecast period as follows: Beginning inventory plus planned production minus expected sales. ($8_{t-1} + 6_t - 4_t$). Enter in space 8_t .
- #18 Compute 9_t Plant capacity next quarter (in widgets). This is a big one because in this one operation you will also get forecast figures for depreciation, new investment in plant and the net book value of the plant.

First compute plant value next quarter. Then divide this by \$20.00 to get plant capacity because it takes \$20.00 of plant value to produce one unit of plant capacity. Plant, net book value, next quarter (40_t) is equal to what it was at the beginning of the quarter (40_{t-1}), less the amount it depreciated during the quarter (19_t), plus your new investment in plant (32_t). In short, beginning plant minus depreciation plus new investment.

The Calculation: Compute 19_t , Depreciation ($2\frac{1}{2}\%$ of 40_{t-1}). Enter in space 19_t . Next decide on your new investment in plant. Enter in space 32_t .

Note: In deciding how much to invest in new plant remember that it must make up for the quarter's depreciation of $2\frac{1}{2}\%$ plus whatever

expansion in plant capacity you may wish to make. Better also take a look to see if you have the cash. It would be expensive to borrow it.

Now compute Plant, net book value, next quarter.
Enter in space 40_t .

$$\text{Formula: } 40_t = 40_{t-1} - 19_t + 32_t.$$

or = beginning plant - depr.
+ new investment

Finally you are ready to compute Plant capacity next quarter.

$$\text{Formula: } 9_t = (40_{t-1} - 19_t + 32_t) \div \$20.00$$

$$\text{or} = 40_t \div \$20.00$$

$$\text{or} = \text{Plant value} \div \$20.00$$

Enter in space 9_t .

#19 You have now completed the preliminary calculations dealing with operations in general. Next compute the entire "income and expense" statement which includes the profit you expect to make. Do this as outlined in steps #20 to #33 inclusive.

#20 Compute your expected receipts, sales revenue first. You have only one source of income which is receipts from sales of widgets. Price times expected sales volume. $0_t \times 4_t$. You decided on price in step #10 and estimated expected sales volume in step #14. Enter in spaces 11_t and 28_t .

#21 Now compute all your expected expenses: steps #22 to #27 inclusive.

#22 Labor expense

a. If no overtime is used multiply labor cost per unit ($7a_t$) times production during the quarter (6_t).

$$\text{Formula: } 7a_t \times 6_t. \text{ Enter in space } 12_t.$$

b. If you go into overtime at wage rates of time and a half the formula is:

$$(7a_t \times 9_{t-1}) + (1 \frac{1}{2} \times 7a_t) (6_t - 9_{t-1}).$$

Read it in words as follows: Labor cost per unit ($7a_t$) times plant capacity at the beginning of the quarter (9_{t-1}) plus $1\frac{1}{2}$ times labor cost per unit ($1\frac{1}{2} \times 7a_t$) multiplied by the amount you produce in excess of plant capacity ($6_t - 9_{t-1}$). Enter in space 12_t .

#23 Materials expense: $7b_t \times 6_t$. Enter in space 13_t .

Note: However the figures in steps #22 and #23 give us the labor and materials expenses of the widgets produced during the three months period. This is not what we want. We should have the labor and materials expenses of widgets sold during this period. If production and sales are equal during this period, there is no problem. But two other possibilities exist and are very probable:

- A. Sales may exceed production and the extra widgets taken out of inventory.
- B. Production may exceed sales and the extra widgets put into inventory.

Hence the next expense item "Reduction Finished Goods Inventory" is included to correct this situation.

#24 Reduction finished goods inventory value expense (Positive or negative)

- A. If sales are greater than production, our labor and materials expenses figure which includes only goods produced understates the labor and materials expenses of those sold. It does not include the labor and materials costs of the widgets taken out of inventory and sold. These costs must be added. To correct multiply standard cost of \$3.00 ($4_t - 6_t$). Thus here "Reduction Finished Goods Inventory" is a positive number. Enter in space 14_t .
- B. If production is greater than sales our labor and materials expenses figure overstates the labor and materials costs of widgets sold since it includes the labor and materials costs of the widgets taken out of inventory and sold. These costs must be subtracted. To correct multiply standard cost of \$3.00 per widget times amount by which production exceeds sales and subtract from expense (or

add as a negative number). \$3.00 ($6_t - 4_t$). Thus here "Reduction Finished Goods Inventory" is a negative number. Enter in space 14_t .

Note I: These extra unsold widgets are put into "finished goods inventory" and carried as an asset at \$3.00 each until they are sold in a later period when sales exceed production. See item 38.

Note II: Make sure when you get to step #41 that your asset, viz., "Inventory Value of Finished Goods" was reduced (if sales exceed production) and increased (if production exceeds sales) by this same amount of dollars. That is, reduced or increased from what it was at the end of the previous period. Also check that in step #17 your inventory of finished goods was changed by the corresponding amount of widgets.

- #25 Administrative expense: Same as "actual," + \$50,000 if a change in overtime is involved. Enter in space 15_t .
- #26 Your next four expense items, viz., marketing, R & D, maintenance, and depreciation were computed in steps #11, #12, #13, and #18 and entered in spaces 16_t , 17_t , 18_t , and 19_t , respectively.
- #27 Misc. expense: Add the following and enter the total in space 20_t .
- A. Sundries: \$10,000 plus 18 cents per unit of present plant capacity. $\$10,000 + .18 (9_{t-1})$.
 - B. Carrying charge of raw materials inventory. 5% of such inventory value at beginning of period. 5% of 39_{t-1} .
 - C. Carrying charge of finished goods inventory left at end of forecast period. 50 cents per unit. $.5(8_t)$.
 - D. Incidental costs connected with plant investment.

$$\text{Formula: } \frac{1}{10,000,000} \times (32_t)^2$$

- E. Cash shortage costs.

$$\text{Formula: } \frac{3}{20,000,000} \times (37_{t-1})$$

F. Ordering charge: \$50,000 if materials are purchased during forecast period.

- #28 Add all your expenses (12_t to 20_t) and enter in space 21_t .
- #29 Subtract total expenses (21_t) from total receipts (11_t) and enter in 22_t . This is your gross profit before income tax.
- #30 Compute your tax (Model 1 use 48% of gross profit or loss before tax). It is a negative number if there is a loss. Enter in space 23_t and 30_t .
- #31 Subtract tax to get net profit after taxes. Remember when you subtract a negative number you add. Enter in space 24_t .
- #32 Decide on the dividends you are going to pay to your stockholders and enter in space 25_t and 31_t . Watch your cash. Dividends are limited to excess of owners' equity over \$10,000,000.
- #33 Compute "addition to owners' equity" by subtracting dividends from profits after taxes. (Enter in space 26_t . It may be negative).
- #34 You have now completed your "income and expense" statement (see step #19). Next compute your cash flow statement, most of which is already done. Steps #35 to #38.
- #35 Compute cash expenses: Sum of 12_t , 15_t , 16_t , 17_t , 18_t , and 20_t . Enter in space 29_t .
- #36 Decide on "purchase of materials." This is your last major operating decision. Enter in 33_t . You are now ordering for period $t + 1$ - See 13_{t-1} material expense, for the amount you have been using up per quarter.
- #37 Add up all cash disbursements (29_t than 33_t) and enter in space 34_t .
- #38 Compute "addition to cash assets" by subtracting total disbursements from cash receipts and enter this figure in space 35_t (may be negative). This completes your cash flow statement. $28_t - 34_t$.
- #39 Make out your balance sheet, first the assets. Steps #40 to #44.

- #40 Net cash assets equal the cash you had on hand, (from previous "Actual") plus (or minus), addition to cash assets. $37_{t-1} \pm 35_t$. Enter in space 37_t .
- #41 Inventory value, finished goods: number of units of finished goods on hand $\times$ \$3.00 (Standard cost per unit). $\$3.00 \times (8_t)$. Enter in space 38_t .
- #42 Inventory value, materials. Computation: Value of materials on hand at beginning of forecast period less materials expenses plus purchase $39_{t-1} - 13_t + 33_t$. Enter in space 39_t .
- #43 Plant net book value. Computation: Its value at beginning of the period less depreciation (2 1/2%) plus new investment in plant. This was done in step #18.
- #44 Next add all your assets and since you have no listed liabilities (debts), this is your Owners' Equity. Enter in space 41_t .

$$\text{Formula: } 37_t + 38_t + 39_t + 40_t$$

Also: $41_{t-1} + 26_t$ should give the same results. Check it.

Your job should now be done. Study it. If your expected profit is not as large as you would like it to be, possibly you may wish to make some changes in your decisions and calculate their effects.

APPENDIX B

MANAGEMENT 101 WINTER TERM - 1966

PROJECT PYGMALION

Richard A. Norman

We would like your help in a special research project. We want to find out some things about how business decisions are made and we need your cooperation. The project will not require any significant amount of work beyond the normal course requirements, but we think it will make the course much more interesting and meaningful to you.

Here is what we want to find out:

In operating a business a manager is continually faced with highly complex situations which require immediate decisions, but about which he has only incomplete, ambiguous, ill-structured information. Somehow he must pull that information together as a basis for his decisions. We are interested in how he does this.

Here is our approach to the problem:

The business game presents you with the same kind of a problem. We want to find out how you organize the information you are given in the game in arriving at your decision recommendations.

Here is what must be done:

1. As a part of the normal play of the game, you will prepare a forecast for your team's firm each week on your copy of the game work-sheet. We would like you to make a copy of those figures to turn in at class each week. (They will give us a summary of your analysis of the situation each week).
2. Time is provided at class each week for you to meet with the members of your team to arrive at team decisions. We would like those meetings to be organized so that each member of the team has an opportunity to explain the reasoning behind his decision recommendations before the team decision is reached. We want to record those discussions on tape. (They will provide information about the way in which you have organized the available information for decision purposes).

We plan to analyze these data in such a way as to shed some light on how people approach these kinds of problems. We are trying to find out something about what the process is, rather than what it should be. We are not trying to evaluate your decision processes or to differentiate between "good" or "bad" decisions. As a practical matter, we don't even know what a "good" or a "bad" approach is. So don't worry about how "good" or "bad" your analyses of the game situations may be. Just play the game in the way that seems best to you.

MANAGEMENT 101 - WINTER TERM - 1966
PROJECT PYGMALION
R. A. Norman

PROCEDURES

1. Each class member will be furnished with:
 - a. An 18 column work sheet to be used for accumulating team results and for preparing his own forecasts and decision recommendations for each period.
 - b. A supply of "Forecast and Decision Recommendation" forms for submitting his own forecasts at class each week.
2. The instructor will assign each class member to a team.
3. At the initial class meeting the team members will meet to select a firm name and a firm secretary. He will be responsible for:
 - a. Chairing the team meetings.
 - b. Operating the tape recorder.
 - c. Recording and entering team decisions at class meetings.
 - d. Distributing team results at lecture each week.

(He will be furnished with the team decision sheet.)
4. At subsequent class meetings:
 - a. A period of time will be set aside at the end of the class period for team meetings. Space will be provided so that each team can get together separately with its own tape recorder.
 - b. The firm secretary will identify the tape reel and will open the meeting so that the team, the date, and the team members can be identified in playing the tape.
 - c. The discussion will start with one of the members identifying himself and then stating and explaining his decision recommendations. (For example, if he recommends a price reduction, he should so state and then indicate what he expects to happen as a result and why he expects these results.
 - d. After all the team members have explained their recommendations, a team decision should be discussed and developed. The secretary will enter the decision on the team decision sheet and deliver it to the instructor.
5. At the following lecture the computer runs showing the results of the period play will be delivered to the firm secretary for distribution to the team members. These will provide the basis for the forecast and decision recommendations for the next period.

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