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MANAGEMENT SYSTEM IMPACT ON ORGANIZATIONAL CLIMATE AND PERFORMANCE.

The University of Oklahoma, Ph.D., 1976
Business Administration

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THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

MANAGEMENT SYSTEM IMPACT ON ORGANIZATIONAL CLIMATE AND PERFORMANCE

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

DOCTOR OF PHILOSOPHY

BY

BERVIL DELONE DAVIS

Norman, Oklahoma

1976

MANAGEMENT SYSTEM IMPACT ON ORGANIZATIONAL

CLIMATE AND PERFORMANCE

APPROVED BY

DISSERTATION COMMITTEE

ACKNOWLEDGMENTS

Learning is a continuing experience. For helping make this research a learning experience for me, I wish to thank the members of my doctoral committee - Professors Walter Scheffer, Rodney Evans, Burt Scanlan, and especially the chairman, Roger Atherton, Jr. The many hours of discussion during the formative stages, primarily by telephone, resulted in a climate which I perceived to be both challenging and rewarding, yet always friendly. I have benefited from their advice. My only regret is that I have not been skillful enough to utilize all their suggestions.

The data for this study were collected from seven highly dedicated, capable aerospace organizations which have requested to remain anonymous. It has been my sincere desire to honor that request and to them I shall always be grateful for their help. The NASA project managers, PEB secretariat, and legal officers have also provided data, advice, encouragement, and support which are highly appreciated. A special note of thanks goes to Hugh Brady for his direct assistance in developing a computer program that made the computer analysis portion of this effort a pleasure.

To my supervisors and supporters at NASA who made this endeavor possible, I offer my sincere thanks to James Shephard, Leland Belew, William Simmons, Jr., James Murphy, Bill Sneed, William Ferguson, and Clyde Hightower.

Finally, I wish to thank my wife, Freda, for her unlimited supply of patience and understanding. Her unwavering support, encouragement, and love made it possible for me to continue learning.

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MANAGEMENT SYSTEM IMPACT ON ORGANIZATIONAL CLIMATE AND PERFORMANCE

CHAPTER I

INTRODUCTION

This exploratory research project was designed to test the interrelationships of the management system, organizational climate, and organizational performance in a selected sample of organizations in the aerospace industry. Determining the strengths of these relationships may aid practicing managers in developing and maintaining organizational environments that are more appropriate for effective operations. A better understanding of these relationships may also aid academicians in the explanation of the motivational and behavioral aspects of organizational psychology.

Organizational psychology, a relatively new multidisciplinary research field, offers a unique opportunity for the study of variations in the working environment. It deals with the interactive effects of man and his organization. An effective organization integrates human behavior for the attainment of a common purpose. However, human behavior can be influenced by organizational factors which may affect the degree to which a common purpose or performance goal can be achieved.[1]

---

[1]Joseph A. Litterer, The Analysis of Organizations, (New York: John Wiley and Sons, Inc., 1965), p. 43; Ernest Dale and L. C. Michelon, Modern Management Methods, (Cleveland: The World Publishing Company, 1966), p. 31.

In the past, organizational factors have been studied in a variety of ways. Stogdill, Tannenbaum, Schmidt, Lawler, Maslow, Porter, Georgopoulos, and others have studied singular factors such as leadership, motivation, organization structure, organization processes, job satisfaction, performance, effectiveness, and organizational climate in an attempt to learn more about these constructs and their relationship to the management process.[1] Litwin, Stringer, Likert, Lawler, Gavin, Downey, Hellriegel, and others have studied multiple relationships between many of these same variables.[2]

Some integrative attempts have been made to establish a method or model that would allow one to conceptualize and deal with these very complex, interactive, and multivariate research results in a consistent manner. One notable integrative attempt was the work of Likert in his

---

[1]Ralph M. Stogdill, Handbook of Leadership, (New York: The Free Press, 1974); Robert Tannenbaum and Warren H. Schmidt, "How to Choose a Leadership Pattern," Harvard Business Review 36 (March-April, 1958): 95-101; Edward E. Lawler III, "Attitude Surveys and Job Performance," Personnel Administration 30, No. 5 (September-October 1967):3-5; Abraham H. Maslow, Motivation and Personality, (New York: Harper and Row Publishers, 1954); Lyman W. Porter and Edward E. Lawler III, "Properties of Organization Structure in Relation to Job Attitudes and Job Behavior," Psychological Bulletin 64, No. 1 (1965):23-51; Basil S. Georgopoulos and Arnold S. Tannenbaum, "A Study of Organizational Effectiveness," American Sociological Review 22 (October 1957):534-544.

[2]George H. Litwin and Robert A. Stringer, Jr., Motivation and Organizational Climate, (Boston: Division of Research, Graduate School of Business Administration, Harvard University, 1968); Rensis Likert, The Human Organization, (New York: McGraw-Hill Book Company, 1967); Edward E. Lawler III, Douglas T. Hall, and Greg R. Oldham, "Organizational Climate: Relationship to Organization Structure, Process, and Performance," Organizational Behavior and Human Performance 11 (February 1974):139-155; James F. Gavin, "Organizational Climate As A Function of Personal and Organizational Variables," Journal of Applied Psychology 60, No. 1 (February 1975):135-139; H. Kirk Downey, Don Hellriegel, and John W. Slocum, Jr., "Congruence Between Individual Needs, Organizational Climate, Job Satisfaction, and Performance," Academy of Management Journal 18, No. 1 (March 1975):149-155.

study of causal, intervening, and end-result variables relative to the human organization. Likert states that only the causal, independent variables, such as management policies, decisions, and leadership strategies can be directly changed by management. He contends that the independent variables, such as these, constitute an organization's management system.[1]

The intervening variable represents the internal health or personality of the organization, which is a perceivable characteristic of all organizations. Forehand, Gilmer, Gellerman, Davis, and Schneider have all noted differences in organizational personality or climate.[2] In 1964, Forehand and Gilmer focused attention on organizational climate by reviewing all previous studies relevant to the environmental variations in organizational behavior. Since that time, very intensive and diverse efforts have been devoted to conceptualizing, measuring, and utilizing the organizational climate concept.[3]

The end-result or dependent variables in the Likert chain are those that reflect organizational achievements such as effectiveness or productivity. In the long-run the survival of an organization is

---

[1]Likert, The Human Organization, p. 136.

[2]Garlie A. Forehand and B. von Haller Gilmer, "Environmental Variation in Studies of Organizational Behavior," Psychological Bulletin 62 (December 1964):361-382; Saul W. Gellerman, "The Company Personality," The Management Review 48 (March 1959):5-9; James W. Davis, Jr., "Rules, Hierarchy, and Organization Climate," Personnel Administration 31, No. 2 (March-April 1968):50-55; Benjamin Schneider, "Organizational Climate: Individual Preferences and Organizational Realities," Journal of Applied Psychology 56, No. 3 (1972):211-217.

[3]Don Hellriegel and John W. Slocum, Jr., "Organizational Climate: Measures, Research, and Contingencies," Academy of Management Journal 17, No. 2 (June 1974):255.

dependent upon its effectiveness.[1] The process of evaluating an organzation's effectiveness in the short-run has been the subject of numerous theoretical studies and investigations as reported by Price, Tannenbaum, Georgopoulos, and Mott.[2] Effectiveness is viewed as the degree of goal achievement within the constraints of an organization's resources.[3]

The relationship of the Likert interactive chain of variables as discussed above was brought into better focus by Gibson et al.[4] Drawing heavily upon the work of Likert, Litwin, Stringer, and others, Gibson et al. constructed an integrative systems model. The Gibson model identifies causal input variables which include organizational systems, as well as personal variables. These causal variables interact and generate an organizational climate as an intervening variable which leads to behavior phenomena that affect organizational performance. A feedback cycle to each major category illustrates the dynamics of the system. These authors made no attempt to identify the explicit relationship between the organizational variables (causal inputs), the organizational climate (intervening variable), and the effectiveness factors (consequences), even though many contradictory research findings exist relative to these relationships. This research will further examine some

---

[1]James L. Gibson, John M. Ivancevich, and James H. Donnelly, Jr., Organizations: Structure, Processes, Behavior, (Dallas: Business Publications, Inc., 1973), p. 37.

[2]James L. Price, Organizational Effectiveness: An Inventory of Propositions, (Homewood, Illinois: Richard D. Irwin, Inc., 1968); Georgopoulos and Tannenbaum, "A Study of Organizational Effectiveness," pp. 534-544; Paul E. Mott, The Characteristics of Effective Organizations, (New York: Harper and Row Publishers, 1972).

[3]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, p. 20.

[4]Ibid., p. 328.

of these relationships in the aerospace industry. Aerospace typifies industries that not only have had a rapid technological growth rate, but also employ very creative personnel and perceptive managers who are required to perform highly complex feasibility investigations, detailed engineering, and manufacturing operations. Relative to complexity and rate of change, the aerospace organization of today may be very typical of future organizations because "industrial organizations that survive in the future will undoubtedly have to deal with more and more rapid technological innovation."[1]

Purpose of The Study

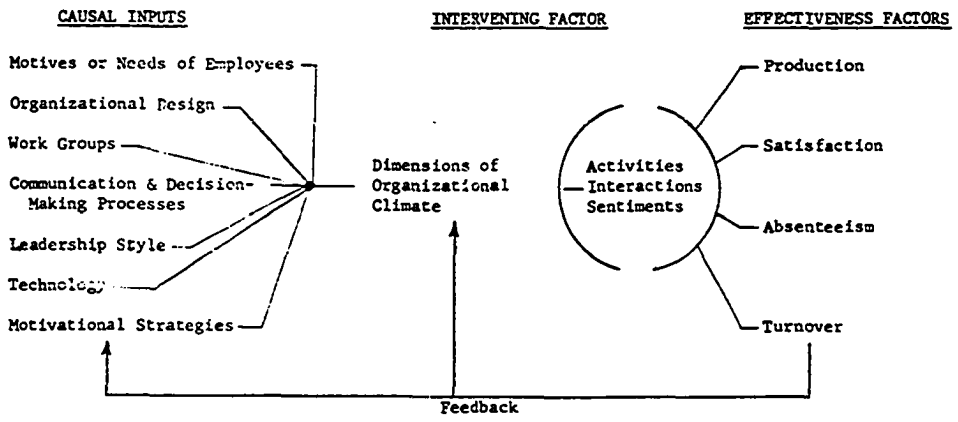
The purpose of this study is to expand upon the model proposed by Gibson, Ivancevich, and Donnelly by examining the strength of some of the relationships between specific organizational factors associated with their model. In keeping with the basis for the model, both Likert's and Litwin and Stringer's test instruments will be used for collecting the data which represent the causal inputs and intervening variable, respectively. Actual organizational performance data will be used to represent the effectiveness factors. The Gibson et al. integrative systems model is shown in Figure 1. This model will be used as a general conceptual framework in order to accomplish the purpose of this study systematically. A more explicit representation is provided by the research model, as shown in Figure 2, which specifically delineates the particular variables being examined. The research model is not intended to replace the systems model, but is used as a mechanism to

---

[1]Paul R. Lawrence and Jay W. Lorsch, Organization and Environment - Managing Differentiation and Integration, (Homewood, Illinois: Richard D. Irwin, Inc., 1969), p. 19.

FIGURE 1

AN INTEGRATIVE MODEL OF SYSTEM, CLIMATE, AND EFFECTIVENESS FACTORS



SOURCE: James L. Gibson, John M. Ivancevich, and James H. Donnelly, Jr., Organizations: Structure, Processes, Behavior, (Dallas: Business Publications, Inc., 1973), p. 328.

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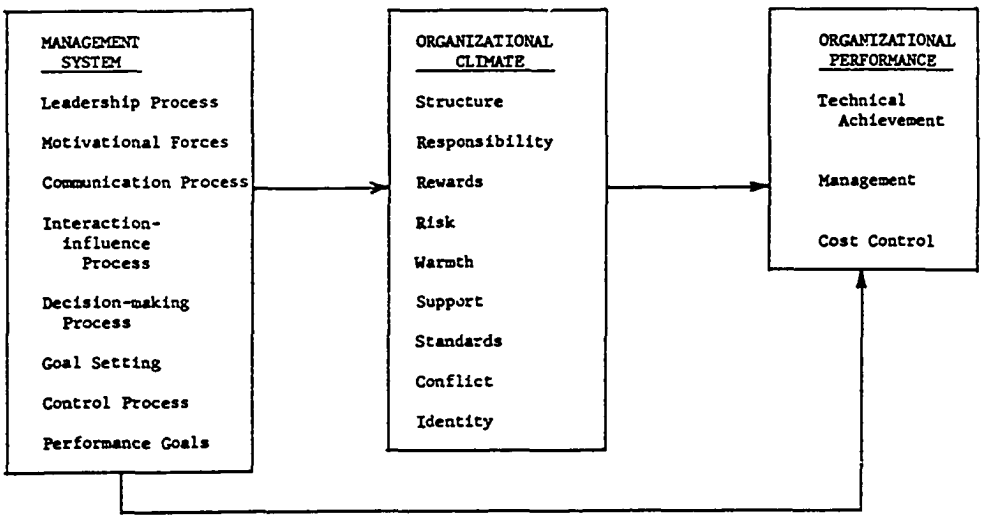
FIGURE 2

RESEARCH MODEL



organize the research effort and to integrate the findings from this investigation.

This exploratory research will investigate whether specific relationships exist between the major variables shown in the research model and the relative strengths of these relationships. This investigation is considered exploratory because neither theory nor research has developed specific hypotheses that establish a clear understanding with predictive value concerning these relationships.

Research Model

Many theorists and researchers have developed conceptual models to more effectively explain their ideas and findings. Indik cites a need for models that can combine fragmented pieces of information which would be helpful in building more adequate taxonomies or theories. Without such a framework for organizing research results and available information, Indik contends that not only will inadequate or inefficient organizational behavior theory prevail but there will be an inability to handle the large number of relevant facts being accumulated from continuing research activities. Likewise, when a good theory has been established, a very useful characteristic is that it will suggest new hypotheses, as well as help to provide order to present findings.[1]

It is the aim of this study to take another stride in the direction proposed by Indik. This is accomplished by conducting a multiple variable research project that will attempt to add relevant, clarifying research data that can be integrated into the Gibson et al. systems

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[1]Bernard P. Indik, "Toward an Effective Theory of Organizational Behavior," Personnel Administration 31, No. 4 (July-August 1968):51.

model. For simplification, a research model, as shown in Figure 2, which is specifically applicable to this study was constructed to reflect only the relationships between the variables under investigation. The research model does not necessarily provide a complete explanation of the interrelationships between all organizational variables. This was not its intent. It is used only as a framework to organize this research effort. The important feature of the model is that it leads to some clearly testable relationships between specific variables which are believed to be very important at this time in adding to the knowledge of organizational performance.

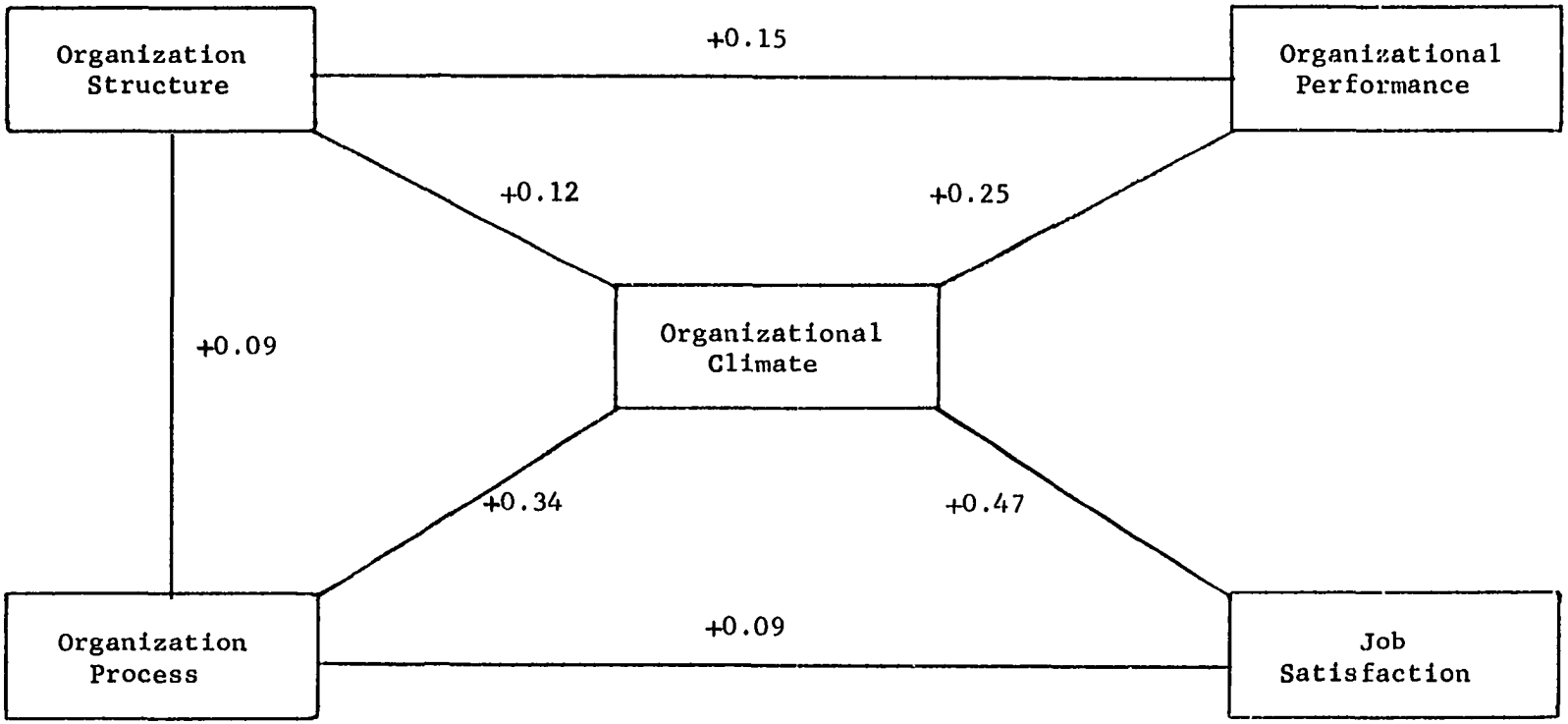
The idea for the research model can be attributed to several stimuli. The initial stimulus came from the dissertation of Keith Curtis.[1] The works of Likert and Gibson et al. provided more in-depth credence to organizing a method that would clearly depict the relationships under study. Finally, Lawler, Hall, and Oldham presented a model as shown in Figure 3, which clearly portrayed and crystalized an approach which seemed most appropriate to this research. Their model provided an excellent method of presenting the relationships to be tested and a concise way of presenting their results. Their results (correlations) were summarized and displayed as shown in Figure 3. The numbers in the model represent the median correlations between the various sets of variables. Each major variable had from three to six subordinate variables (dimensions) that were all correlated with each other to arrive at the median correlation between each major variable. This method of calculating and presenting the final summary of results

---

[1]Keith W. Curtis, "The Management System and Its Impact on The Organization," (Ph.D. dissertation, University of Oklahoma, 1973), p. 3.

FIGURE 3

LAWLER, HALL, AND OLDHAM RESEARCH
MODEL WITH SUMMARY OF RESULTS



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will be used in this study.

The research model includes specific variables/subvariables which will be used throughout the dissertation. To avoid confusion and to standardize the terminology in this study, the variables and their specific descriptions are as follows:

1. Management system - The overall management style, as perceived by organizational members, expressed in terms of leadership, motivation, communication, interaction-influence, decision making, goal setting, control, and performance goals which are labeled along a continuum from exploitive authoritative, benevolent authoritative, and consultative to participative.[1]

   a) Leadership process - degree of trust, confidence, and supportive relations between superior and subordinates. Leadership process and leadership style are treated as being synonymous.

   b) Motivational forces - extent that personal motives such as physical, security, economic, and ego are tapped and the manner in which they are used to accomplish organizational goals.

   c) Communication process - degree and direction of information flow in the organization.

   d) Interaction-influence process - degree that both superior and subordinates are able to affect organizational goals, methods, and activities.

---

[1]The descriptions of the management system and all of its subvariables are extracted from the Likert Profile of Organizational Characteristics test instrument as shown in The Human Organization, pp. 197-211.

e) Decision-making process - level and degree of centralization of the decision-making process in the organization.

f) Goal setting - organizational level and degree of group participation in setting realistic goals.

g) Control process - degree that control of organizational activities are dispersed within the organization and the emphasis placed upon self-control and problem solving.

h) Performance goals - achievable levels sought and the degree that human resources are developed.

2. Organizational climate - "A set of properties of the work environment, perceived directly or indirectly by the employees who work in this environment and is assumed to be a major force in influencing their behavior on the job."[1]

a) Structure - perceived limitations of the task situation, the amount of detailed information available, and the constraints placed on behavior which reduces either the challenge of the job or the perceived worth of succeeding at the job.[2]

b) Responsibility - status differentiation relative to the extent that individuals are their own boss.

c) Rewards - perceived emphasis upon positive rewards for a job well done versus punishments for poor performance.

---

[1]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, p. 314.

[2]The descriptions of all the organizational climate subvariables are extracted from the Litwin and Stringer Test Instrument as shown in Motivation and Organizational Climate, pp. 204-207.

d) Risk - perceived philosophy of management relative to taking chances in business decisions.

e) Warmth - perceived degree of friendliness within the organization.

f) Support - perceived degree of helpfulness between superiors, subordinates, and peers.

g) Standards - perceived level of organizational performance, expectations, and goals.

h) Conflict - perceived attitude toward resolution of agreements and disagreements.

i) Identity - individual identification with the organization and its goals.

3. Performance - The degree to which the aerospace contractor organization meets and/or exceeds contract requirements, specifically in the areas of technical achievement, overall project management, and cost control.[1]

a) Technical achievement - quality and timeliness of required engineering accomplishments made during a performance evaluation period.

b) Management - responsiveness to program requirements and effectiveness of overall project planning and implementation.

c) Cost control - accuracy of budget projections relative to expenditures and quality of budget requirements submitted in a timely manner.

---

[1]The descriptions of all performance variables/subvariables are extracted from actual NASA performance evaluation criteria that are available to the researcher.

Organizational performance is being used as the effectiveness factor or consequence variable in the research model. The tenuous relationship between performance and effectiveness has been recognized and will be discussed in more detail in Chapter II.

Even though the research model is based on the Gibson et al. model, there are several reasons why all of the variables in the integrative systems model were not selected for investigation. Some of these are (1) motives, needs, and work groups have been explored and the results reported in detail in the previous works of Scanlan, Lair, Patton, Patchen, and others;[1] (2) Lawler, Hall, and Oldham found that organizational design had a very low relationship with climate in a recent similar study in research and development organizations;[2] (3) technology is felt to be equally high and not measurably different in the available organizations willing to be sampled; (4) behavior phenomena such as activities, interactions, and sentiments have been explored by Homans and others;[3] (5) job satisfaction has, likewise, been thoroughly studied as reported in the previous works of Lawler,

---

[1]Burt K. Scanlan, Principles of Management and Organizational Behavior, (New York: John Wiley and Sons, Inc., 1973); Marilyn June Lair, "A Study of Congruency of Individual Needs and the Motivation Aspects of the Organizational Climate," (Ph.D. dissertation, University of Oklahoma, 1972); Robert T. Patton, "Interrelationship of Organization Leadership Style, Type of Work Accomplished, and Organizational Climate With Extrinsic and Intrinsic Motivation Developed Within the Organization," (DBA dissertation, University of Washington, 1969); Martin Patchen, "Supervisory Methods and Group Performance Norms," Administrative Science Quarterly 7 (1962):275-294.

[2]Lawler, Hall, and Oldham, "Organizational Climate: Relationship to Organizational Structure, Process, and Performance," pp. 139-155.

[3]Daniel A. Wren, The Evolution of Management Thought, (New York: The Ronald Press Company, 1972), pp. 341-343.

Hall, Oldham, Karasick, Dunnette, Campbell, Hakel, and Vroom;[1] (6) absenteeism and turnover have been examined by Porter, Lawler, Argyle, Gardner, and Cioffi;[2] (7) too many variables to cope with in an exploratory field research project that is constrained by the usual limitations of time, finance, and willing participants.

Research Questions

The major interest in this research is the interrelationships among the management system, organizational climate, and organizational performance in a selected group of firms in the aerospace industry. The primary questions to be answered by this dissertation and a justification for their inclusion in this study are identified in this section.

1. Are management systems positively related to perceived organizational climate?

The management system, as identified by Likert, has been shown to be a causal variable. The management system as used in this research consists of the eight organizational variables identified by Likert

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[1]Lawler, Hall, and Oldham, "Organizational Climate: Relationship to Organizational Structure, Process, and Performance," pp. 139-155; Bernard W. Karasick, "Organizational Climate and Its Relationship to Managerial Behavior," (Ph.D. dissertation, Purdue University, 1971); Wendell French, The Personnel Management Process: Human Resources Administration, (New York: Houghton Mifflin Company, 1970); M. D. Dunnette, J. P. Campbell, and M. D. Hakel, "Factors Contributing to Job Satisfaction and Job Dissatisfaction in Six Occupational Groups," Organizational Behavior and Human Performance 2 (1967):143-147; Victor H. Vroom, Motivation and Moral, (New York: John Wiley and Sons, Inc., 1964).

[2]Porter and Lawler, "Properties of Organization Structure in Relation to Job Attitudes and Job Behavior," pp. 23-51; Michael Argyle, Godfrey Gardner, and Frank Cioffi, "Supervisory Methods Related to Productivity, Absenteeism and Labour Turnover," in Management and Motivation, ed. Victor H. Vroom and Edward L. Deci, (Harmondsworth, Middlesex, England: Penguin-Books Ltd., 1973), pp. 170-191.

as leadership processes, motivational forces, communications, interaction-influence, decision making, goal setting, control, and performance goals.[1] Gibson, Ivancevich, and Donnelly have used four of these eight variables (leadership style, communication, decision making, and motivation) as causal inputs in their integrative systems model. They also use organizational climate as the intervening variable the same as Litwin and Stringer did.

Curtis utilized the Likert and Litwin and Stringer test instruments to measure the relationship between the management system and organizational climate in a government hospital. He found a significant positive correlation in a single case study.[2]

Meyer conducted a study on achievement motivation to gain a better understanding of how the management system in an organization, especially as it is influenced by management's style and practices, affects the motivation of the employees. He used the Litwin and Stringer organizational climate questionnaire to compare climates in two differently managed plants. The plant with a "Theory Y" manager was found to have a better climate and was more successful in relation to its competitors than the "Theory X" managed plant. Meyer concluded by saying the most important influences on climate is the manager's style.[3]

Gavin, utilizing a self-developed questionnaire that contained elements of Litwin and Stringer's work, investigated the relationship

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[1]Likert, The Human Organization, pp. 197-211.

[2]Keith W. Curtis, "The Management System and Its Impact on the Organization," pp. 232-233.

[3]Herbert H. Meyer, "Achievement Motivation and Industrial Climates," in Organizational Climate: Explorations of a Concept, ed. Renato Tagiuri and George H. Litwin, (Boston: Division of Research, Graduate School of Business Administration, Harvard University, 1968), pp. 154-163.

between certain organizational variables and organizational climate in a medium sized bank. He found that several organizational variables, such as personnel compensation, organization, and task content accounted for only a small amount of variance in organizational climate perceptions. He concluded that organizational climate perceptions do not merely reflect organizational differences as some have suggested but felt additional research was necessary to further clarify the extent of the relationship.[1]

So to obtain some empirical evidence to support or reject Gibson, Ivancevich, and Donnelly's conceptualization, to extend the works of Curtis and Meyer to a larger number and different kind of organizations, and to provide some of the additional research suggested by Gavin, this research question seems justified.

2. Is organizational climate positively related to organizational performance?

Vroom, Turner, Lawrence, Friedlander, Margulies, and Kahn have all found a relationship between organizational climate and performance. All of them considered climate as the independent variable.[2] Farris, Lawler, Pelz, and Andrews have examined the relationship between some organizational process variables such as some that are identified as bureaucratic procedures, budget allocations, colleague collaboration, etc., and organization performance. Generally, the process variables

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[1]Gavin, "Organizational Climate as A Function of Personal and Organizational Variables," pp. 137-138.

[2]Robert D. Pritchard and Bernard W. Karasick, "The Effects of Organizational Climate on Managerial Job Performance and Job Satisfaction," Organizational Behavior and Human Performance 9 (1973):128.

which affect organizational climate were positively related to one or more performance measurements.[1] However, none of their studies utilized climate as an intervening variable.

Lawler, Hall, and Oldham recently completed a study in which organizational climate was an intervening variable between organization structure, organization process, and organization performance. Their study, using data collected from 21 research and development organizations, found a positive correlation between climate and performance.[2] Litwin and Stringer, using climate as an intervening variable, found in a laboratory experiment that performance was related to organizational climate. In their later field studies, they implied there were some positive correlations between climate and performance, although it was not substantiated with data.[3] Gibson, Ivancevich, and Donnelly list production as an effectiveness or dependent variable in their integrative systems model, which suggests there is a relationship between climate and performance.[4]

Kaczka and Kirk developed a large-scale computer model to test Likert and Seashore's hypothesis that managerial climate has a significant effect on organization performance. The hypothesis further stated an "employee-oriented" climate would yield a higher performance level than would a "task-oriented" climate. Kaczka and Kirk concluded, after

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[1]Lawler, Hall, and Oldham, "Organizational Climate: Relationship to Organizational Structure, Process, and Performance," p. 151.

[2]Ibid.

[3]Litwin and Stringer, Motivation and Organizational Climate, pp. 93-166.

[4]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, p. 328.

a detailed computer simulation representing the behavior of a business organization, that where the leadership style is "employee-oriented," unit costs were lower and profits were higher. The results tended to support the Likert and Seashore hypothesis.[1]

Fiedler and Chemers argue that "it seems likely that organizational climate will interact with the leader's task-or relationship-motivation in affecting organizational performance."[2] They indicate that organizational climate is one of the most important concepts in current organization theory. However, there has been an insufficient amount of field research to conclude the type of climate that is the most conducive to effective organization performance.[3]

So to obtain some empirical evidence to support or reject Gibson, Ivancevich, and Donnelly's conceptualization; to use organizational climate as an intervening variable; and to extend the works of Litwin, Stringer, Lawler, Hall, Oldham, Kaczka, and Kirk to several organizations within the same industry in a field study, this research question seems justified.

3. Are management systems positively related to organizational performance?

Likert has been the prime mover in advocating that there is a significant relationship between the management system and performance. His theory is that organizations using a management system that embraces

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[1]Eugene E. Kaczka and Roy V. Kirk, "Managerial Climate, Work Groups, and Organizational Performance," Administrative Science Quarterly 12 (September 1967):254-272.

[2]Fred E. Fiedler and Martin M. Chemers, Leadership and Effective Management, (Glenview, Illinois: Scott, Foresman and Company, 1974), p. 110.

[3]Ibid.

(1) the principle of supportive relationships, (2) group decision making, (3) group methods of supervision, and (4) high performance goals, will be the most productive.[1] However, Likert does not address the issue of climate, as such, as an intervening variable.

The Gibson, Ivancevich, and Donnelly model implies that a relationship exists between the management system and performance when organizational climate is used as an intervening variable.[2]

Curtis found that a government hospital with a relatively poor management system was also low performing.[3] Kavcic, Rus, and Tannenbaum surveyed four Yugoslav industrial organizations and found the ones having higher management systems also had higher productivity.[4] Both of these studies support Likert's theory.

Butterfield and Farris, in a Brazilian bank study, found that the management system was unrelated to objective measures of organizational performance.[5]

So to obtain empirical evidence to support or reject Gibson, Ivancevich, and Donnelly's conceptualization, and to extend the works of Curtis, Kavcic, Rus, Tannenbaum, Butterfield, and Farris to several organizations within the same industry, the research question seems justified.

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[1]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, pp. 78-81.

[2]Ibid., p. 328.

[3]Curtis, "The Management System and Its Impact on the Organization," pp. 233-244.

[4]Bogdan Kavcic, Veljko Rus, and Arnold S. Tannenbaum, "Control, Participation, and Effectiveness in Four Yugoslav Industrial Organizations," Administrative Science Quarterly 16 (1971):74-86.

[5]D. Anthony Butterfield and George F. Farris, "The Likert Organizational Profile: Methodological Analysis and Test of System 4 Theory in Brazil," Journal of Applied Psychology 59, No. 1 (1974):15-23.

Need For This Research

This section will provide specific rationale for conducting this research project and discuss why the aerospace industry setting was chosen.

The brief background and contradictory research findings identified in the previous section illustrate the complexity of investigating organization performance and the need for further research. These contradictory research findings add further frustration to practitioners who are attempting to organize and lead more and more complex organizations. James D. Thompson suggests that people have been too busy trying to make complex organizations work through trial and error rather than studying management systems to understand how and why the administrative process does or does not work.[1] As Lawler et al. have stated, relatively little is yet known about the determinants of climate, and additional research is needed to determine the relationships between climate, performance, and various process variables.[2]

Results of research thus far on these relationships are still inconclusive. This research attempts to clarify some of these issues and questions by conducting a field study to further investigate some of the variables that are believed to contribute to different organizational climates and performance. To this end, this research will explore and measure the relationships among a management system, organizational climate, and performance. Although several studies have investigated various organizations in industry, including at least one case study in

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[1]James D. Thompson, Organizations In Action, (New York: McGraw-Hill Book Company, 1967), p. 144.

[2]Lawler, Hall, and Oldham, "Organizational Climate: Relationship to Organizational Structure, Process, and Performance," p. 153.

an aerospace firm,[1] none has specifically conducted a comparative study of several aerospace organizations where these relationships were examined. An exploratory research project which involves the highly complex aerospace industry is both timely and relevant. It is timely because of the very depressed economic conditions in which the industry finds itself. As a matter of fact, six firms declined to participate in this research because of poor economic conditions such as declining contracts, personnel layoffs, and organization consolidation.

The National Aeronautics and Space Administration (NASA) budget has been in a general decline since 1966. This decline has brought a greater need to obtain more services and hardware for less money. NASA is relying more and more on award fee-incentive type of contracts to encourage aerospace firm management to economize and implement more effective management systems. Because contract awards are becoming much smaller in size and number, competition is mounting to the point where firms are very selective in proposing on new work in order to most effectively match existing skills and facilities with new work. In short, aerospace is searching not only for more specific work but also for more effective management systems.

Throughout the 1950's and early 1960's, the aerospace firms were "fixated" at the technical stage. They were mainly concerned about technical and engineering problems. Effective management was given little consideration as long as cost reimbursable government contracts were plentiful. However, the need for more effective operations is now

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[1]Robert Thomas Patton, "Interrelationship of Organization Leadership Style, Type of Work Accomplished, and Organizational Climate with Extrinsic and Intrinsic Motivation Developed Within The Organization."

gaining recognition.[1]

Wentz cites four basic reasons for the shift from techniques to administration: (1) demands by the Department of Defense and NASA for prime contractors to make commitments of substantial company funds for bidding on proposals, (2) the introduction of cost-plus-incentive-fee contracting, (3) political and technological considerations, and (4) commercial diversification of the industry.[2]

Research on this industry is highly relevant because Eric Trist cites the aerospace industry as having the greatest complexity and the fastest change-rate of any science-based industry.[3] There is no reason to assume any foreseeable reductions in this complexity. Highly developed, modern technology-based societies look to the future where change, progress, and planning are integral parts of life and very crucial to management.[4]

The above statements lead one to conclude that the aerospace industry may be leading the way for others in a more highly technological world. If this is the case, organizational behavior research in the aerospace industry today is very appropriate because the results can be related to other progressive industries and organizations now and in the future.

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[1]William H. Reynolds, "The Marketing Concept and The Aerospace Business," Journal of Marketing 30 (April 1966):10.

[2]Walter B. Wentz, "Aerospace Discovers Marketing," Journal of Marketing 31 (April 1967):27-28.

[3]Eric L. Trist, Foreword to Matrix Organization, by Donald R. Kingdon, (London: Tavistock Publications Ltd., 1973), pp. xi-xii.

[4]Leonard R. Sayles and Margaret K. Chandler, Managing Large Systems - Organizations for The Future, (New York: Harper and Row, 1971), p. 1.

Contingency theorists are now putting to rest the question about which organizational approach, authoritative or participative, is best. They are now concluding that the most appropriate approach is dependent upon the relationship between the task, the people, and the organization. This approach provides a way of thinking about the total complexity of the situation rather than ignoring it. This study will provide additional relevant data from a highly complex industry.[1]

The aerospace industry is characterized by a high ratio of engineer-managers. Most of these have had little or no training in management theory or human relations. They are promoted to management positions because of their technical expertise.[2] Dewhirst contends this is an area of conflict between the professional's desire to practice science or engineering and the organization's desire that he become a manager.[3] This study should be interesting to all managers, particularly aerospace managers, as it will identify specific organizational variable relationships and the resulting consequences. It will also provide them an exposure to some of the more sophisticated mechanisms for analyzing the management system, organizational climate, and performance which can be used to monitor and assess their own management system and organizational climate.

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[1]John J. Morse and Jay W. Lorsch, "Beyond Theory Y," Harvard Business Review 48 (May-June 1970):68.

[2]James A. Bayton and Richard L. Chapman, Transformation of Scientists and Engineers into Managers, (Washington, D. C.: NASA, 1972), p. 106.

[3]H. Dudley Dewhirst, "Impact of Organizational Climate on The Desire to Manage Among Engineers and Scientists," Personnel Journal 5 (1971):196.

Since the aerospace organizations being studied have only one customer, NASA, this study provides a unique opportunity to relate the management system and organizational climate of an organization to the customer's formal performance evaluation of that organization. It is considered unique in that the type of government contract requires periodic performance evaluations by the government to determine the amount of incentive fee earned. The detailed performance criterion is developed specifically for each contract, but the criterion is always within the same three major criteria: technical achievement, management, and cost control. Very rigid government procedures are followed by the NASA project manager, NASA monitors, and a NASA Performance Evaluation Board in the actual measurement, evaluation, and administration of the cost-plus-award-fee incentive contract. To the researcher's knowledge, this is the first time a field study of this type has been conducted where the organization's single customer measures the organization's performance and correlates the data with that organization's management system and climate. The participating organizations have expressed great interest in learning the results and conclusions reached by this research effort.

Organization of The Dissertation

The remaining chapters of the dissertation are organized in a manner which (1) provides the theoretical background and previous research activities relative to this study, (2) describes and substantiates the research project, and (3) presents the results and conclusions. Chapter II provides a detailed review of the theoretical and related research work for each major variable identified in the

research model.

Chapter III provides the research methodology. In Chapter III the research design, rationale for selecting the test instruments, research setting, characteristics of the sample, data collection, sampling procedures, method of data analysis, and limitations of this field study are discussed.

The results are presented in Chapter IV. The final chapter includes a discussion of the research findings, the summary, observations, conclusions, and implications of the study findings, as well as recommendations for future research. The research model is used to summarize the study by identifying (1) each major variable and subvariable under test and (2) the statistical relationships that were found between each major variable in the industry sample.

CHAPTER II

THEORETICAL BACKGROUND AND PREVIOUS RESEARCH

This chapter provides a detailed review of the applicable theory and associated research that are relevant to this study. To adequately review each of the major variables identified in the research model, each variable will be reviewed separately, beginning with the independent variable.

Management System

Introduction

This section will review the theoretical background and the research which is pertinent to an investigation of the management system and its impact on organizational climate and performance.

The Management System Concept and Description

Gellerman suggests that the effective supervisor considers his status with his subordinates as the primary element of management because a good supervisor will strive to attain mutual understanding and a free exchange of information. It is this communication process that "animates or paralyzes, excites or relaxes, coordinates or confuses a group."[1] Management techniques and communication practices which are

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[1]Saul W. Gellerman, Management by Motivation, (American Management Association, 1968), p. 41.

used in establishing this communication network in an organization are often referred collectively to as managerial style. This managerial style or behavioral pattern tends to permeate down from top to lower management levels and in so doing characterizes the actions of most managers in an organization.[1] When viewed collectively, some have called it the management system.[2]

Likert uses the term management system but offers no formal definition for it. He describes it as a generalized overall management style which organizational members perceive. In trying to conceptualize a construct that would allow him to verbalize very complex, interactive, and multivariate survey results, Likert found that organizations tended to cluster in four different areas on the measuring instruments. These clusters were labeled Systems 1, 2, 3, and 4. Other names that provide a more descriptive title to these organizational characteristics are (1) exploitive authoritative, (2) benevolent authoritative, (3) consultative, and (4) participative group, respectively. He found that organizations can be described in terms of eight different variables, each of which is a continuum from System 1 to System 4.[3]

The eight variables that make up Likert's profile of organizational characteristics[4] are as follows:

1. Leadership process - This variable is used to distinguish the degree to which superiors and subordinates perceive trust,

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[1]Ibid., p. 226.

[2]Likert, The Human Organization, pp. 13-46.

[3]Ibid., p. 27.

[4]These descriptions were extracted from the Likert Profile of Organizational Characteristics test instrument as shown in Likert, The Human Organization, pp. 197-211.

confidence, and supportive relations with each other. In System 4 organizations, subordinates feel free to discuss job problems with their superiors, who in turn solicit their ideas and opinions. Just the opposite exists in System 1 organizations. System 2 and 3 organizations experience varying degrees of these interrelationships.

2. Motivational forces - The character of these forces taps the underlying motives of the organization toward its employees, the employee's attitude toward the organization and other employees, as well as the employee's degree of satisfaction derived. In System 4 organizations, a full range of motives are tapped through participative methods. In System 1 organizations, only physical, security, and economic motives are tapped through the use of fear and sanctions. System 1 organization employees have unfavorable attitudes toward the organization and its goals.

3. Communication process - This variable is used to distinguish the amount and direction of information flow within the organization. Organizations having higher management systems experience greater amounts of communication in all directions, vertically and laterally, with increasing degrees of accuracy in the data being communicated.

4. Interaction-influence process - This variable is used to distinguish the amount and character of interactions within the organization, the amount of teamwork, and the influence employees have on the goals, methods, and activities of their organization. Organizations having higher management systems experience more interaction, and employees have greater influence.

5. Decision-making process - This variable is used to distinguish the degree of centralization in decision making. Organizations having higher management systems have more decentralized decision-making.

6. Goal setting - This variable is used to distinguish the degree of employee participation in setting organizational goals. Organizations having higher management systems have more employee participation in setting high, realistic objectives.

7. Control process - This variable is used to distinguish the extent to which the review and control functions are concentrated. Organizations having a management System 4 have control functions dispersed throughout the organization, and emphasis is placed upon self-control and problem solving. System 1 organizations have a centralized control system, and emphasis is placed upon fixing the blame for any mistakes.

8. Performance goals - This variable is used to distinguish the relative level of organizational goals and the recognition management gives to developing the human resources of the organization. System 4 is characterized with performance goals that are high and actively sought by superiors who recognize the necessity for making a full commitment to developing, through training, the human resources of the organization. Just the opposite is found in organizations having a management System 1.

By combining the above eight organizational variables, Likert's management systems can be described as follows:

> System 1 Management has no confidence or trust in subordinates. The bulk of the decisions and the goal setting of the organization are made at the top. Subordinates are forced to work with fear, threats, punishment, and occasional rewards. The little superior-subordinate interaction which takes place is usually with fear and mistrust. The control process is highly concentrated in top management, and an informal organization generally develops which opposes the goals of the formal organization.

System 2 Management has condescending confidence and trust in subordinates such as in the master and servant relationship. The bulk of the decisions and goal setting of the organization are made at the top, though many decisions are made within a prescribed framework at lower levels. Rewards and some actual or potential punishment are used to motivate workers. The control process is still concentrated in top management, but some is delegated to middle levels.

System 3 Management has substantial but not complete confidence and trust in subordinates. Subordinates are permitted to make minor decisions at lower levels. Communication flows both up and down the hierarchy. Rewards, occasional punishment, and some involvement are used to motivate. There is a moderate amount of superior-subordinate interaction, often with a fair amount of confidence and trust. Significant aspects of the control process are delegated downward with a feeling of responsibility at both higher and lower levels. An informal organization may develop, but it may either support or partially resist goals of the organization.

System 4 Management is seen as having complete confidence and trust in subordinates. Decision making is widely dispersed throughout the organization. Communication flows not only up and down the hierarchy but among peers. Workers are motivated by participation and involvement in developing economic rewards, setting goals, improving methods, and appraising progress toward goals. There is extensive, friendly superior-subordinate interaction with a high degree of confidence and trust. The informal and formal organizations are often one and the same. Thus, all social forces support efforts to achieve stated organizational goals.[1]

The management system definition being used in this research is based upon the above descriptions. As noted in Chapter I, a management system is the overall management style, as perceived by organizational members, expressed in terms of leadership, motivation, communication, interaction-influence, decision making, goal setting, control, and performance goals which are labeled along a continuum from exploitive authoritative, benevolent authoritative, and consultative to participative.

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[1]William J. Reddin, Managerial Effectiveness, (New York: McGraw-Hill Book Company, 1970), pp. 196-197.

Katz and Kahn suggest that management systems comprise the organized activities for controlling, coordinating, and directing the many other subsystems one may find within an organization. These organizations do not necessarily have to be authoritarian in character, but they do have to possess an established and definitive form in order to provide a proper decision-making system.[1]

Management System Background and Supporting Research

Likert's method of viewing organizations is a direct result of the large number of studies that he conducted while Director of the Institute for Social Research (ISR) at the University of Michigan. In 1947 the ISR began an extensive program of leadership and management research studies. This Michigan team found that supervisors characterized as "employee-centered" were more likely to be in charge of high-producing groups and that those supervisors characterized as "production-centered" were likely to be in charge of low producing groups.[2]

An "employee-centered" supervisor rating was given to the one who had more consideration for his people than he did for expediting production activities. This did not mean that production was ignored, but rather that more emphasis was placed upon allowing employees to establish their own methods, sharing responsibilities, and receiving generalized supervision in lieu of close supervision.[3] This general

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[1]Daniel Katz and Robert L. Kahn, The Social Psychology of Organizations, (New York: John Wiley and Sons, Inc., 1966), pp. 42-44.

[2]Saul W. Gellerman, Management and Productivity, (American Management Association, 1963), p. 34.

[3]Ibid.

description can now be recognized as fitting more closely with Likert's description of System 4.

A "production-centered" supervisor rating was given to the one who placed primary emphasis upon getting the work done. There was a noticeable lack of empathy for the workers, who were looked upon as instruments for doing rather than people with individual needs and emotions. Instructions to workers were very explicit, objective, and demanding.[1] This general description can now be recognized as fitting more closely with Likert's description of System 1.

Likert summarized some of the more pertinent findings that emerged from the ISR research on leadership and organizational performance in his 1961 book, New Patterns of Management. These studies became the basis for the Likert management system concept. The general design of most of these studies was to measure and examine the types of leadership and other related variables that better performing organizations used in contrast to those used by poorer performing organizations. Performance was measured in terms of (1) productivity per man hour, (2) job satisfaction, (3) turnover, (4) absenteeism, (5) costs, (6) scrap loss, and (7) employee and managerial motivation. The ISR studies were conducted in a wide variety of industries, and data were obtained from tens of thousands of employees whose jobs ranged from unskilled laborers to specialized research scientists.[2] Other related ISR research activities which formulated the management system concept are reviewed below.

Indik et al. found in one organizational study that high performance was directly associated with (1) the openness in the channels of

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[1]Ibid., p. 35.

[2]Rensis Likert, New Patterns of Management, (New York: McGraw-Hill Book Company, 1961), pp. 5-6.

communication between supervisors and subordinates, (2) the subordinate's satisfaction about the superior's supporting behavior, and (3) a relatively high degree of individual autonomy.[1]

Likert and Willis found that managers in the higher-producing agencies of a life insurance company were perceived by their subordinates to be "unselfish," "cooperative," "sympathetic," "democratic," "interested in agents' success," "sincere in dealing with agents," and "eager to help." Managers who did not have these characteristics were more likely to be found in the lower-producing agencies.[2]

In another study reported by Likert, train crew foremen who took time to properly train subordinates for better jobs achieved a higher level of organizational performance than those foremen who did not display an interest in preparing workers for promotion.[3]

Seashore and Georgopoulos found an inverse relationship between the average amount of "unreasonable" pressure workers perceived in a manufacturing department and the productivity of that department. Greater pressure for better performance was also associated with a lower level of confidence and trust in supervision. Georgopoulos also found in another study that there was an appreciable relationship between the amount of employee-perceived conflict among themselves and with supervision and the level of production in their organization. The greater the conflict, the lower the level of production.[4]

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[1]Bernard Indik, Basil S. Georgopoulos, and Stanley E. Seashore, "Superior-Subordinate Relationships and Performance," Personal Psychology 14 (Winter 1961):357-374.

[2]Likert, New Patterns of Management, pp. 10-11.

[3]Ibid., pp. 11-12.

[4]Ibid., pp. 8-9.

Katz et al., Mann, and Dent report that general supervision is more conducive to higher-producing organizations than close supervision. Supervisors of low-producing organizations tend to spend more time instructing their subordinates in minute details than do the higher-producing supervisors.[1]

Argyle et al. performed a related study in the British electrical industry where the performance measures used were output, voluntary absenteeism, and turnover. Foremen of higher-producing organizations tended to use general rather than close supervision and were also relatively more democratic in their behavior than were the foremen of less productive organizations. Attitudes of the more effective foremen tended to be more "employee-centered" than "production-centered."[2] This British study tended to support the above ISR findings in the United States.

A brief summary of the above studies reveals the following attributes that were found associated with the higher-producing organizations: (1) open communication channels, (2) supporting behavioral patterns, (3) individual autonomy, (4) supervision sincerity and degree of employee empathy, (5) supervision's interest in human development, (6) reasonable pressure to perform, (7) evidence of confidence and trust, (8) low levels of conflict, and (9) general supervision. These attributes, when viewed collectively, explain the relevance of the organizational variables Likert used in developing his concept of management systems.

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[1] Ibid., p. 9.

[2] Argyle, Gardner, and Cioffi, "Supervisory Methods Relative to Productivity, Absenteeism, and Labor Turnover," pp. 170-191.

Likert developed his theory of management systems from his experience in these leadership studies. Some authors consider Likert's four management systems to be just varying styles of leadership.[1] Others consider leadership as the key element that pervades Likert's management system concept.[2]

From the above cited studies one might conclude that all of the ISR studies have shown a positive correlation between "employee-centered" supervisors and organizational performance. This has not been the case. There is growing evidence that indicates "employee-centered" supervision does not lead to the best results under all circumstances.[3]

Morris and Reimer conducted an experimental investigation by creating groups, totaling more than 500 employees, and exposing them to either "employee-centered" or "production-centered" supervision by altering the style of supervision within an on-going industrial firm. In two groups, an attempt was made to push down the level of decision making. The supervisors were instructed to provide more general supervision and allow employees more freedom in establishing their work methods than previously allowed. Two other groups were treated just the opposite. Decisions were made at higher levels, and the employees were more closely supervised than they had been previously. After one year of administering the above treatments, all four groups had significant increases in productivity. The more closely supervised groups also had

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[1]French, The Personnel Management Process: Human Resources Administration, p. 108.

[2]Paul E. Mott, The Characteristics of Effective Organizations, p. 127.

[3]Gellerman, Motivation and Productivity, p. 38.

a larger increase in productivity than the more generally supervised groups.[1]

Sales conducted an experiment in an industrial assembly line setting. Two supervisors played "employee-centered" and "production-centered" roles, respectively, over their work groups. The productivity levels of the two groups remained virtually identical throughout the experiment.[2] Therefore, neither method of managing was considered superior.

Patchen conducted a study in a large plastic manufacturing company to determine the relationship between supervisory methods and group performance. He found that closer supervision actually increased production standards. This finding was explained by concluding that the employees thought the foremen were probably in a better position to impart higher performance standards to the group. By being closer to the work, the foremen could link rewards and punishments more closely with known work performance.[3]

Kahn, one of the ISR researchers, now states that 'most successful supervisors combine employee-centered and production-centered orientations, working out their own creative way of synthesizing these two concerns.'[4]

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[1]Nancy C. Morse and Everett Reimer, "The Experimental Change of a Major Organizational Variable," in Management and Motivation, ed. Victor H. Vroom and Edward L. Deci, (Harmondsworth, Middlesex, England: Penguin Books Ltd, 1973), pp. 192-213.

[2]Stephen M. Sales, "Supervisory Style and Productivity: Review and Theory," Personnel Psychology 19 (1966):279.

[3]Patchen, "Supervisory Methods and Group Performance Norms," pp. 275-294.

[4]Gellerman, Motivation and Productivity, p. 37.

Blake and Mouton, based on their research, offered further support. They introduced the managerial grid. The vertical axis of the grid was labeled "concern for production" and the horizontal axis was labeled "concern for people." They contended that a manager must be equally concerned about both people and production.[1]

Contingency Approach

Several authors now believe that there is not a "one best way" type of leadership or management style. Lawrence, Lorsch, Morse, and others now contend that the most productive organization is the one that matches the needs of its tasks and people in any particular situation. These contingency theorists say their theoretical assumptions emphasize that the appropriate organization structure and management approach are contingent upon the nature of the work and the particular needs of the people in the organization.[2]

Joan Woodward was one of the first to identify the need for a contingency or situational approach to management. She found that firms having different techniques of production, small batch, mass production, or continuous, often used different management practices. But when the firms were grouped according to their production techniques, the more successful firms in each group followed very similar management practices.[3]

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[1] Robert R. Blake and Jane S. Mouton, The Managerial Grid, (Houston: Gulf Publishing Co., 1964), p. 10.

[2] Morse and Lorsch, "Beyond Theory Y," pp. 61-62.

[3] Fred Luthans, "The Contingency Theory of Management," Business Horizons 12 (June 1973):70.

Burns and Stalker classified two distinctly different sets of management approaches as "mechanistic" and "organic," the first being the most applicable for organizations operating under stable conditions and the latter applicable to organizations operating under unstable conditions.[1] Descriptions of these two divergencies tend to parallel Likert's System 1 and 4, respectively.

Situational theory is directed toward discovering what are the situational variables and under what conditions do they either allow or cause certain kinds of leader characteristics and behavior to be the most effective.[2] Fiedler has developed a leadership contingency theory which "postulates that the effectiveness of a group is contingent upon the relationship between leadership style and the degree to which the group situation enables the leader to exert influence."[3] Reddin, likewise, contends that effectiveness depends upon the leadership style that is the most appropriate to the situation in which it is used.[4] Schein, another situationalist, concludes that leadership is a function of the organization. He believes that it takes a good leadership and a good organizational membership working together to achieve an effective organization.[5] Filley and House conclude that "the managers of

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[1]Lawrence and Lorsch, Organization and Environment: Managing Differentiation and Integration, pp. 187-189.

[2]Alan C. Filley and Robert J. House, Managerial Process and Organizational Behavior, (Glenview, Illinois: Scott, Foresman and Company, 1969), p. 396.

[3]Fred E. Fiedler, A Theory of Leadership Effectiveness, (New York: McGraw-Hill Book Company, 1967), p. 15.

[4]Reddin, Managerial Effectiveness, p. 35.

[5]Edgar H. Schein, Organizational Psychology, (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1965), p. 105.

productive organizations are those who strive to use all the factors that yield favorable and cooperative attitudes, in such a way that motivational forces are mutually reinforcing."[1]

Use of The Management System Concept

Cribbin contends that everybody is blessed with retrospective infallibility. He criticizes earlier studies on "employee-centered" and "production-centered" supervision because they emphasized the wrong end of the organizational ladder. Upper management's style and influence upon the organization should have also been considered. Cribbin also cites the research of Vroom and Mann, where they found that the selection of either the authoritarian or participative managerial approach for best organizational performance is highly dependent upon the independent needs of the employees. But Cribbin concludes that "Likert is much closer to reality, if not truth, when he speaks of 'management systems'. For it is the management philosophy permeating an organization that is crucial, not the results that are obtained from the study of this or that group of lower-level supervisors and managers."[2]

Likert's ideas on how management ought to deal with people have been evolving for several years into what he calls a "modified theory" of management which incorporates more than just supervisory methods. He says management cannot continue trying to buy cooperation, but instead must build an organization in which each employee can enjoy a sense of

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[1] Filley and House, Managerial Process and Organizational Behavior, p. 360.

[2] James L. Cribbin, Effective Managerial Leadership, (American Management Association, Inc., 1972), pp. 37-38.

importance and influence.[1] On this basis and from his experience, Likert has developed his management system idea. Likert and others are convinced that System 1 organizations are characterized as classical design types (rule by rules) and are ineffective because they do not reflect the changing character of their operating environment.[2]

Organizations characterized as System 4 (group participation) have the highest productivity and are the most effective. Likert substantiates this finding from his research experience. He contends that many different groups of managers, totaling several hundred, irrespective of their field of experience, have agreed that the highest producing organizations they have known had management systems more like System 4 than System 1. Likewise, when a group of middle and upper level managers from several leading industrial firms in the United States were asked to characterize what type management system they preferred, System 4 was again the most highly favored.[3] Likewise, an organization currently characterized as System 1 or 2 can improve its level of productivity by initiating systematic changes toward System 4.[4]

A classic success story for a company introducing a new management system is reported by Marrow, Bowers, and Seashore and briefly described below. The Harwood Company, a highly successful pajama manufacturer, purchased its leading competitor, the Weldon Company, in

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[1]Gellerman, Motivation and Productivity, pp. 44-47.

[2]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, p. 79.

[3]Likert, The Human Organization, pp. 3-11.

[4]Alfred J. Morrow, David G. Bowers, and Stanley E. Seashore, Management By Participation, (New York: Harper and Row, Publishers, 1967), pp. 215-222.

1962. After the merger, the differences in leadership style and in the management system between the two firms were so great, the original plan to treat Weldon as an autonomous division appeared impossible. To help the Weldon division, the Harwood Company hired members of the ISR from the University of Michigan to "measure, interpret, and analyze employee attitudes and behavior during the period of change."[1] A second team of behavioral scientists was hired as "change agents" to implement a program to "increase managerial competence, improve interpersonal relations, and train supervisors and executives in the principles of participative management."[2] Weldon's entire management was retained.

The first changes were introduced to improve the plant facilities and to change to an easier work-flow and control system. The next phase involved major changes in the management system and the consequent changes in the social and psychological work environment. From the start, participative management principles were emphasized. Later, training programs were used to break up old habits of distrust and to develop openness, trust, and active joint resolution of problems. Everyone from the plant manager down to the lowest production workers were brought together in exercises to implement joint problem solving through participative methods in groups. Finally, a concerted effort was made to distribute responsibility and influence downward in the organization.[3]

In 1962 the Weldon division had a measured management System 2 based upon the ISR measuring method (an early Likert test instrument).

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[1] Ibid., p. xv.

[2] Ibid.

[3] Ibid., pp. 68-70.

By 1964 the management system had changed to a "consultative" System 3. The changes in organizational performance in the same period were very noticeable. Return on capital invested increased from -15 to +17 percent. Production efficiency increased from -11 to +14 percent. The monthly labor turnover rate decreased from 10 to 4 percent. The daily absentee rate decreased from 6 to 3 percent.[1]

The Weldon change program ended in 1965 and all consultants left. One year later the Weldon managers and supervisors completed the management system rating again to determine if the change to management System 3 was enduring. A management System 3 was found to still exist in 1966.[2] The change, if any, in organizational performance from 1964 to 1966 was not reported.

In 1969, Seashore and Bowers returned to the Weldon division for a follow-up measurement of the state of the organization. Managers, supervisors, and a sample of employees completed the same test instrument. Company records were used to check changes in productivity. Although a specific productivity value was not published, the authors stated that their estimate from the data was that productivity had been stable with a slight decline in recent months arising from the addition of several inexperienced employees. The management system had shifted into a System 4 on every subvariable in the Likert test instrument with the exception of motivation which remained under System 3.[3]

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[1]Ibid., pp. 145-220.

[2]Ibid., p. 222.

[3]Stanley E. Seashore and David G. Bowers, "Durability of Organizational Change," American Psychologist 25 (1970):227-233.

Summary

To summarize this review on the management system, there is considerable evidence that it is an important independent organizational variable that has evolved from numerous leadership and organizational studies. Even though empirical results are not all-conclusive and there are varying opinions on which management approach is best, what matters is whether management's style is perceived as a management system that is conducive to an organizational climate that encourages behavior which ultimately benefits the organization. This researcher agrees with the view expressed by Blake, Mouton, Young, and Summer when they say that an organization's character is cast at the top by the structure, policies, and procedures which top management establishes.[1] The ultimate responsibility of top management is to administer the management system. When the system is established, the behavioral patterns of the organizational members begin to evolve and formulate.[2] The managerial styles tend to consolidate into an established system which displays a remarkably consistent set of interrelationships. Managers tend to view the long-term pattern rather than the short-term fluctuations.[3] "This reflects a natural tendency toward what might be called 'organizational homogenization,' which a previous generation of observers lamented as conformity and which we know today as simply the result of the ways in which managers

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[1]Robert R. Blake and Jane S. Mouton, Building a Dynamic Corporation Through Grid Organization Development, (Reading, Mass.: Addison-Wesley Publishing Company, 1969), p. 35; Stanley Young and Charles E. Summer, Jr., Management: A Systems Analysis, (Atlanta: Scott, Foresman and Company, 1966), p. 15.

[2]Douglas McGregor, The Human Side of Enterprise, (New York: McGraw-Hill Book Company, 1960), p. 183.

[3]Likert, The Human Organization, p. 116.

are selected and their facility in learning the ropes or absorbing their predecessor's beliefs."[1] The resulting organization climate will be an important determinant of individual and organizational performance. From this review it is concluded that the management system of an organization deserves further investigation, particularly as it relates to organizational climate and performance.

Organizational Climate

Introduction

This section will review the theoretical background and some of the research which is most pertinent to an investigation of organizational climate and its relationship to management systems and organizational performance.

Organizational Climate Concepts and Definitions

The organizational climate concept has evolved from an attempt to apply a theory of motivation to the behavior of individuals in an organization. It provides a way of describing the influence organizations have on the motivation of the individuals who work in these organizations. Organizational theories tend to utilize very descriptive concepts about formal organization structure which seem to have a more indirect effect on employee's attitudes, motivation, and behavior. The climate concept attempts to provide a useful bridge between the theories of individual motivation and behavior on the one hand, and organizational theories on the other.[2]

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[1]Gellerman, Management By Motivation, p. 226.

[2]Litwin and Stringer, Motivation and Organizational Climate, p. 5.

Use of the climate concept is relatively new; however, there has been a considerable amount of recent research on the subject of organizational climate as reported by Frederikson, Friedlander, Margulies, Litwin, Stringer, Schneider, Bartlett, and Tagiuri.[1] As in any new field, it takes some time to agree upon common terms and definitions. The term organizational climate and many related terms such as environment, situation, conditions, and circumstances have been widely used to explain individual or group behavior.

Every organization develops its own climate. The climate of the organization reflects the norms and values of the formal system and the member's reinterpretation of them into the informal organization. Gellerman states that every company develops its own distinct "personality" or working environment. This personality is "basically an expression of the collective dispositions of its key men toward its key problems."[2]

Organizational climate reflects the history of the internal and external struggles, the types of people the organization attracts, its work processes, the modes of communication, and the exercise of authority within the system.[3] Climate has a connotation of continuity, but it is not as lasting as culture. Climate is determined by characteristics, conduct, attitudes, and expectations of other people, and by sociological and cultural realities.[4]

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[1] Lawler, Hall, and Oldham, "Organizational Climate: Relationship to Organizational Structure, Process, and Performance," p. 139.

[2] Gellerman, "The Company Personality," p. 5.

[3] Katz and Kahn, The Social Psychology of Organizations, pp. 65-66.

[4] Renato Tagiuri, "The Concept of Organizational Climate," in Organizational Climate: Explorations of a Concept, ed. Renato Tagiuri

In studies thus far, there have been several definitions of organizational climate. For this dissertation, the definition proposed by Gibson, Ivancivich, and Donnelly will be used since it is based upon employees' perceived impressions about their organization, and from the literature review, this appears to be the most prevalent way of defining organizational climate at this time. As noted in Chapter I, organizational climate is defined as "a set of properties of the work environment, perceived directly or indirectly by the employees who work in this environment and is assumed to be a major force in influencing their behavior on the job."[1]

Organizational climate is thought to influence behavior in several ways, but until recently no concerted effort was made to explore the interaction effect of climate on the behavior of people in organizations. This interaction effect has now been recognized and investigated by several researchers such as Forehand, Frederikson, Litwin, Stringer, Andrews, and Campbell et al.[2] These investigations have viewed climate variously as the independent, intervening, or dependent variable. The results of these investigations will be discussed in the following sections of this dissertation.

Climate as an Independent Variable

Early climate studies appear to have concentrated on using climate as an independent variable, a predictor of future outcomes. Some research

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and George Litwin, (Boston: Division of Research, Graduate School of Business Administration, Harvard University, 1968), p. 24.

[1]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, p. 314.

[2]Pritchard and Karasick, "The Effects of Organizational Climate on Managerial Job Performance and Job Satisfaction," p. 126.

on climate and dependent measures of organizational effectiveness indicate that there is a positive relationship. Some of these studies will be reviewed in this section.

Frederikson conducted an experiment in 1966 to test this relationship. Four different climates were created by different treatments on the participants while they were taking an in-basket test. The four climates were identified as follows:

1. low rules, low structure
2. highly structured and rules oriented
3. close supervision
4. autonomous or democratic environment

Performance (productivity) data from the in-basket test, plus various test scores and biographical data, were analyzed to determine the predictability of performance under different created environments. Predictability seemed to be higher with the low rules, low structure type of environment. Climate was seen as the moderator of relationships between individual characteristics and behavior. The performance of individuals who worked in a consistent climate was more predictable than those working under changing conditions. The inconsistent climates actually had a negative effect on productivity. Participants used different work methods when subjected to different climate conditions. The more restrictive climates caused the participants to work more through formal organization channels.[1]

Pelz and Andrews studied 1311 research and development engineers, scientists, and professors in five industrial laboratories, five government laboratories, and seven departments in a large university. They

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[1] Ibid., pp. 127-128.

sought to identify the environmental conditions conducive to innovative, high quality research. Scientific performance was measured by (1) a panel of knowledgeable peers and supervisors, and (2) objective measures such as the output of papers, patents, and reports over a five-year period. They found that two consistent climate characteristics, autonomy and coordination, were related to high levels of scientific achievement and innovation such as challenge, complexity, minimal structure, and freedom.[1]

Farris conducted a follow-up of Pelz and Andrew's work and found the relationships they reported had remained stable. Farris expanded the study to measure the association between six different organizational process variables and four performance measures as shown in Table 1. He found that all six process variables were positively related to at least one performance measure.[2]

Some researchers feel that climate cannot be directly manipulated as an independent variable. Climate is a perception which results from the numerous events that happen to, and around, people and may affect their day-to-day job experiences. Therefore, climate can only be a dependent variable or outcome in the sense that it is the global summary of a person's perceptions rather than a perception of a discrete event.[3]

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[1]Donald C. Pelz and Frank M. Andrews, Scientists in Organizations-Productive Climates for Research and Development, (New York: John Wiley and Sons, Inc., 1966), p. vi.

[2]George F. Farris, "Organizational Factors and Individual Performance: A Longitudinal Study," Journal of Applied Psychology 53 (1969):87-92.

[3]Benjamin Schneider and Douglas T. Hall, "Toward Specifying the Concept of Work Climate: A Study of Roman Catholic Diocesan Priests," Journal of Applied Psychology 56, No. 6 (1972):448.

TABLE 1

FARRIS RESEARCH VARIABLES

Organizational Process Variables	Performance Measures
Involvement in technical work	Contribution
Influence on work goals	Usefulness
Extent of contact with colleagues	Patents
Diversity of work activities	Reports
Salary	
Number of subordinates	

SOURCE: George F. Farris, "Organizational Factors and Individual Performance: A Longitudinal Study," Journal of Applied Psychology 53 (1969):87-92.

Climate as a Dependent Variable

A small number of researchers have suggested that climate should be treated as a dependent variable. Some of these more pertinent studies are reviewed in this section.

George and Bishop viewed climate as being dependent upon the organization's structure. They investigated the relationship between four properties of organizational structure (complexity, centralization, formalization, and professional latitude), and the teacher's perception of organizational climate in schools. They found that highly bureaucratic educational systems were more likely to be perceived as "closed" or "cold" climates than less bureaucratic organizations.[1]

Davis conducted a similar study using five different government organizations. He indicated that a strong relationship existed between decision-making discretion and the employee's perception of climate. He further concluded that, just as each organization has a different climate, they seem to attract and retain those individuals that find a congenial compatibility between themselves and the organization.[2]

Organizational climate was used as a dependent variable in a bank study to determine the extent to which employee perceptions of climate were influenced by organizational and individual variables. Organizational variables were identified as personnel composition, organization, task content, and physical environment. Individual variables were biographical data from the study participants. Data from a sample of 162 management level personnel tended to indicate that climate

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[1] Julius R. George and Lloyd K. Bishop, "Relationship of Organizational Structure and Teacher Personality Characteristics to Organizational Climate," Administrative Science Quarterly 16 (December 1971):472.

[2] Davis, "Rules, Hierarchy, and Organizational Climate," pp. 50-55.

perceptions are somewhat equally influenced by personal and organizational factors. Both variables accounted for small but significant amounts of variance in organizational climate perceptions.[1]

Some researchers contend that sensitivity training programs can induce changes in an employee's perception of his organization's climate. In some organizational development programs that have included sensitivity training, the noted changes in climate perceptions tended to extend over a considerable period of time. The external environment was also found to interact with sensitivity training to induce changes in climate perception.[2]

One experimental design tested the hypothesis that perceptions of climate vary according to the employee's orientation to his environment. The employee environments that were tested in a laboratory setting were identified as the degree of participation, stockholder orientation, and organizational position level. These different environments were found to have a significant effect on the employee's perceived climate.[3]

Although some researchers continue to use organizational climate as a dependent variable, there appears to be a growing trend in the literature for researchers to conceptualize climate as an intervening variable. Because of this trend, this research has conceptualized organizational climate as an intervening variable as previously shown in the research model in Chapter I.

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[1]Gavin, "Organizational Climate as a Function of Personal and Organizational Variables," pp. 135-139.

[2]Hellriegel and Slocum, "Organizational Climate: Measures, Research and Contingencies," p. 276.

[3]Ibid., p. 275.

Climate as an Intervening Variable

Most recent climate research appears to be concentrating on using organizational climate as an intervening variable. Some of the authors, with the dates of their work in parentheses, that have conceptualized organizational climate as an intervening variable are as follows: (1) Litwin and Stringer (1968), (2) Patton (1969), (3) Karasick (1971), (4) Schneider (1972, 1973), (5) Schneider and Hall (1972), (6) Pritchard and Karasick (1973), (7) Curtis (1973), (8) Gibson, Ivancevich, and Donnelly (1973), and (9) Lawler, Hall, and Oldham (1974). They have used job activities, leadership styles, organization structure, and organizational processes, etc., as independent variables. The dependent variables were usually some output which was considered important either to the organization or the individual employee. The works of these authors will be reviewed in this section.

Litwin and Stringer were among the first to use organizational climate as the intervening variable. In an experiment, they used leadership style as the independent variable and organizational climate as the intervening variable. The dependent variables were motivation, job satisfaction, and performance. Leadership style was found to be a very significant determinant of organizational climate. Achievement motivation was found to be positively related to the employee's degree of perceived responsibility in the organization. Job satisfaction and performance were found to be positively related to climate. These findings suggest that organizational climate is an important variable in studies of human organizations.[1]

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[1]Litwin and Stringer, Motivation and Organizational Climate, pp. 93-144.

Patton conducted a dissertation study in one aerospace firm using leadership style as the independent variable, organizational climate as the intervening variable, and motivation as the dependent variable. In a sample of over 1,000 employees, he found there was a significant positive relationship between (1) leadership style and organizational climate, (2) organizational climate and motivation, and (3) leadership style and motivation.[1]

Karasick investigated the relationship between organizational factors such as policies and practices with organizational climate and overall organization performance in two industrial organizations. He found that organizational climate was influenced by organizational policies and practices. Effective organizational subunits tended to have different climates from the less effective ones.[2]

Schneider, in a study that conceptualized perceived climate as an intervening variable, found that bank customer intentions to switch their accounts were significantly related to their perceptions of bank employees and the climate of the bank. The study supported Schneider's contention that "climate perceptions of an organization may be summary perceptions of events or experiences perceived by people who interact with it."[3] Schneider concluded that people may leave an organization because of their summary perceptions.

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[1]Robert T. Patton, "Interrelationship of Organization Leadership, Type of Work Accomplished, and Organizational Climate with Extrinsic and Intrinsic Motivation Developed Within the Organization," p. 86.

[2]Karasick, "Organizational Climate and Its Relationship to Managerial Behavior," p. 74.

[3]Benjamin Schneider, "The Perception of Organizational Climate: The Customer's View," Journal of Applied Psychology 57, No. 3 (1973): 126-146.

Schneider and Hall, in a study of Roman Catholic Diocesan priests, found there were significant positive relationships between task activities and perceived climate and a positive relationship between climate and importance of the work.[1]

Pritchard and Karasick found that overall organizational policies, practices, and local environment had a strong positive influence on climate. A significant positive correlation was found between performance and only two specific subvariables of climate (structure and status polarization). Several correlation values between performance and climate subvariables were negative. The median overall correlation value between organizational climate and performance was only +0.05.[2]

Curtis conducted a case study in a government hospital to investigate the relationships among the management system, organizational climate, and overall performance. He found a significant positive correlation between the management system and perceived climate. A statistical relationship between climate and performance was not established.[3]

Gibson, Ivancevich, and Donnelly have reviewed previous climate research findings and attempted to integrate them with various concepts of management and organizational behavior. Their integrative systems model showing organizational climate as an intervening variable was previously shown in Figure 1. They concluded that the climate concept

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[1]Schneider and Hall, "Toward Specifying the Concept of Work Climate: A Study of Roman Catholic Diocesan Priests," pp. 447-455.

[2]Pritchard and Karasick, "The Effects of Organizational Climate on Managerial Job Performance and Satisfaction," pp. 126-146.

[3]Curtis, "The Management System and Its Impact on The Organization," pp. 232-233.

must be blended with other concepts of management and organizational behavior before it can provide a better understanding of organizational behavior.[1]

Lawler, Hall, and Oldham investigated the relationships among organization structure, organization process, organizational climate, organizational performance, and employee job satisfaction. Their conceptual model and overall correlational results were presented in Chapter I, Figure 3. The subvariables for each of the major variables in their model are shown in Table 2. Five of six organizational process variables had a significantly positive correlation with one or more of the five climate variables. The organization's structure had only a slight positive relationship to the climate of the research and development organizations. Climate, as perceived by 291 scientists, had a significant positive relationship with two of the three performance measures. Significant, positive associations were found between the climate factors and satisfaction measures.[2]

From these studies it is apparent that organizational climate is being recognized as an important intervening variable in the study of human organizations. As noted in the studies, there are numerous references to different climate dimensions. The next section will describe the different dimensions or subvariables of organizational climate.

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[1]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, pp. 327-328.

[2]Lawler, Hall, and Oldham, "Organizational Climate: Relationship to Organizational Structure, Process, and Performance," pp. 139-155.

TABLE 2

LAWLER, HALL, AND OLDHAM RESEARCH MODEL VARIABLES

Organization Structure	Organization Process
Levels	Performance review frequency
Tall/flat	Performance review relationship to compensation program
Levels from top	Professional autonomy
Span of control	Assignment generality
Size	Collaboration support
	Informal budget account

Climate	Performance	Satisfaction
Competence/potence	Technical	Security
Responsible	Administrative	Social
Practical	Objective	Esteem
Risk oriented		Autonomy
Impulsive		Fulfillment
		Pay

SOURCE: Edward E. Lawler, III, Douglas T. Hall, and Greg R. Oldham, "Organizational Climate: Relationship to Organizational Structure, Process, and Performance," Organizational Behavior and Human Performance 11 (February 1974):148-150.

Organizational Climate Dimensions

The literature shows that a number of researchers and theorists have developed their own organizational climate dimensions, sometimes referred to as variables or subvariables. Before the researcher can adequately conduct climate research, he must identify relevant dimensions and means of measurement. Dimensions serve to describe situations, as well as changes in those situations, and provide a means to relate to specific motivations and behavior.

Objective dimensions

Forehand and Gilmer, two of the early organizational climate theorists, referred to organizational climate as a set of characteristics which describe and distinguish an organization over some period of time and have some influence on the behavior of its people.[1] The set of characteristics or dimensions they suggested includes size, structure, leadership patterns, system complexity, goal direction, and communication networks. This approach placed emphasis upon objective measures of climate.

Objective measurement of climate is also evidenced in the works of Palmer, Evan, and Katzel et al. These researchers identify organizational differences with indices such as the number of levels of authority, ratio of different types of personnel, and size of the work force. An example of their work is reflected in Palmer's analysis. He factor analyzed 21 organizational conditions in 188 manufacturing firms. These conditions were reduced to eight orthogonal factors, five of which could

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[1]Forehand and Gilmer, "Environmental Variation in Studies of Organizational Behavior," p. 362.

be defined by both organizational and behavioral measures. These five factors were (1) retirement welfare, (2) size of work force, (3) insurance benefits, (4) thrift benefits, and (5) theft versus discounts.[1]

The variables used by researchers who have developed their own objective climate dimensions are summarized in Table 3. The use of objective dimensions has not been prevalent in the literature since the mid 1960s. For this reason, other means to determine climate dimensions were used. This research will focus on the use of perceptive dimensions.

Perceptive dimensions

A much larger number of researchers have attempted to operationalize climate using the perceptive approach. The important distinction between objective and perceptual measures of climate is whether the determiner of the significant effects can say it is the situation as it actually exists, as determined by objective measures, or it is the situation perceived by the organizational members. Tagiuri takes specific exception to Forehand and Gilmer's objective view. Tagiuri views climate as the environment that is interpreted by organizational members, and it is this interpretation which affects their attitudes and motivation.[2]

When discussing the relationships among causal, intervening, and end-result variables, Likert emphasizes the usefulness of employee perceptions as influencing motivational forces and, in turn, behavior.[3] He

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[1] Ibid., p. 366.

[2] Renato Tagiuri, "The Concept of Organizational Climate," p. 27.

[3] Likert, New Patterns of Management, pp. 196-201.

TABLE 3
OBJECTIVE DIMENSIONS OF ORGANIZATIONAL CLIMATE

OBJECTIVE DIMENSIONS			
PALMER (1961)[a]	KATZEL, BARRETT & PARKER (1961)[b]	EVANS (1963)[c]	FOREHAND & GILMER (1964)[d]
RETIREMENT WELFARE SIZE OF WORK FORCE INSURANCE BENEFITS THRIFT BENEFITS THEFT VS. DISCOUNTS	SIZE OF WORK FORCE CITY SIZE WAGE RATE UNIONIZATION PERCENTAGE OF MALE EMPLOYEES	RATIO OF HIGHER-LEVEL SUPERVISORS TO FOREMAN NUMBER OF LEVELS OF AUTHORITY FROM TOP MANAGEMENT TO WORKERS RATIO OF ADMINISTRATIVE TO PRODUCTION PERSONNEL	SIZE STRUCTURE LEADERSHIP PATTERNS SYSTEM COMPLEXITY GOAL DIRECTION COMMUNICATION NETWORKS

[a]G. J. Palmer, "Test of a Theory of Leadership and Organization Behavior with Management Gaming." Second Annual Report, 1961, Louisiana State University, Contract Nonr 1575 (05), Office of Naval Research, Group Psychology Branch.

[b] R. A. Katzell, R. S. Barrett, and T. C. Parker, "Job Satisfaction, Job Performance, and Situational Characteristics," Journal of Applied Psychology 45 (1961): 65–72.

[c]William M. Evan, "Indices of the Hierarchical Structure of Industrial Organizations," Management Science 9 (1963), 468–477.

[d]Forehand and Gilmer, "Environmental Variation in Studies of Organizational Behavior," pp. 361–382.

feels that the causal variables (structure, management practices, etc.) interact with personality to produce perceptions, and only through these perceptions can the relationship between causal and end-result variables be understood.

Based upon the literature review, there now tends to be rather general agreement that climate is the individual perceptions of the organizational members. Considerable climate research has been directed toward developing a taxonomic base of perceptive climate dimensions. Some researchers, such as Litwin, Stringer, Schneider, Bartlett, and Meyer, have used factor analytic methods on their collected organizational climate data to identify clustered responses and establish specific climate dimensions.[1]

Factor analysis

In 1966 Litwin and Stringer factor analyzed the data collected from an industrial firm by a questionnaire that was designed to measure the perception of organization members. Six climate dimensions were identified as follows:

1. Structure - Member's perceptions of organizational constraints, rules, regulations and red tape.
2. Individual responsibility - Member's feelings of autonomy, of being one's own boss.
3. Rewards - Feelings related to being confident of adequate and appropriate rewards - pay, praise, special dispensations - for doing the job well.
4. Risk and risk taking - Member's perceptions of the degree of challenge and risk in the work situation.
5. Warmth and support - Feelings of general good fellowship and helpfulness prevailing in the work setting.
6. Tolerance and conflict - Member's degree of confidence that the climate can tolerate different opinions.[2]

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[1]Karasick, "Organizational Climate and Its Relationship to Managerial Behavior," pp. 6-7.

[2]Ibid.

Schneider and Bartlett factor analyzed data collected in an insurance agency in an effort to define specific climate dimensions. Six climate dimensions emerged: (1) managerial support, (2) managerial structure, (3) concern for new employees, (4) intra-agency conflict, (5) agent independence, and (6) general satisfaction.[1] The researchers considered these six dimensions as possible predictors of later performance and also as potential moderators of the relationship between selection information and performance measures. The identified dimensions were later utilized in developing an organizational climate test instrument.

Meyer conducted a factor analysis on data collected from approximately 350 General Electric employees. The data clustered into six groups which were identified and described as follows:

1. Constraining conformity - The feeling employees have about the constraints in the office, such as rules, procedures, policies, and practices.
2. Responsibility - The feeling that employees have a lot of individual responsibility delegated to them.
3. Standards - The emphasis that employees feel is being placed on doing a good job.
4. Reward - The degree to which employees feel that they are fairly rewarded for good work, rather than only being punished when something goes wrong.
5. Organizational clarity - The feeling that things are pretty well organized rather than being disorderly, confused, or chaotic.
6. Friendly team spirit - The feeling that general good fellowship prevails in the atmosphere, that management and fellow employees are warm and trusting.[2]

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[1]Benjamin Schneider and C. J. Bartlett, "Individual Differences and Organizational Climate I: The Research Plan and Questionnaire Development," Personnel Psychology 21 (1968):323-334.

[2]Meyer, "Achievement Motivation and Industrial Climates," pp. 161-162.

Meyer, Litwin, and Stringer later collaborated their findings in developing an expanded test instrument which identified nine dimensions. This is the test instrument being used in this research.

This is only a small sample of the work that has been done in developing perceptive climate dimensions. The above described climate dimensions and those of other known researchers are summarized in Table 4 for ease of comparison.

There may be general agreement that organizational climate should be operationalized in terms of perceptive dimensions, but from Table 4 there is strong evidence that this is where general agreement ends. Therefore, when planning a climate research project, great care must be taken in selecting a test instrument that has been developed in a compatible setting. Otherwise, test instrument modifications may be required. The process of selecting the test instrument for this research will be discussed in Chapter III.

Summary

To summarize this review on organizational climate, there is considerable evidence that it is an important organizational variable relative to the management of human resources. Likewise, as Davis and Gellerman suggest, company climates are as different as individual personalities. Litwin and Stringer proved that different climates could be generated and several researchers found strong positive relationships between organizational climate and performance. However, consistent relationships were not always found as evidenced by Pritchard and Karasick. What matters most of all is that the concept is recognized and investigated in enough different settings such that its benefits and uses are thoroughly understood. If the effective utilization of

TABLE 4
PERCEPTUAL DIMENSIONS OF ORGANIZATIONAL CLIMATE

PERCEPTUAL DIMENSIONS				
HALPIN & CROFT (1963)	TAGIURI (1968)	LITWIN & STRINGER (1968)	MEYER (1968)	SCHNEIDER & BARTLETT (1968)
DISENGAGEMENT HINDRANCE INTIMACY ESPIRIT ALOOFNESS PRODUCTION EMPHASIS THRUST CONSIDERATION	DIRECTION AND GUIDANCE PROFESSIONAL ATMOSPHERE QUALITY OF SUPERIORS RESULTS, ANTONOMY & SATISFACTION	STRUCTURE RESPONSIBILITY REWARDS RISK WARMTH STANDARDS CONFLICT IDENTITY SUPPORT	CONSTRAINING CONFORMITY RESPONSIBILITY STANDARDS REWARDS ORGANIZATIONAL CLARITY FRIENDLY TEAM SPIRIT	MANAGERIAL SUPPORT CONCERN FOR NEW EMPLOYEES INTRA-AGENCY CONFLICT AGENT INDEPENDENCE GENERAL SATISFACTION MANAGERIAL STRUCTURES

PERCEPTUAL DIMENSIONS			
CAMPBELL AND PRITCHARD (1969)	GILMER (1971)	PAYNE & MANSFIELD (1973)	LAWLER III, HALL & OLDHAM (1974)
ANTONOMY DEVELOPMENT ORIENTATION (INCREASING) DEVELOPMENT ORIENTATIONS (NEW) INVOLVEMENT ORGANIZATION EXPECTATIONS SATISFACTION CONFLICT VS COOPERATION SOCIAL RELATIONS SUPPORTIVENESS STRUCTURE LEVEL OF REWARD PERFORMANCE - REWARD DEPENDENCY STATUS/GOODS & SERVICES MOTIVATION TO ACHIEVE PRESSURE STATUS POLARIZATION INTELLIGENCE CONCERN WITH INTERNAL OPERATIONS FLEXIBILITY & INNOVATION DECISION CENTRALIZATION ENVIRONMENTAL SERVERITY KNOWLEDGE OF RESULTS	SIZE AND SHAPE OF ORGANIZATIONS LEADERSHIP PATTERNS COMMUNICATION NETWORKS GOAL DIRECTIONS DECISION-MAKING PROCEDURES	LEADERS PSYCHOLOGICAL DISTANCE QUESTIONING AUTHORITY EGALITARIANISM MANAGEMENT CONCERN FOR EMPLOYEE INVOLVEMENT OPEN-MINDEDNESS EMOTIONAL CONTROL FUTURE ORIENTATION SCIENTIFIC & TECHNICAL ORIENTATION INTELLECTUAL ORIENTATION JOB CHALLENGE TASK ORIENTATION INDUSTRIOUSNESS ALTRUISM SOCIABILITY INTERPERSONNEL AGGRESSION RULES ORIENTATION ADMINISTRATIVE EFFICIENCY CONVENTIONALITY READINESS TO INNOVATE ORIENTATION TO WIDER COMMUNITY	COMPETENT/POTENT RESPONSIBLE PRACTICAL RISK-ORIENTATED IMPULSIVE

human resources is to be the determinant of successful companies of the future as Meyer concluded, it is evident that additional knowledge about the effects of climate on these human resources is of major importance.[1] From this review, it is concluded that organizational climate as conceptualized in the research model deserves further investigation, particularly as it relates to an organization's management system and organizational performance.

Organizational Performance

Introduction

This section will review the theoretical background and the research pertinent to an investigation of organizational performance and its relationships with the management system and organizational climate.

Organizational Performance Concept and Definitions

The evaluation of an organization's overall performance is one of the most difficult problems in organization theory.[2] The primary cause of this difficulty lies in the selection of appropriate criteria that can measure performance and yet be applicable to more than one organization. Unless the criteria can be applied to all types of organizations, it is impossible to classify organizations on an effective continuum.[3] This relationship is essential for adequate comparative analysis. The

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[1] Ibid., pp. 165-166.

[2] Richard N. Osburn and James G. Hunt, "Environment and Organizational Effectiveness," Administrative Science Quarterly 19, No. 2 (June 1974):237.

[3] Price, Organizational Effectiveness: An Inventory of Propositions, p. 5.

literature reveals that researchers have used many diverse measures or concepts of effectiveness.

The traditional concept of organization effectiveness, sometimes referred to as success, is the degree of goal achievement. Some authors such as Price continue to use this concept.[1] Thorndike noted a general tendency for researchers to use organizational productivity, net profit, mission achievement, and the organization's success in maintaining or expanding itself as effectiveness criteria.[2] Koontz and O'Donnell conceptualized organizational effectiveness in terms of an organization being both effective, relative to goal attainment, and efficient, relative to a productivity ratio (output/input).[3] Other writers, such as Kahn, Morse, and Katz, have used morale, commitment to the organization, absenteeism, personnel turnover, and employee satisfaction as criteria.[4]

Georgopoulos and Tannenbaum report that practically all of the above criteria, except productivity, have been found unsatisfactory. For instance, findings that utilize morale and member satisfactions relative to effectiveness have been inconsistent, nonsignificant, or very difficult to interpret. Turnover and absenteeism studies have produced results that are equally difficult to interpret because of believed

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[1]Ibid., pp. 2-3.

[2]Georgopoulos and Tannenbaum, "A Study of Organizational Effectiveness," p. 534.

[3]Harold Koontz and Cyril O'Donnell, Principles of Management, 5th ed., (New York: McGraw-Hill Book Company, 1972), p. 94.

[4]Georgopoulos and Tannenbaum, "A Study of Organizational Effectiveness," p. 534.

interactions with other organizational variables. Profit is considered insufficient since it is keyed only to the financial conditions of the firm and does not include the behavioral aspects. Profit is also tied too closely to fluctuations in the general economy outside the firm, such as markets, sales, and prices.[1]

Koontz and O'Donnell contend there are problems in using the productivity ratio as an effectiveness criterion because of its inability to adequately measure the production inputs and outputs. They cite four specific problems relative to these measurements: (1) Management customarily makes decisions that deal with the future; because of this custom there tends to be a problem of uncertainty about future inputs and outputs; (2) there is often a problem in not having clearly defined goals and without them outputs cannot be accurately measured and knowledge of efficiency becomes impossible; (3) most firms lack the conceptual ability and measuring techniques to adequately evaluate themselves as a total system over time; therefore, there is often a tendency to optimize subsystems or elements without due consideration of the whole system, and subsystem optimization in this manner may create a problem in overall efficiency of the firm; and (4) inputs such as labor and capital cannot easily be shifted from less profitable opportunities to more profitable ones in short periods of time and this restriction creates a problem of resource immobility.[2]

The issue of which concept, criterion, or criteria should be used for measuring performance has not yet been resolved. For the purposes of this study, organization performance is defined, as noted in Chapter I,

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[1]Ibid., p. 535.

[2]Koontz and O'Donnell, Principles of Management, p. 94.

as the degree to which the aerospace contractor organization meets and/or exceeds contract requirements, specifically in the area of technical achievement, overall project management, and cost control. This is the researcher's definition which is based upon the measurement criteria NASA uses for contractor organization performance evaluation in order to determine the amount of award fee earned on cost-plus-award fee contracts.

Theoretical Studies

Gibson, Ivancevich, and Donnelly have developed a conceptual framework which they propose to use in understanding effectiveness in terms of systems theory. (Their systems framework is shown in Figure 4.) They describe the systems theory as follows:

> The organization is viewed as one element of a number of elements which interact interdependently. The flow of inputs and outputs is the basic starting point in the description of the organization. In simplest terms, the organization takes resources (its inputs) from the larger system (its environment), processes these resources, and returns them in changed form (its output).[1]

The above concept is based upon two assumptions: (1) Society expects each organization to use all of its resources efficiently, and (2) organizational survival is dependent upon how well the organization satisfies society. An ineffective organization cannot survive in the long run.[2]

This systems approach suggests two specific considerations: (1) An organization must depend upon its ability to adapt to the demands of its environment, and (2) the total cycle must have management's

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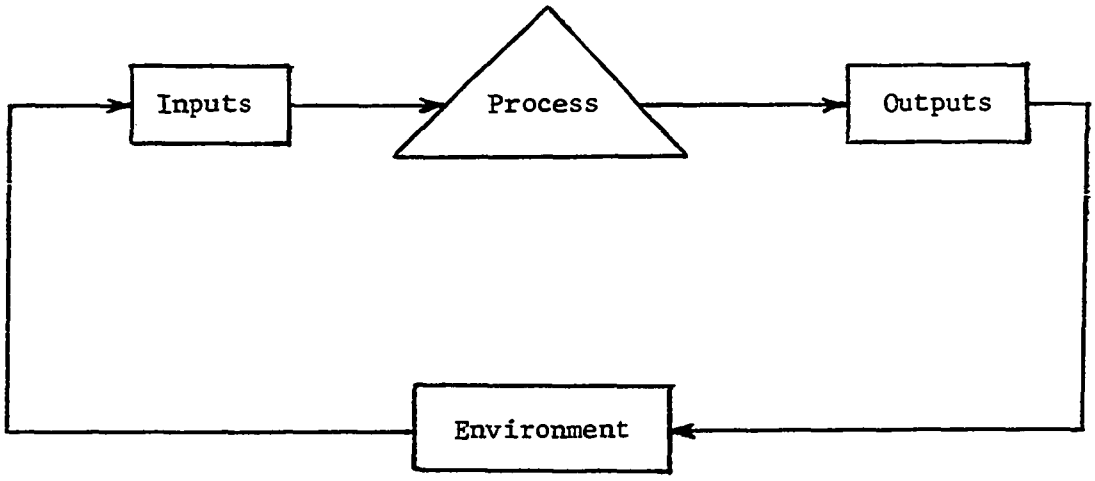
[1]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, p. 22.

[2]Ibid., pp. 22-23.

FIGURE 4

SYSTEMS THEORY FRAMEWORK



SOURCE: James L. Gibson, John M. Ivancevich, and James H. Donnelly, Jr., Organizations: Structure, Processes, Behavior, (Dallas: Business Publications, Inc., 1973), p. 22. Used with permission of Business Publications, Inc.

attention if these demands are met. Gibson et al. conclude that performance criteria must reflect these two considerations and effectiveness must be defined accordingly.[1]

The work of Gross is directly compatible with the above systems approach. He identifies seven activities of an organization that can be used for determining its performance. Each of them can be directed toward maintaining some element of the systems cycle. The seven activities are briefly described and identified with the above system theory elements as follows:

1. Acquiring resources - This is the first step in the system cycle and is applicable to the acquisition of people, money, and machines.

2. Making efficient use of inputs relative to outputs - This activity is associated with the system process element and relates to the proper mixing of inputs in order to achieve the highest efficiency in the system.

3. Producing outputs of services or goods - This activity is associated with the system output element and relates to maintaining the appropriate marketing mix, supplies, and scheduling.

4. Performing technical and administrative tasks rationally - This activity is associated with all the system elements as well as the system's adaptation to its environment. The activity is related to the methods used in attaining the organizational objectives.

5. Investing in the organization - This activity is associated with the system inputs relative to the allocation of current input resources for investment in future capability.

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[1]Ibid., p. 23.

6. Conforming to codes of behavior - This activity is associated with the system environment relative to laws, morals, and the ethical codes of society.

7. Satisfying the varying interests of groups and people - This activity is associated with all of the system elements and is related to the interests of the organization's employees, customers, and investors.[1]

Others contributing theoretical studies on organizational effectiveness include Price, Seiler, and Caplow. Table 5 identifies their effectiveness criteria and shows a direct comparison with that developed by Gross.

Price performed a comparative analysis of 50 previous studies to determine "what we really know, what we nearly know, what we think we know, and what we claim we know about the effectiveness of organizations."[2] He concludes that effectiveness is a single dependent variable that was determined from five different causal variables (economic system, internal and external political system, control system, population, and ecology) and five different effectiveness criteria or intervening variables (productivity, conformity, morale, adaptiveness, and institutionalization) as shown in Table 5. The single dependent variable was the degree of goal achievement. He suggests that productivity is more closely related to effectiveness than the other four intervening variables.[3]

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[1]Ibid., pp. 25-26. See also Betram Gross, "What Are Your Organization's Objectives? A General Systems Approach to Planning," Human Relations 18 (August 1965):195-215.

[2]Price, Organizational Effectiveness: An Inventory of Propositions, p. 1.

[3]Ibid., pp. 1-5.

TABLE 5

THE RELATIONSHIPS AMONG FOUR LISTS OF EFFECTIVENESS CRITERIA

Author	Effectiveness Criteria						
Gross	Acquiring resources	Operating efficiently	Producing outputs	Behaving rationally	Observing codes	Investing in the organization	Satisfying interests
Price	Productivity Institutionalization	Productivity	Productivity	Adaptiveness	Morale Conformity Adaptiveness Institutionalization	Institutionalization	Morale Adaptiveness Institutionalization
Seiler	Productivity	Productivity	Productivity	Productivity	Satisfaction	Development	Satisfaction
Caplow	Stability	Stability	Achievement	Stability	Integration	Stability Integration Voluntarism	Voluntarism

SOURCE: James L. Gibson, John M. Ivancevich, and James H. Donnelly, Jr., Organizations: Structure, Processes, Behavior, (Dallas: Business Publications, Inc., 1973), p. 32. Used with permission of Business Publications, Inc.

Seiler's theoretical study is also compatible with the Gibson et al. systems theory, although it is much more abstract. He viewed the process element only in behavioral terms and limited the outputs to only three effectiveness criteria (productivity, satisfaction, and development) as shown in Table 5.[1]

Caplow attempted to develop a single theoretical model that could be used to analyze any organization by using only four measuring variables (stability, achievement, integration, and voluntarism) as shown in Table 5. Although rough and incomplete, Caplow's model reflects the necessity for adapting to the environment and is, therefore, compatible with Gibson et al. systems theory.[2]

The Yuchtman and Seashore systems resource approach is also compatible with the systems theory. This approach includes (1) utilizing a systems model which emphasizes the distinctiveness of the organization as an identifiable social structure, (2) emphasizing the relationship between the organization and its environment plus its bargaining position, and (3) considering all organization performance factors together over a period of time and not for only one goal at a specific point in time.[3]

Based on the theoretical studies, it is obvious there is inconsistency in the terminology of measurements. However, the systems approach attempts to focus on the total complexity of the situation. It

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[1]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, pp. 29-30. See also John A. Seiler, Systems Analysis in Organizational Behavior, (Homewood, Illinois: Richard D. Irwin, Inc., and The Dorsey Press, 1967).

[2]Ibid., p. 30. See also Theodore Caplow, Principles of Organization, (New York: Harcourt, Brace, and World, 1964).

[3]Ephraim Yuchtman and Stanley E. Seashore, "A System Resource Approach to Organizational Effectiveness," American Sociological Review 32 (1967):377-395.

also provides a way to compare the works of different researchers as Gibson et al. have done in Table 5.

The approach NASA uses for measuring organizational performance can also be related to the systems theory approach. The three performance criteria, technical achievement, overall project management, and cost control, which the researcher identified in the previous definition of performance have multiple subcriteria under each one. Subcriteria within overall project management and cost control are related to the system inputs because they relate to the number, skill-mix, and utilization of people as well as the budgets for accomplishing the work. The interaction of project management and cost control criteria is associated with the system process variable. The technical achievement and project management criteria are associated with the system outputs. All three criteria are associated with the environment the firm is experiencing, which might influence the availability of the proper people, money, and machinery, as well as influence the management approach and outputs.

Based upon these identified relationships of the NASA performance criteria to elements of the systems theory framework, the researcher added NASA to the listing of effectiveness criteria previously shown in Table 5. These comparisons are shown in Table 6. Since project management is defined as the responsiveness to program requirements and effectiveness of overall project planning and implementation, it logically belongs under each criterion. The three NASA criteria do not apparently have a one-to-one relationship to any of the other criteria listed in Table 6.

Research Studies

As evidenced by the theoretical studies, there is a lack of

TABLE 6

EFFECTIVENESS CRITERIA COMPARISONS

Author	Effectiveness Criteria						
Gross	Acquiring resources	Operating efficiently	Producing outputs	Behaving rationally	Observing codes	Investing in the organization	Satisfying interests
Price	Productivity Institution-alization	Productivity	Productivity	Adaptiveness	Morale Conformity Adaptiveness Institution-alization	Institution-alization	Morale Adaptive-ness Institu-tionali-zation
Seiler	Productivity	Productivity	Productivity	Productivity	Satisfaction	Development	Satisfac-tion
Caplow	Stability	Stability	Achievement	Stability	Integration	Stability Integration Voluntarism	Voluntar-ism
NASA	Project management Cost control	Project management Cost control	Technical achievement Project management	Technical achievement Project management Cost control	Technical achievement Project management Cost control	Project management Cost control	Technical achieve-ment Project management Cost control

consistency on effectiveness criteria. When reviewing research studies, the situation does not improve. Each researcher has tended to develop his own criteria.

The Georgopoulos and Tannenbaum view that any effectiveness criterion chosen should be system-relevant and applicable across organizations is also compatible with the Gibson et al. systems theory. Georgopoulos and Tannenbaum found that effectiveness was directly related to productivity and flexibility and inversely related to strain.[1] Productivity was viewed as the efficiency ratio, the familiar output/input concept, which can be related directly to Gross's concept of operating efficiency; flexibility was conceptualized to be the organization's ability to react and adjust to changes, which is equivalent to Price's concept of adaptability and Gross's concept of observing codes and satisfying interests; and strain was the degree of tension and conflict perceived among the employees, which is related to Caplow's integration, Seiler's satisfaction, and Price's morale.[2] In the Georgopoulos and Tannenbaum study, effectiveness was measured in two ways: (1) by actual productivity data relative to established work standards, and (2) by combining and averaging the ratings of overall performance for the preceding six months by outside management experts that were familiar with the work of each operating station.[3]

Mott attempted to expand the research of Georgopoulos and Tannenbaum. There were two basic differences in his research: (1) All

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[1]Georgopoulos and Tannenbaum, "A Study of Organizational Effectiveness," pp. 534-539.

[2]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, p. 33.

[3]Ibid.

effectiveness measures were as perceived by the employees and no external experts were used, and (2) effectiveness at different hierarchical levels of the organization was measured with a survey questionnaire. He proposed that organizational effectiveness be viewed in terms of three factors: (1) productivity, (2) adaptability, and (3) flexibility. He found effectiveness positively related to all three factors.[1]

Gibson et al. have questioned the validity of Mott's productivity measurement methods. Perceptions of productivity may not be as accurate as more objective "hard" data. Productivity, in the Mott study, is again related to the efficiency ratio, output/input, even though "hard" data are not used. Adaptability is the term used to determine how quickly employees accept new methods and procedures. Adaptability is related to Caplow's concept of integration. Flexibility is the term that was used to determine how well people in the organization could adjust to emergency situations such as accelerated work schedules. Flexibility, as used by Mott, is very similar to the term Price called adaptiveness.[2]

Friedlander and Pickle explored the concept of total organizational effectiveness by reviewing the relationships between internal and external system effectiveness in 97 small business organizations. By studying these interrelationships, they concluded that managers of small firms found it very difficult to achieve a balanced relationship between all the necessary component elements. The criteria for the evaluation consisted of the societal component or external system and the employee component or internal system as shown in Table 7. The relationships

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[1]Mott, The Characteristics of Effective Organizations, pp. 17-35.

[2]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, p. 35.

TABLE 7

FRIEDLANDER AND PICKLE EFFECTIVENESS CRITERIA

External System	Internal System
Community	Satisfaction with working conditions
Government	Satisfaction with financial rewards
Customers	Confidence in management
Suppliers	Opinion about immediate supervisor
Creditors	Satisfaction with self-development

SOURCE: Frank Friedlander and Hal Pickle, "Components of Effectiveness in Small Organizations," Administrative Science Quarterly 13 (September 1968):295-297.

between external and internal criteria of organizational effectiveness were found to be very weak. Likewise, no definite patterns of relationship could be found among the external components of the organizational system.[1]

Friedlander and Pickle did not attempt to measure overall effectiveness but rather sought only to discover the interrelationship between their external and internal system criteria in an ongoing small business. They assumed that overall effectiveness included the degree to which the firm was profitable, satisfied its employees, and was valued by society. In this respect, their study is considered to be consistent with the theoretical systems theory.[2]

In one detailed study, each of 283 business managers was asked to apply his own concept of organizational effectiveness. The descriptions of these organizations were then factor analyzed and summarized into 24 basic dimensions, seven of which were rather highly related. Using a multiple regression model and weights of relative importance that the managers assigned to each dimension, the list of effectiveness criteria was narrowed to seven items. Listed in order of importance, they are (1) performance-support-utilization, (2) planning, (3) reliability, (4) initiation, (5) development, (6) staffing, and (7) cooperation.[3]

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[1]Frank Friedlander and Hal Pickle, "Components of Effectiveness in Small Organizations," Administrative Science Quarterly 13 (September 1968):289-304.

[2]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, pp. 35-36.

[3]Thomas A. Mahoney, "Managerial Perceptions of Organizational Effectiveness," Management Science 14 (October 1967):B76-B91.

Mahoney states that his studies suggest that managers tend to base their judgements of effectiveness upon perceptions of relatively few dimensions, and perhaps one to five is adequate. No single list of criteria can be identified as appropriate for all situations. It was concluded that supervisory style and employee attitudes were found to contribute to organizational reliability and initiative which in turn contribute to the level of productivity.[1]

Mahoney and Weitzel argue that productive performance is the basic criterion of organizational effectiveness in general types of businesses. This performance is directly related to the degree to which organizations can cope with emergencies and still attain their primary goals. Other more independent criteria of effectiveness appear to be the degree of initiation of new ideas and the degree of employee's reliability to accomplish their assigned functions without continuous supervision.[2]

With the above general business data, Mahoney and Weitzel collected and analyzed data from four research and development (R and D) companies for comparison. The linear multiple regression model that Mahoney had developed in his earlier study was used to analyze the data within his 24 basic dimensions. In this R and D study, the 24 basic dimensions were narrowed to six, which differed from the seven Mahoney previously identified in the general business study. These six new effectiveness dimensions in order of importance were found to be (1) reliable performance, (2) cooperation, (3) development of skills,

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[1]Ibid., p. B88.

[2]Thomas A. Mahoney and William Weitzel, "Managerial Models of Organizational Effectiveness," Administrative Science Quarterly 14 (September 1969):360.

(4) turnover from inability to do the job, (5) employee selectivity, and (6) flexibility - readiness to try new ideas.[1] This different list and ranking of effectiveness criteria for R and D as opposed to general business were explained in terms of a different hierarchical complex which is compared in Table 8. These differences in criteria ordering were considered to be based upon each industry's having a different concept of long range criteria and a different work environment.[2]

The work of Mahoney appears to be compatible with the Gibson et al. systems theory since he does address overall effectiveness in terms of productivity, flexibility, and adaptability with definitions which appear compatible with those provided by Mott.

Mott has suggested that technology should be viewed as an important causal variable relative to organizational behavior and effectiveness. Mahoney and Frost attempted to test this relationship using J. D. Thompson's typology of technology (long-linked or serially independent, mediating, and intensive or custom technology). Utilizing data from 297 organizations, the hypothesis that organizational effectiveness varies with the dominant technology of the organization was tested. Regression analysis techniques revealed the following results: (1) In long-linked technology the predominant criteria of effectiveness were planning, output performance, and reliability of performance; (2) in mediating technology the predominant criterion of effectiveness was flexibility; and (3) in intensive technology the predominant criteria were output performance, cooperation, and quality of the staff. Using technology as the main effect in an analysis of variance model, "no statistically

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[1]Ibid., p. 361.

[2]Ibid., pp. 362-363.

TABLE 8

BUSINESS HIERARCHICAL COMPLEX
CRITERIA RELATIONSHIPS

High-order Criteria		Low-order Criteria	
General Business	R and D	General Business	R and D
Productivity	Cooperative behavior	Leadership style	Efficiency
Planning	Staff development	Organizational climate	Productivity
Initiation	Reliable performance	Capacity for performance	Output behavior
Reliable performance			

SOURCE: Thomas A. Mahoney and William Weitzel, "Managerial Models of Organizational Effectiveness," Administrative Science Quarterly 14 (September 1969):362-363.

significant relationship was observed between technology and organizational effectiveness."[1] The researchers suggested that, even though their results were not fully conclusive, some performance dimensions do vary according to the dominant technology of the organization.

Seashore and Yuchtman studied the annual performance records of 75 insurance agencies that spanned a period of eleven years. Using factorial analysis, they attempted to discover the factorial elements, initially presumed to be goals, that characterize the behavior of small business organizations. An initial listing of 76 performance variables was reduced to ten major factors. These factors are (1) business volume, (2) production costs, (3) new member productivity, (4) youthfulness of members, (5) business mix, (6) manpower growth, (7) management emphasis, (8) maintenance cost, (9) member productivity, and (10) market penetration. Over a span of ten years, only factors (1), (5), and (10) remained relatively stable because they represent cumulative performances. The other factors were more cyclic in nature. Further analysis revealed one common denominator, which was "the acquisition of resources for organizational functioning from the organization's environment."[2] This is in consonance with their view of effectiveness as being "the relative bargaining position of organizations in relation to resources over which there is competition."[3] The Seashore and Yuchtman study is also

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[1]Thomas A. Mahoney and Peter J. Frost, "The Role of Technology in Models of Organizational Effectiveness," in Academy of Management Proceedings, ed. Vance F. Mitchell, Richard T. Barth, and Francis H. Mitchell, 32nd Annual Meeting, (Minneapolis, Minnesota, August 13-16 1972), p. 76.

[2]Stanley E. Seashore and Ephriam Yuchtman, "Factorial Analysis of Organizational Performance," Administrative Science Quarterly 12 (December 1967):392.

[3]Ibid., p. 393.

consistent with the Gibson et al. systems concept of analyzing effectiveness since it has considered the environmental aspects of overall performance.[1]

To summarize the research studies, there is further evidence that measurement terminology or effectiveness criteria are whatever the researcher decides they should be. But regardless of the specific terminology used, there appears to be a thread of commonality in that they each can be related to the Gibson et al. systems theory. This provides some comparative value to them which, as Price has suggested, is essential.[2]

Performance and Effectiveness Relationship

As pointed out in the Introduction to this study, the researcher recognizes that the relationship among organizational performance, as defined in this research, systems concepts, and criteria of effectiveness has not been clearly established. There appears to be, however, an intuitive relationship.

Likert discussed increased performance, productivity, and effectiveness somewhat synonymously. Mott, in his discussion on organizational effectiveness, referred to effective performance and actions of leaders that made considerable difference in performance, but the specific relationship was avoided. Seashore and Yuchtman's work in factor analyzing organizational performance data conceptualized performance relative to goal achievement in much the same way as Price defined effectiveness.

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[1]Ibid.

[2]Price, Organizational Effectiveness: An Inventory of Propositions, p. 5.

As discussed previously, several researchers have elaborated upon the difficulty of determining the appropriate dimensions of effectiveness and the problems associated with obtaining accurate measurements. In this respect, Mahoney found that performance was the most important of seven basic criteria of effectiveness. Georgopoulos and Tannenbaum utilized judges to rate overall performance of the organization. Georgopoulos stated "organizational effectiveness was selected as the dependent variable . . . because it represents total station performance."[1] In this context, he defined effectiveness as "the extent to which an organization/station accomplishes its objectives, without incapacitating its resources and without placing its members in undue strain. It was measured in two ways: (1) by averaging actual worker productivity figures, . . ., and (2) . . . ratings given to each station by several judges who evaluated its overall performance."[2] Later, in the same article, Georgopoulos stated, "station performance, or organizational effectiveness measured in terms of productivity figures and management ratings, ..."[3] When Gibson et al. referred to the Georgopoulos and Tannenbaum study, they stated, "overall station effectiveness was measured by asking a panel of experts to rate each . . . ."[4] Therefore, there appears to be a great deal of freedom in using the terms effectiveness and performance interchangeably in the literature.

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[1]Basil S. Georgopoulos, "Normative Structure Variables and Organizational Behavior," Human Relations 18, No. 7 (May 1965):160.

[2]Ibid.

[3]Ibid., p. 168.

[4]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, p. 33.

Gibson et al. stated that society views effectiveness as "the extent to which an organization achieves its objectives within the constraints of limited resources."[1] An organization is also efficient if it maximizes its objectives with the minimum use of resources. However, Gibson et al. cited examples where organizations are very effective in terms of achieving their objectives of maximizing profits while at the same time very inefficient in their use of resources. From these examples, they concluded that "(1) goal achievement is a necessary condition for effective performance, and (2) efficient use of resources is a necessary, but insufficient, condition for effectiveness."[2] Therefore, goal achievement and efficiency are viewed as primary elements in the measurement of performance.

Organizational performance was primarily looked at in terms of goal achievement and efficiency in the short-run in this study. The length of the aerospace contracts are usually short-run, less than five years. During this contract period, NASA placed emphasis on goal achievement, meeting and exceeding the contract requirements. Efficiency was measured in terms of resources utilized, manpower and funding, to accomplish the contract objectives. From this standpoint, the organization's short-term performance may improve but at the expense of long-term effectiveness. A demand for unreasonable, uncompensated overtime, for instance, to meet a schedule that would earn the organization extra award fee for a particular performance evaluation period might reduce the

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[1] Ibid., p. 20.

[2] Ibid., p. 21.

organization's long-run ability to perform effectively. Likert called this condition "watered" earnings while liquidating the organization.[1] A negative relationship between short-run performance and long-term effectiveness may develop if this condition persists.

This study focuses on performance only in the short-run where NASA developed surrogates were used as measurement criteria. These NASA surrogates do not provide the means for an overall systematic evaluation of an organization's long-run effectiveness in terms of input, throughput, and output variables. These surrogates are, however, the only ones available to the researcher. Their validity and reliability have been mutually satisfactory to both NASA and the aerospace contractors for over ten years.

Summary and Conclusion

To conclude this review on organizational performance, there is considerable evidence that it is a very important concept. As Mahoney and Weitzel stated, "the concepts of organizational effectiveness are the basis of theories of management and organization behavior and provide rationale for normative theories of organization behavior and management practice."[2] However, there is little consensus on specific effectiveness criteria. Utilization of the Gibson et al. systems concept does make it possible to compare many different research activities even though there are various effectiveness measures in use.

An overall measurement of organizational performance, as used by Georgopoulos and Tannenbaum, is considered the "global" concept. Gibson

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[1]Likert, The Human Organization, p. 96.

[2]Mahoney and Weitzel, "Managerial Models of Organizational Effectiveness," p. 357.

et al. state that the "global" concept includes a number of different "component" concepts.[1] Agreeing on what these components should be is again back to establishing the specific multivariate measurement criterion. From this review, it appears that most researchers subscribe to the multivariate approach. This approach is what Mahoney has called the mid-range criteria which can provide a basis for comparative assessment of on-going organizations.[2]

It is recognized that the specific performance criteria selected for this study do not measure some of the components identified in some of the research reviewed in this section, such as morale, creativeness, adaptability, flexibility, and tension. However, the researcher is using a multivariate performance measurement that has been in use for several years and the only one available for this research. The details of this measurement will be discussed in the next chapter.

Technology, as an effectiveness criterion, as suggested by Mott, is not being used as one of the variables in this research. First, as noted earlier, Mahoney and Frost found no statistically significant relationship between technology and effectiveness. Second, technology is assumed to be equally high and not measurably different in the organizations being investigated. Additionally, any differences between organizations tend to be equalized in the performance measurement process, which will be discussed in the next chapter.

From the total literature review, it is concluded that each major variable identified in the research model (management system,

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[1]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, p. 357.

[2]Mahoney, "Managerial Perceptions of Organizational Effectiveness," p. B77.

organizational climate, and organizational performance) is an important element in organizational behavior and is deserving of further research. The inconclusive and conflicting results found in many of the multivariable studies are good examples of why further research of the relationships reflected in the Gibson et al. integrative systems model is needed.

CHAPTER III

RESEARCH METHODOLOGY

Introduction

The purpose of this chapter is to describe the overall research plan and strategy. There are four major sections. The first section explains the research design, methodology, and instrumentation; the second describes the research setting, organization sample, and characteristics of the sample organization; the third reviews the data collection and analysis, and the fourth discusses some of the research constraints and limitations.

Research Design

The research design is the plan, structure, and strategy of an investigation to obtain answers to research questions. The plan is the overall scheme. The structure is the guiding model relative to the operation of the variables under test. Strategy is the methods used to collect and analyze the data.[1]

There are four different categories of social scientific research: (1) laboratory experiment, (2) field experiment, (3) field study, and (4) survey research. A laboratory experiment is research in a controlled environment where the investigator manipulates and controls one or more

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[1]Fred N. Kerlinger, Foundations of Behavioral Research, 2nd ed., (New York: Holt, Rinehart and Winston, Inc., 1973), p. 300.

independent variables. A field experiment is like the laboratory experiment except that it is conducted in a more realistic work situation. Field studies are ex post facto investigations into the relationships and interactions among variables in real social structures. Survey research is a method for studying populations by the selection of samples from that population to discover the relative incidence, distribution, and interrelationships of specific variables.[1]

The field study was selected for this research because it is an ex post facto study that did not involve any planned manipulation of variables. The experimental approach was not feasible because it is difficult to receive the cooperation of ongoing organizations to permit a manipulation of variables. It is also virtually impossible to control exogenous variables in an ongoing organization.

Field studies can be divided into two categories: (1) exploratory, and (2) hypothesis-testing. Exploratory research seeks to determine what is rather than predicting relations to be found. Exploratory research is used to (1) discover significant variables in a field situation, (2) discover relations among variables, and (3) lay the groundwork for more systematic and rigorous hypothesis testing in the future.[2] This research is considered exploratory because its objective is to discover relationships among specific variables.

There are three primary methods used in conducting exploratory research: (1) literature survey, (2) case study, and (3) survey within a population.[3] The survey method has been selected for this research

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[1]Ibid., pp. 395-410.

[2]Ibid., p. 406.

[3]Claire Selltiz, Marie Jahoda, Morton Deutsch, and Stuart W. Cook,

because, considering the objectives, it appeared to be the only practical approach to determine the variable relationships under study in multiple ongoing organizations.

Methodology

The survey approach is a method of studying populations by selecting and studying samples chosen from that population or sample space.[1] This study was concerned with three sample spaces. The first sample space was that of organizations in the aerospace industry. The second sample space was that of aerospace organizations that had an active cost-plus-award fee contract with a specific NASA Field Center. The third sample space was that of employees within the sample organizations.

A survey may be conducted in several different ways: (1) personal interview, (2) mail questionnaire, (3) panel discussion, (4) telephone, and (5) controlled observation.[2] The method that seemed most appropriate to obtain suitable data for this research was the mail questionnaire. This method was chosen primarily to preserve confidentiality and anonymity. First, the organizations surveyed agreed to participate only if their anonymity was maintained. Second, as a NASA employee, the researcher could not very well represent himself as an impartial researcher from a university.

Kerlinger warns that mail questionnaires have at least two serious drawbacks. First, responses are usually poor. A return rate of 40 to 50

Research Methods in Social Relations, (New York: Holt, Rinehart, and Winston, 1959), p. 53.

[1] Kerlinger, Foundations of Behavioral Research, p. 410.

[2] Ibid., p. 412.

percent is common. Second, there is usually an inability to check the responses obtained.[1] The researcher recognized these deficiencies, but the constraint of confidentiality and anonymity prevailed. Efforts were made to encourage response by addressing the questionnaire directly to the employee by name via a transmittal letter and asking that it be signed and returned to the company designated research coordinator upon mailing the questionnaire. Additionally, each employee was asked not to identify himself on the questionnaire since strict anonymity would be reserved. No follow-up action was attempted and no returned questionnaire was made available to any one other than the researcher.

Whyte concluded that mail questionnaires are very useful for gathering information on internally held psychological factors.[2] Since this study was concerned with organization members' perceptions, which are internally held psychological factors, the mail questionnaire type of test instrumentation appeared to be appropriate for gathering the data for this study.

Instrumentation

To conduct comprehensive and meaningful research, it is a truism that conclusions are only as valid as the data being analyzed. Therefore, as an insurance factor for collecting valid data, only professionally developed, tried and tested, test instruments were utilized in this research. Two basic instruments that have been developed by other experienced researchers were selected for collecting the management system

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[1]Ibid., p. 414.

[2]William F. Whyte, Organizational Behavior: Theory and Application, (Homewood, Illinois: Richard D. Irwin, 1969), p. 48.

and organizational climate data. The organizational performance data were obtained directly from NASA as "hard" data which have been used for determining the amount of earned award fee on incentive contracts. Each of the test instruments and method of obtaining the performance data will be discussed separately in this section.

Management system test instrument

From the literature review, it is evident that the work to develop a management system test instrument for use in measuring the variables identified for this research has been concentrated at the Institute for Social Research at the University of Michigan. The only other similar effort that could be found in the literature was that of House and Rizzo.[1]

House and Rizzo constructed an Organization Description Questionnaire (ODQ) to measure organization practices and effectiveness of organization subunits. The ODQ was based on data collected from 65 interviews with managerial and professional employees in a large, heavy equipment manufacturing firm, plus statements derived from current research literature. It contained 144 questions and 27 variables, 19 climate and 8 criterion.[2] These variables are shown in Table 9.

After the ODQ was developed from the interview data, it was then administered to 290 people in the same organization. The data were subjected to a discriminant validity test as described by Campbell and Fiske.[3]

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[1]Robert J. House and John R. Rizzo, "Toward The Measurement of Organizational Practices: Scale Development and Validation," Journal of Applied Psychology 56, No. 5 (1972):388.

[2]Ibid.

[3]Ibid., p. 392. See also D. T. Campbell and D. W. Fiske, "Convergent and Discriminatory Validation by the Multitrait-Multimethod Matrix," Psychological Bulletin 56 (1959):81-105.

TABLE 9

HOUSE AND RIZZO ORGANIZATION DESCRIPTION
QUESTIONNAIRE VARIABLES

Climate	Criterion
Conflict and inconsistency	Role conflict
Decision timeliness	Role clarity
Emphasis on analytic method	Satisfaction with advancement
Emphasis on personal development	Leader initiating structure
Formalization	Leader tolerance of freedom
Goal consensus and clarity	Leader consideration
Communication adequacy	Leader production emphasis
Information distortion and suppression	Leader predictive accuracy
Job pressure	
Adequacy of planning	
Smoothness of horizontal communication	
Selection on ability and performance	
Tolerance of error	
Top management receptiveness	
Upward information requirements	
Violations in chain of command	
Work flow coordination	
Adaptability	
Adequacy of authority	

SOURCE: Robert J. House and John R. Rizzo, "Toward The Measurement of Organizational Practices: Scale Development and Validation," Journal of Applied Psychology 56, No. 5 (1972):390.

Five scales failed to achieve adequate significance because the inter-scale consistency correlations were too low. Only eight of the climate scales were paired with the criterion scales and tested. Therefore, the total validity of the instrument was not tested. House and Rizzo concluded that "perhaps the most significant aspect of the study concerns the increased probability that organizational variables are measurable and that such measures have some claim to validity in a natural setting."[1] Because of the problems associated with this instrument, it was not selected.

As stated in Chapter II, the management system concept was an outgrowth of many studies conducted at the Institute for Social Research under the direction of Rensis Likert. A series of related studies was conducted in an attempt to discover the organizational principles, methods of leadership, and managerial styles which would result in the best organizational performance. Most of these studies measured and examined the different types of leadership and other related variables used by the high performing organizations in contrast to the lower performing organizations.[2] Over several years the measuring instruments were formulated and refined. Based upon research data on small groups and upon data from studies showing what the highest producing managers do and what kinds of organizations they develop, Likert published his first management system test instrument in 1961.[3]

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[1]Ibid., p. 396.

[2]Likert, New Patterns of Management, p. 5.

[3]Ibid., pp. 222-235.

Likert continued to refine the test instrument by deleting the management system headings at the top of the instrument, rewording the questions, adding new questions, and reversing the order of scoring on some of the questions. This new form was administered to three different groups of managers, each group from a different type of industry. The corrected split-half reliability coefficients, using the Spearman-Brown formula, for each set of data were +0.90, +0.97, and +0.98.[1] These data mean that a high correlation existed between each question and the total score which meets Likert's requirement for an instrument that would focus upon the characteristics of a single management system. Likert contends that data from 115 studies showed a corrected split-half reliability coefficient of +0.98. Additionally, when the data were factor analyzed, only one dominant factor emerged, which was his original intent. This high correlation between the question scores and the total score was intended because Likert had found that respondents generally display a very consistent pattern on all the organizational variables when describing their organizations.[2]

The conceptual construct of the management system variable requires that every component part of a particular management system must fit well with all of the other parts so that all of them can function effectively. If each management system is to have its own integrity, it must be compatible within all of its dimensions. It was for the above reasons that Likert was insistent upon developing a test instrument that would

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[1]Likert, The Human Organization, pp. 118-122. The Spearman-Brown formula for estimating reliability from two comparable halves of a test is discussed by Henry Garrett and R. S. Woodworth, in Statistics In Psychology and Education, (New York: David McKay Company, Inc., 1966), pp. 339-340.

[2]Ibid., pp. 116-117.

be capable of measuring a consistent management system pattern within an organization.[1]

Butterfield and Farris used the Likert test instrument in shortened form (20 item-Form S) to measure the organizational characteristics of a Brazilian bank organization. These writers contended that, despite widespread use of the Likert test instrument, it had not been subjected to a rigid analysis relative to its use as a measuring instrument. Using the results from the bank study, they performed a methodological analysis of Form S. Form S was designed to measure six organizational processes: (1) leadership, (2) motivation, (3) communication, (4) decision making, (5) goal setting, and (6) control. Factor analysis of the bank study data, with varimax rotation for the six factors, showed leadership to be a predominant first factor. The remaining five factors were thought to be a mixture of the remaining processes. The researchers identified them as resistance, guidance, informed decision making, dispersion of goal setting and control measures, and motivation and communication. The test-retest reliability of the Form S was determined to be 0.52 over a six-to eighteen-month period, utilizing 13 bank participants. Butterfield and Farris indicated that actual management system changes over this period contributed to this relatively moderate correlation. They agreed that use of the Likert test instrument appeared to be quite legitimate for measuring an organization's management system.[2]

Some of the other researchers who have used the Likert Profile of Organizational Characteristics test instrument include Marrow, Bowers,

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[1]Ibid., p. 123.

[2]Butterfield and Farris, "The Likert Organizational Profile: Methodological Analysis and Test of System 4 Theory in Brazil," pp. 15-23.

Seashore, Golembiewski, Kavcic, Rus, Tannenbaum, Carrigan, Blumberg, and Wiener.[1] They have viewed it as a valid test instrument for measuring organizational management systems. Since it has been thoroughly validated, appears to be sufficiently reliable, and has been widely used by other researchers, the Likert management system test instrument was selected for use in this research.

Likert test instrument

This section will describe the management system test instrument and explain how it was scored in this study.

The test instrument has 51 questions divided into the eight organizational variables previously described in Chapter II. It measures the extent to which employees perceive their organization on the System 1 to 4 continua. The median of the employee responses for each question is calculated and plotted along the continua that describe the eight organizational variable processes.[2]

The degree of utilization or perception of these processes in an organization can be checked at any point along a 20-point scale divided into four sections, each section representing one of the four management systems. An example of this arrangement, using the management system headings and one question, is shown in Figure 5.

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[1]Marrow, Bowers, and Seashore, Management by Participation; Robert T. Golembiewski and Stokes B. Carrigan, "Planned Change Through Laboratory Methods," Training and Development Journal 17, No. 3 (March 1973):18-27; Kavcic, Rus, and Tannenbaum, "Control, Participation, and Effectiveness in Four Yogoslav Industrial Organizations," pp. 74-86; A. Blumberg and W. Wiener, "One From Two: Facilitating an Organizational Merger," Journal of Applied Behavioral Science 7 (1971):87-102.

[2]Likert, The Human Organization, pp. 3-28.

FIGURE 5

MANAGEMENT SYSTEM TEST INSTRUMENT SCALES

Organizational Variable	System 1	System 2	System 3	System 4
Direction of Information Flow	Downward	Mostly Downward	Down and up	Down, up, and with peers
	1 2 3 4 5	6 7 8 9 10	11 12 13 14 15	16 17 18 19 20

SOURCE: Rensis Likert, The Human Organization, (New York: McGraw-Hill Book Company, 1967), p. 201.

The test instrument is further subdivided into eight sections, one for each of the eight organizational variables. Each variable has a series of questions associated with it. The identification of these eight variables and the number of questions under each are shown in Table 10.

As shown in Figure 5, the score on each question can range from 1 to 20. The median value of each participant's scores on the questions within each variable, identified in Table 10, was used as the individual variable score. These individual variable scores were used in the management system and organizational climate statistical correlation tests. This appeared to be the most appropriate method for correlating what the researcher considered to be ordinal data at the individual level. However, where the individual variable scores had to be further consolidated to determine the organization's variable scores, it was necessary to use the mean value of each participant's scores on the questions within each variable to avoid using the median of median values. Some researchers have stated that medians should not be subjected to further statistical analysis and recommend using mean scores where additional consolidations are required.[1] In this case, the mean value of each participant's scores on the questions within each variable was used as the individual variable score. The mean value of these previously determined eight variable mean scores was then used as the surrogate management system score for each organization. This surrogate management

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[1]Joan Welkowitz, Robert B. Ewen, and Jacob Cohen, Introductory Statistics for the Behavioral Sciences, (New York: Academic Press, 1971), p. 44.

TABLE 10

LIKERT TEST INSTRUMENT VARIABLES

Organizational Variable	Number of Questions
Leadership process	5
Motivational forces	7
Communication process	14
Interaction-influence process	6
Decision-making process	8
Goal setting	3
Control process	5
Performance goals	3

SOURCE: Rensis Likert, The Human Organization, (New York: McGraw-Hill Book Company, 1967), pp. 197-211.

system score can range from 1.0 to 4.99, and is calculated with the following equation:

Management system score = (mean value X 4/20) + 1.0.[1]

1. System 1 (exploitive authoritative) = 1.0 - 1.99
2. System 2 (benevolent authoritative) = 2.0 - 2.99
3. System 3 (consultative) = 3.0 - 3.99
4. System 4 (participative group) = 4.0 - 4.99

This method of using mean values to calculate the variable, organization, and management system scores was used by Likert.[2] This method was selected for this study so that the management system scores would be directly comparable to those presented by Likert and also to avoid the compound use of medians which some researchers contend are meaningless values.[3]

In this research the eight management system variable scores and the surrogate management system score were calculated for each of the seven organizations and compared.

To summarize the management system test instrumentation section, the Likert test instrument appeared to be the most appropriate for this research. Widely accepted, it has been used extensively to measure organizational variables. The median value of each participant's scores on the questions within each variable was used as the individual variable score in the management system and organizational climate statistical correlation tests. The mean value of the eight variable scores has

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[1]Likert, The Human Organization, p. 36.

[2]Ibid.

[3]Welkowitz, Ewen, and Cohen, Introductory Statistics for the Behavioral Sciences, p. 44.

been used to summarize the overall organizational processes into a surrogate management system score which is desirable in this research.

This test instrument is very appropriate for this study for several reasons. First, it was developed by an experienced behavioral researcher, Dr. Likert, while he was Director of the University of Michigan's Institute for Social Research. Second, it was based on data collected from many different firms and industries. Third, it has been extensively used for approximately 15 years. Finally, there are extraordinarily high intercorrelations between each item and the total score.

A copy of the management system test instrument may be found in appendix III.

Organizational climate test instrument

The literature review reveals that there has been considerable effort devoted to developing test instruments that could measure the climate characteristics of an organization. Halpin and Croft have perhaps the most popular one for measuring the climate of public school organizations. Their instrument has been modified by others such as Margulies for special situations.[1] Other test instruments were separately developed by (1) Campbell and Pritchard, (2) Litwin and Stringer, (3) Schneider and Bartlett, (4) Payne and Pheysey, revised by Payne and Mansfield, and (5) Lawler, Hall, and Oldham.[2]

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[1]Newton Margulies, "A Study of Organizational Culture and the Self-Actualizing Process," (Ph.D. dissertation, University of California, 1965), p. 75.

[2]Karasick, "Organizational Climate and Its Relationship to Managerial Behavior,"; Litwin and Stringer, Motivation and Organizational Climate; Schneider and Bartlett, "Individual Differences and Organizational Climate I: The Research Plan and Questionnaire Development," pp. 323-334; Roy L. Payne and D. Pheysey, "G. G. Stern's Organizational Climate Index: A Reconceptualization and Application to Business Organizations,"

Organizational climate test instruments should have dimensional (scale) consistency; all items in each dimension should be positively related and measuring the same thing. The instrument should also have independent dimensions (scales); that is, no overlap with other scales.[1] In other words, the best test instrument would have the highest scale consistency (large positive correlation) and scale independence (low scale intercorrelations).

Scale consistency and intercorrelation data are available for some of the available test instruments. Karasick analyzed the Campbell and Pritchard test instrument which consists of 106 questions and 22 dimensions. The scale consistency correlation coefficients ranged from +0.43 to +0.82 with a mean value of +0.71 when corrected with the Spearman-Brown prophecy formula.[2] The mean scale intercorrelation coefficient was +0.18 with a range from -0.28 to +0.70.[3] The scale intercorrelation coefficients are not subject to correction with the

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Organizational Behavior and Human Performance 6 (1971):77-98; Roy L. Payne and Roger Mansfield, "Relationships of Perceptions of Organizational Climate to Organizational Structure, Context, and Hierarchical Position," Administrative Science Quarterly 18 (December 1973):515-526; Lawler, Hall, and Oldham, "Organizational Climate: Relationship to Organizational Structure, Process, and Performance," pp. 139-155.

[1]Litwin and Stringer, Motivation and Organizational Climate, pp. 82-83.

[2]The Spearman-Brown prophecy formula, $r = nr_{11}/(1 + (n - 1)r_{11})$, is useful for comparing test instruments because it corrects the initial correlation value by considering the number of questions on each dimensional scale. n = number of questions per scale, r_{11} = initial correlation value. The usefulness of this formula is discussed by Henry Garrett and R. S. Woodworth, Statistics in Psychology and Education, (New York: David McKay Company, Inc., 1966), pp. 337-345.

[3]Karasick, "Organizational Climate and Its Relationship to Managerial Behavior," pp. 35-39.

prophecy formula because this correlation is not dependent upon the number of items in each scale.

Schneider and Bartlett statistically analyzed their test instrument, consisting of 80 questions and six dimensions, and found that the scale consistency correlation coefficients, when corrected by the Spearman-Brown prophecy formula, ranged from +0.52 to +0.90 for insurance agents and +0.56 to +0.90 for managerial personnel. The mean for each set of data was +0.65 and +0.66, respectively. The scale intercorrelation coefficients ranged from -0.54 to +0.59 and -0.30 to +0.60, respectively. The statistical mean for the scale intercorrelation was +0.31 and +0.27, respectively.[1]

Schneider and Bartlett compared the above results with a similar analysis on the Litwin and Stringer test instrument, which consists of 50 questions with nine dimensions. As a matter of comparison, the Litwin and Stringer instrument had a scale consistency correlation coefficient range, when corrected with the Spearman-Brown prophecy formula, from +0.48 to +0.81 with a mean of +0.71. The scale intercorrelation coefficient mean was +0.40 with a range from +0.18 to +0.69.[2]

Payne and Mansfield have provided only the scale consistency correlation coefficient data for their 160-question, 20-dimension test instrument. The coefficients ranged from +0.58 to +0.80 with a mean of +0.70.[3] It is not known whether these values have been corrected with

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[1]Benjamin Schneider and C. J. Bartlett, "Individual Differences and Organizational Climate II: Measurement of Organizational Climate by the Multi-Trait, Multi-Rater Matrix," Personnel Psychology 23 (Winter 1970):501.

[2]Ibid., pp. 501-502.

[3]Payne and Mansfield, "Relationships of Perceptions of Organizational Climate to Organizational Structure, Context, and Hierarchical Position," pp. 515-526.

the Spearman-Brown prophecy formula. In any case, the scale intercorrelation data are not available for this 20-page, complex questionnaire.

Table 11 provides a summary comparison of the above test instrument statistical review.

From the above analysis, the Litwin and Stringer test instrument can be judged superior and was selected for this research for the following reasons: (1) The scale consistency is as high as or higher than either of the others; all items in each dimensional scale are positive and tend to measure the same thing; there is a slightly larger scale overlap, but this appears to be offset by other factors in the other instruments; and it was designed, as discussed below, primarily for industrial use and is therefore appropriate. (2) The Schneider and Bartlett instrument was designed for use in insurance agencies; their questions would require some alteration to be applicable to the aerospace industry which might invalidate its applicability. (3) The Campbell and Pritchard instrument is very lengthy; its only use was reported in a dissertation by Bernard W. Karasick,[1] whose work was chaired by Dr. Robert D. Pritchard, a co-developer of the questionnaire; Karasick chose to use only 11 of the 22 dimensions because of its length and meaningfulness in his sample; and its usefulness appeared questionable to this research.

The Litwin and Stringer Organizational Climate Questionnaire (OCQ), unlike the popular Halpin and Croft public school system climate questionnaire, was developed in an industrial firm (General Electric Company). They administered an open-ended questionnaire to 45 managers and lower ranking personnel from several departments to collect a sample of

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[1]Karasick, "Organizational Climate and Its Relationship to Managerial Behavior," p. 33.

TABLE 11

CLIMATE TEST INSTRUMENT STATISTICAL COMPARISON

Test Instrument	Scale Consistency		Scale Intercorrelation	
	Mean	Range	Mean	Range
Campbell and Pritchard	+0.71	+0.43 to +0.82	+0.18	-0.28 to +0.70
Schneider and Bartlett	+0.65	+0.52 to +0.90	+0.31	-0.54 to +0.59
	+0.66	+0.56 to +0.90	+0.27	-0.39 to +0.60
Litwin and Stringer	+0.71	+0.48 to +0.81	+0.40	+0.18 to +0.69
Payne and Mansfield	+0.70	+0.58 to +0.80	Not Available	

descriptive material about the organization's internal environment. The responses to 44 questions were given to three judges, each with considerable experience in content analysis. They were asked to sort the responses into one of the eight climate dimensions that Litwin and Stringer had found previously by factor analysis. Through analysis of each dimension and inter-judge agreement, the dimensions were reduced from eight to six and the number of questions from 44 to 31. From this research an initial questionnaire was developed.[1]

This initial questionnaire was then administered to 60 first-year MBA students at Harvard who had at least one year of work experience. Sixty different organizations were represented. From this experiment, a refined OCQ was developed again by dimensional analysis, and administered to more than 500 people from various field organizations. This new OCQ reduced scale overlap and increased the independence of each scale. The nine dimensions finally identified were described as follows:

1. Structure - The feeling that employees have about the constraints in the group, how many rules, regulations, procedures there are; is there an emphasis on red tape and going through channels, or is there a loose and informal atmosphere.

2. Responsibility - The feeling of being your own boss; not having to double-check all your decisions; when you have a job to do, knowing that it is your job.

3. Reward - The feeling of being rewarded for a job well done; emphasizing positive rewards rather than punishments; the perceived fairness of the pay and promotion policies.

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[1]Litwin and Stringer, Motivation and Organizational Climate, pp. 66-67.

4. Risk - The sense of riskiness and challenge in the job and in the organization; is there an emphasis on taking calculated risks, or is playing it safe the best way to go.

5. Warmth - The feeling of general good fellowship that prevails in the work group atmosphere; the emphasis on being well-liked; the prevalence of friendly and informal social groups.

6. Support - The perceived helpfulness of the managers and other employees in the group; emphasis on mutual support from above and below.

7. Standards - The perceived importance of implicit and explicit goals and performance standards; the emphasis on doing a good job; the challenge represented in personal and group goals.

8. Conflict - The feeling that managers and other workers want to hear different opinions; the emphasis placed on getting problems out in the open, rather than smoothing them over or ignoring them.

9. Identity - The feeling that you belong to a company and you are a valuable member of a working team; the importance placed on this kind of spirit.[1]

The above nine variables can be clustered as shown below to identify particular patterns of organizational climate. These patterns[2] were formulated through analysis of scale interrelationships and conceptual similarity.

Pattern I: Structure - Measures the perception of formality in the organization. Negatively related to achievement motivation.

Pattern II: Challenge - Includes risk, responsibility, and standard variables and measures the perception of challenge and excitement. These are "motivators" for achievement.

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[1] Ibid., pp. 81-82.

[2] Ibid., p. 146.

Pattern III: Reward and Support - Includes rewards, support, and conflict scales and measures the climate's emphasis on positive reinforcement rather than punishment of task behaviors. Tends to arouse achievement motivation. These could represent the "hygienic factors" of motivation.

Pattern IV: Social Inclusion - Includes warmth and identity variables and measures the perception of the environment's emphasis on sociability, belonging, and group membership. Tends to arouse affiliation motivation.

Through analysis of scale intercorrelations, Litwin and Stringer found that seven of the nine specific dimensions showed very high scale consistency. Only the standards and conflict scales showed any difficulties. The standards scale appeared to correlate closely with items in the responsibility scale. From additional analysis they felt that the conflict scale was measuring several different climate properties and could be dropped. The use of the conflict scale was left to the discretion of the researcher. They caution that if it is used it will probably measure the presence of conflict. It was retained in this research in order to keep the instrument intact as Litwin and Stringer used it. Litwin and Stringer concluded that the instrument was adequate for use in further organizational climate research and that perceived climate could be adequately measured with it.[1] This questionnaire has recently been used successfully by other researchers such as Lair, Curtis, and Perkins.[2]

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[1]Ibid., pp. 68-83.

[2]Lair, "A Study of Congruency of Individual Needs and the Motivational Aspects of the Organizational Climate," 1972; Curtis, "The Management System and Its Impact on the Organization," 1973; Robert Donald Perkins, "Executive Leadership in Organizations," (Ph. D. dissertation, Colorado State University, 1971).

Litwin and Stringer test instrument

The scoring method used with the Litwin and Stringer test instrument will now be explained. There are 50 statements on the organizational climate test instrument. Each statement is scored from 1 to 4 by circling that number which best describes the perceived working conditions as they actually exist in the organization in accordance with the following number codes:

1 = Definitely agree

2 = Inclined to agree

3 = Inclined to disagree

4 = Definitely disagree

The instrument collects data against nine different variables. Each variable contains both positive and negative statements. Negative statements are scored 1-2-3-4. Positive statements are scored 4-3-2-1. Positive items reflect the respondent's agreement with the item statement. The nine variables, the associated statement numbers, and score ranges are shown in Table 12.

The individual scores for questions within each variable, as shown in Table 12, were summed to arrive at the actual score for that variable on each questionnaire. These actual scores were used in the management system and organizational climate statistical correlation tests. This appeared to be the most appropriate method for correlating what the researcher considered to be ordinal data at the individual level. The mean value of all the respondent's scores on each variable within each organization was used as the organization's organizational climate variable score for that variable in all the other statistical analyses. This method avoids the compound use of medians as well as

TABLE 12

ORGANIZATIONAL CLIMATE TEST INSTRUMENT
VARIABLES AND SCORING DATA

Variable	Score Range	Statement Number	
		Positive	Negative
Structure	8 - 32	1, 3, 5	2, 4, 6, 7, 8
Responsibility	7 - 28	10, 11, 12, 13	9, 14, 15
Rewards	6 - 24	16, 17, 18	19, 20, 21
Risk	5 - 20	23, 25, 26	22, 24
Warmth	5 - 20	27, 28, 31	29, 30
Support	5 - 20	33, 35, 36	32, 34
Standards	6 - 24	37, 38, 39	40, 41, 42
Conflict	4 - 16	44, 45	43, 46
Identity	4 - 16	47, 48	49, 50

SOURCE: Personal correspondence from Robert A. Stringer, Jr., March 1974.

eliminating the clustering of data and the large number of ties that were prevalent with medians. The variable mean scores are needed for direct compatibility with the Litwin and Stringer norm scores in the comparative analyses. This method of using the mean value of the individual variable scores to obtain the organization's variable score is consistent with that used by Litwin and Stringer.[1] This method was selected for this study so that the organizational climate variable scores would be directly comparable to the norms for American businessmen. Litwin and Stringer calculated these norms from data they obtained with their test instrument in several field studies.[2]

Since the scoring range for each variable is not the same, as shown in Table 12, all the variable mean scores at the organizational level were normalized so the scores would be directly comparable to each other. This method provides a means for determining the relative predominance of each variable at the organizational level and also for the total sample. The scores were normalized by taking the ratio of the organization's mean score to the maximum score attainable by each variable. For example, if the organization's structure variable score was 20 and since the maximum attainable score on this variable is 32, the normalized score would be 20/32 = 0.625 or 62.5 percent. The normalized scores in this study have been shown as percentages to avoid the use of very small numbers at the three digit level. It was also necessary to normalize the variable scores so that when the variable scores were added to obtain the pattern scores, a direct comparison of the normalized pattern

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[1]Litwin and Stringer, Motivation and Organizational Climate, pp. 145-166.

[2]Personal correspondence from Robert A. Stringer, Jr., March 1, 1974.

scores could be made to easily identify the relative predominance of the climate patterns in each organization and in the sample. The norm variable scores for American businessmen were also normalized in the same manner so they could be directly compared with the sample scores.

The organization's pattern scores that were used in the statistical analyses were obtained by summing the organization's climate variable mean scores as follows:

1. Pattern I (structure) = structure variable mean score.

2. Pattern II (challenge) = sum of the responsibility, risk, and standards variable mean scores.

3. Pattern III (reward and support) = sum of the rewards, support, and conflict variable mean scores.

4. Pattern IV (social inclusion) = sum of the warmth and identity variable mean scores.

The organizational climate pattern scores and the norm pattern scores for American businessmen were also normalized in the same manner as were the climate variable scores and for the same reason as discussed previously.

Each organization's organizational climate variable scores and pattern scores were compared to each of the other organization's respective climate scores as well as to Litwin and Stringer's norm for American businessmen's scores.

The organizational climate variable and pattern scores were not summed to obtain a single total climate score for an organization because none of the literature reviewed discussed or suggested it. Litwin, Stringer, and others only address organizational climate in terms of specific variables or patterns. It is the researcher's opinion that

the reason for this is that since each pattern of climate stimulates a somewhat different perception of motivation, a single, summed total climate score would be meaningless because they are not necessarily additive in nature.

To summarize the organizational climate test instrumentation section, the Litwin and Stringer test instrument appeared to be the most appropriate for this research for several reasons. First, it was developed in an industrial setting, starting in 1966 at the General Electric Company. The original data came from men of varied experience, including that gained from military and research programs that closely parallel many activities in the aerospace industry. Second, it has been used in several studies and its developers have established a profile of norms against each of their nine variable scales for American businessmen. This set of norms provides a kind of standard for comparison with other studies. Third, the scale consistency was as good as or better than any of the other available test instruments.

Performance measurement

The literature review reveals that an adequate test instrument for measuring the performance of organizations, particularly those that are performing under a direct government contract, is not currently available from previous research. However, NASA has developed and is still using a method for evaluating contractor's performance. This existing method will be discussed in this section.

NASA encourages the use of contracts that have award fee features. This feature requires the NASA contract-issuing organization to develop performance evaluation criteria that will be used at specified intervals to measure the contractor's contractual performance. This performance

rating determines the amount (percentage of that available) of award fee the contractor gets for the period of performance being completed. This is a very important event for each contractor because this earned fee is a measure of profit for the contracted effort.

In administering the government award fee contract, there is not a common set of criteria for measuring each contractor's performance. Each responsible NASA project organization must develop a set of criteria that seems the most applicable for their contracted effort. Continuity, formality, and consistency in each organization's measurement and award fee system are maintained by a NASA-Center document of guidelines (Program/Project Performance Evaluation Operating Manual for Cost-Plus-Award-Fee Contracts) and a formal NASA-Center Performance Evaluation Board (PEB).

Guidelines for establishing performance criteria require that they be developed under three major categories: (1) technical achievement, (2) management, and (3) cost control. The detailed measurement criteria under each of these headings are classified as sensitive and are not released as public information. These detailed criteria are used to measure the contractor's performance on a periodic basis, with periods ranging from three to nine months. The specific performance rating dates are established in contract negotiations in one of two ways: (1) to coincide with the accomplishment of some specific major milestone in the program, such as, critical design review, completion of manufacturing, delivery of first flight article, flight performance, etc.; or (2) to coincide with the completion of some pre-set time period, such as three months or six months.

After negotiations, the NASA project manager and his staff develop an award fee plan and the detailed measurement criteria within the three major categories or dimensions. Both the plan and criteria must then be approved by the NASA-Center PEB before it can be implemented. The plan identifies the contract by number, size, contractor name, what is being purchased, period of performance, and the amount of award fee available at each performance rating date or milestone, and names of the NASA monitors (performance evaluators). The monitors include the NASA project manager (chief evaluator) plus approximately four branch chiefs and specialists in specific areas who work directly with the contractor throughout the contract period of performance. These monitors are intimately familiar with the contractor's performance in each of the major categories mentioned above.

The periodic performance evaluation from each monitor, utilizing the applicable criteria (which may be different for each period), is submitted to the project manager in a formal narrative report that identifies strengths and weaknesses of the contractor's performance for that period. The project manager, based upon his evaluation and the monitor's inputs, prepares a final narrative performance evaluation report and forwards it to the PEB for final approval. The report includes an adjective rating, such as, superior, excellent, good, etc., and a numerical weighted score for each major criterion. The numerical rating is based on a scale of 100 points. Each major criterion is weighted and may be weighted differently for each rating period. This numerical performance rating score is then applied to a fee conversion scale to determine the percentage of the available fee the manager recommends. This conversion scale may or may not be a one-to-one ratio. Often the

scale is skewed so that zero fee is earned until the numerical performance rating score is greater than 50 points. If this is the case, the scale from 50 to 100 may or may not be linear. All of these details would have been established in the original plan.

The PEB reviews the project manager's formal evaluation report and a self-appraisal performance report from the contractor. After this review, a formal PEB meeting is held and both the NASA project manager and the contractor project manager make separate and private presentations. At this time, each project manager can be questioned about other areas not addressed in the report to clarify specific points of interest. The PEB makes the final evaluation of the contractor's performance in terms of numerical rating score and the resulting fee in dollars earned. A PEB report is then forwarded to the NASA-Center Fee Determination Official (FDO) for final approval. The FDO is normally the Deputy Director for Management for the particular NASA Field Center.

The researcher has intimate knowledge of this performance evaluation process described above. This knowledge is derived from having helped develop some of the procedures and performance criteria, from monitoring and measuring contractor performance against them, and from serving on the NASA Center Performance Evaluation Board.

The researcher concluded that utilization of "hard" performance data directly from the NASA evaluation process would eliminate the need for developing a performance evaluation questionnaire, with an uncertain validity. Actual performance ratings determined through a very formalized and well-established system, as described above, should provide greater validity than a survey instrument developed from the current effectiveness literature, due to its contradictions and uncertainties.

The performance rating score was selected over the percent fee earned because of the commonality in the rating scores between contractors in that the scale is always linear and directly comparable. This is not necessarily true for the percentage of fee earned.

The scoring method described may best be understood by using a fictitious example with specific numerical values and their meanings identified. Table 13 is a typical example of a performance evaluation summary scoring sheet. For this example, technical achievement is weighted at 50 percent of the total. The contractor's performance was evaluated superior, with a raw evaluation score of 96 percent. The 96 percent raw evaluation score is multiplied by the 50 percent weighting for a weighted score of 48 percent. The sum of each variable's weighted score is the performance rating score, 0.85 in this example. The 0.85 rating would equate to an overall performance adjective rating of excellent.

Figure 6 is a typical nomograph for converting the performance rating score into the amount of fee earned. In the above example, a performance rating score of .85 would convert to a fee of $100,000.

The actual performance rating score and percentage of fee earned is very sensitive information. The organizations that have agreed to participate have also agreed that a performance rating score can be used for determining the relationships identified in the research model. This agreement is based on the condition that the anonymity of each organization be maintained. The performance rating score is a composite of those actually achieved over the preceding two-year period (1973 and 1974) if the contract had existed for that period. If the contract had existed for less than two years, the rating score is a composite (average) of

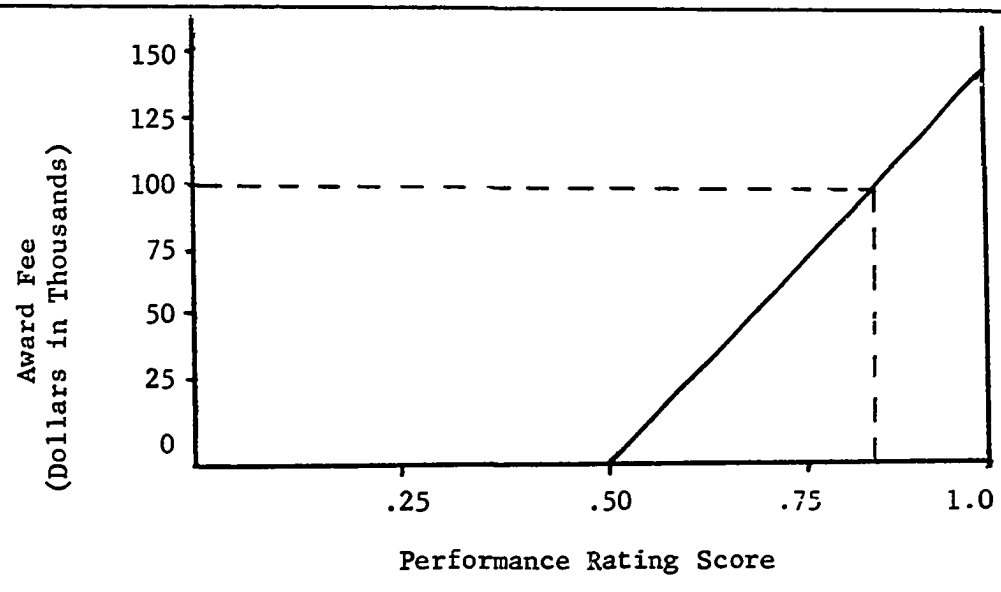
TABLE 13

TYPICAL PERFORMANCE EVALUATION
SUMMARY SCORE SHEET

Performance Variable	Weighting	Adjective Rating	Evaluation Score	Weighted Score
Technical achievement	.50	Superior	.96	.48
Management	.25	Excellent	.84	.21
Cost control	.25	Good	.64	.16
Performance rating score		Excellent		.85

FIGURE 6

AWARD FEE NOMOGRAPH



those earned to date (December 1974). The performance score was obtained directly from the NASA PEB secretariat or project manager for each of the seven organizations.

As described above, multivariate evaluation criteria are used in the evaluation process. But, as pointed out, only the contractor's overall performance adjective rating, performance rating score, and fee earned are made available to the contractor. The multivariate weighted scores are maintained as NASA-sensitive. For this reason, only the performance rating score for each organization can be published in this research. Therefore, the performance rating is a multivariate rating and not a "global" rating as it may appear from just reviewing the actual data. The multivariate evaluation approach appears to be more consistent with the theoretical studies reviewed in Chapter II.

To summarize the performance measurement method used for this research, it was concluded that "hard" performance data would be used because a more appropriate measuring instrument does not appear to be available. Rather than attempting to develop a special test instrument that could distort and invalidate the otherwise good conclusions, the actual contractor organization performance rating scores, as measured by the NASA-developed criteria, were used. The NASA method of measuring performance, used for at least ten years, has proven to be very workable and satisfactory. Therefore, in light of all the difficulties attributed to establishing criteria and measuring effectiveness, it appears that the actual performance rating by the organization's single customer is very appropriate for this exploratory research.

Using evaluators that are thoroughly familiar with the work and contract requirements to evaluate an organization's performance is

consistent with Georgopoulos and Tannenbaum's method of using management experts to evaluate station performance. The NASA method is also consistent with the Yuchtman and Seashore systems resource approach in that performance is measured over a period of time relative to multiple goals. The weighted multivariate evaluation approach to arrive at an overall performance rating is also consistent with the factorial analysis work of Seashore and Yuchtman where they attempted to determine the applicable variables and their cyclic nature over time.

The weaknesses in the NASA evaluation process might be that the focus is short-term, technical, and economically oriented, that is, efficiency rather than behavioral, long-term, or growth-oriented (effectiveness). However, the time span considered, the face validity of the measures, and the availability of the data made NASA's performance review board data seem most appropriate for the purposes of this research.

Test instrumentation summary

The management system and organizational climate test instruments selected appear to be quite interrelated and complementary in their measurements. Gibson et al. drew heavily on Likert, Litwin, and Stringer in developing their integrated systems model. Since the Gibson et al. model has formed the basic premise for this research, it seems highly appropriate to use the Likert and Litwin and Stringer test instruments. Using these professionally developed test instruments to measure the organization's management system and climate, plus the actual performance data of the organization seems to provide an appropriate approach for collecting the data needed for analysis in this research project.

Research Setting

This section describes the sample space from which the organizations were selected and the characteristics of the sample. The plan was to survey as many of the aerospace organizations as possible in order to have a representative sample of those holding NASA contracts for which performance data were available. Having data on several organizations would permit comparative analysis on the relationships under investigation.

Organization Sample

The population from which the data were collected consisted of the major aerospace industry contractors having direct contracts with one of the NASA Field Centers. Each firm having a major government contract for mission-oriented activities that was managed by a NASA project manager at the selected Field Center was considered a potential participant for this study activity. The firms were selected on the basis of contract size, number of contractor personnel in each organization, and project maturity. Also, only those firms with an active contract with mission directed activities which could be evaluated relative to the overall degree of contractor performance were considered. The contractor's organization usually grows from only a small cadre of specialists during the study phase up to a fully staffed engineering and manufacturing organization of several hundred, on major contracts, during the design and manufacturing phase of a program. The contractors selected spanned the spectrum from early mission formulation to hardware manufacturing.

Approximately seventeen different contractor organizations representing thirteen different firms met the above criteria. Each company was contacted after receiving approval from the respective

NASA project manager. Each was asked to participate in this research project. Eight organizations representing six firms declined for various reasons, which included depressed economic conditions, and inability to contribute the time. Two NASA project managers would not grant approval for two organizations to participate. The seven remaining organizations representing six aerospace firms agreed to participate. In the researcher's opinion, an excellent cross section of the aerospace industry is represented in this population. These firms are located throughout the United States. Each participating company provided a specific point of contact for coordinating the research activities. In six of the seven participating organizations, the point of contact was the company project manager. In one company, the coordinator was the Director of Industrial Relations.

Characteristics of The Sample

The seven selected aerospace organizations have been identified as organizations A, B, C, D, E, F, and G. Five of the organizations, A, B, E, F, and G, represented different firms. Two organizations, C and D, represented separate divisions of the same company, but each was autonomous in that they were physically separated by a considerable distance and had their own NASA contract. Some of the smaller organizations had a matrix type of organization; whereas, the larger ones were project oriented. In the matrix type of organization, only those employees who worked directly on the contract on a full time basis were requested to participate. Both professional and non-professional employees were included in the sample. The total population of the seven organizations was approximately 1,000 (as of October 1974). They were not, however, equally distributed. One project organization had slightly less than

half the total, one had about 20 percent, two had about 10 percent each of the total, and the others had about five percent each.

The contract work included early conceptual space project formulation in some organizations, detailed engineering design and manufacturing of hardware in others. The period of time the organization had been under contract ranged from approximately six months to seven years, with a mean of about three years. The contract value ranged from less than $1 million to more than $100 million. The available fee typically ranged from about eight to 12 percent of the contract value.

As stated previously, technology was equally high and not measureably different in the participating organizations. This assumption was based upon a macro viewpoint in that the gross technology was similar (aerospace). The aerospace industry is characterized as having highly complex missions and is subject to a very high technological change rate. From a micro viewpoint, each organization had a different mission as defined in the government contract. Fictitious examples of these specific differences could be as follows: One contractor could have the responsibility for the design, development, and manufacture of the solar electric panels and electrical distribution system, while another contractor could have the responsibility for the design, development, and manufacture of the spacecraft waste management system. Each of these responsibilities appear equally difficult, but a reasonable determination of the higher technology would be difficult. Another equally valid but different comparison could be that a single systems contractor could have the responsibility for integrating all of the spacecraft systems and performing the final tests, while another contractor could be responsible for developing the detailed mission planning requirements and procedures

which include all of the in-flight activities to be done, on what schedule, and identification of the contingency plans in case of equipment or personnel problems. Again, a determination of the higher technology is difficult. The NASA method of evaluating the contractor's performance tends to equalize any technology differences between organizations performing different missions in that each one is always evaluated in terms of their performance under the same three criteria: (1) technical achievement, (2) management, and (3) cost control. Therefore, the researcher concluded that technology should not be treated as a variable in this research.

Maintenance of strict anonymity necessitates holding descriptive data about each organization to very general terms.

To summarize this section, the research setting, organization sample, and characteristics of the sample have been described and discussed. The research involves representative aerospace organizations that had active, mission-type contracts with a specific NASA Field Center. Both the NASA project manager and the contractor project manager had to agree for the organization to participate in this study. Although only seven of a potential 17 organizations agreed to participate, the seven participating organizations are nationally known firms, located throughout the United States. The characteristics of those participating firms were only briefly discussed because of the necessity for maintaining anonymity of the organization, a condition for participating.

Data Collection and Analysis

This section describes the data collection and analysis methods used in this research.

Data Collection and Sampling Procedure

In each participating organization, the project manager and all of his immediate subordinate supervisors plus a randomly selected sample of additional organizational personnel, without regard to supervisory status, were asked to complete the management system and organizational climate questionnaires. The perceptions of the top supervisors were solicited to determine their perception of the management system and climate of the organization. It is these top level people who perpetrate the systems and climate of the organization as noted in the literature review. The additional respondents at lower levels are the receivers with far less influence, but whose actions and motives are essential to performance. The researcher considers that a sample selection of this nature assures good representation across the total organization. Because of their relatively small size, the three organizations having less than 50 direct employees exclusively dedicated to the specific contract effort were requested to provide 100 percent participation. The four organizations with 50 or more direct employees were requested to distribute 30 questionnaires within the organization plus one to the project manager and each of his immediate supervisory subordinates.

A sample size of 30 was chosen from the larger organizations for the following reasons: The "t" distribution in parametric statistics approximates the normal distribution of the population if the sample size is 30 or more from that population. The rules of parametric statistics also state that, for large sample sizes of 30 or more, the sample mean is a reliable estimator of the population mean.[1] On the other hand,

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[1] Frederick Mosteller and Robert E. K. Rourke, Sturdy Statistics-Nonparametric and Order Statistics, (Reading, Mass.: Addison-Wesley Publishing Company, 1973), p. 248.

nonparametric statistics do not require samples to be as large as 30 since nonparametric statistics is distribution-free and well suited for using smaller samples. Robson considers nonparametric samples to be large if there are more than 20 observations per sample.[1] Blalock goes further to say that 10 or more constitute a large sample size and the distribution is practically indistinguishable from the normal distribution.[2] Therefore, the handout of 30 questionnaires assures a normal distribution of them within the sample population. Only a 33 percent return would then meet Blalock's requirements for a normal distribution of responses, which was a much desired goal.

The researcher used three different methods of delivering the questionnaires to the identified coordinator at each participating company. Two local firms had their questionnaires personally delivered. The researcher personally delivered questionnaires to three of the coordinators while they were visiting the NASA Field Center. Only two coordinators received their questionnaires by mail. In each case, either in person or by telephone, the same instructions were given relative to sample selection and questionnaire distribution. The coordinator was asked and assurance was given that the sample would be randomly selected from a list of organization personnel. Each questionnaire was distributed to the employee by name over the signature of the company coordinator. A copy of this distribution letter is provided in appendix II.

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[1] Colin Robson, Experiment Design and Statistics in Psychology, (Harmondsworth, Middlesex, England: Penguin Education, 1973), p. 110.

[2] Hubert M. Blalock, Social Statistics, (New York: McGraw-Hill Book Company, 1960), p. 324.

The researcher prepared the distribution letter for the coordinator's use. He was encouraged to add further information but asked not to change the basic content. There was no evidence of any changes to the letter, except to fill in the company name and provide a date for questionnaire completion as instructed. The researcher requested the completion date to be two weeks from date of distribution. The questionnaires were returned by U. S. mail to the researcher's home address in the self-addressed stamped envelope attached to each questionnaire. The reason for this arrangement was to disassociate the researcher's connection with NASA as much as possible on the assumption that more objective responses would result if the participants believed their information would be used only for the dissertation and would not be used directly by NASA or their company management.

All participating organizations requested and have been assured of their anonymity in the preparation of any analysis or evaluation of data. Each of them has expressed concern for having information revealed about them that could be construed to be sensitive or derogatory. To provide this anonymity, each organization was given a code that was stamped on all questionnaires its employees received. The total list of codes is known only to the researcher, and each one has been changed again in the dissertation. Each participant was also assured of anonymity in order to prevent any identification with a participating firm. The researcher concluded that maintaining this anonymity did not affect the response rate. A recent investigation revealed that there were no differences noted in the answers of respondents who signed and those who did not sign their questionnaires.[1]

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[1]Richard P. Butler, "Effects of Signed and Unsigned Questionnaires for Both Sensitive and Nonsensitive Items," Journal of Applied Psychology

The questionnaires that were given to the project manager and his immediate subordinate supervisors all carried the same code as the rest of the organizational sample but were made distinguishable from the randomly selected sample of respondents by underlining the code. This additional coding has been used only in determining whether any of the upper management responded. This additional information has not been used in any statistical calculations in this research.

There was an overall response rate of 71 percent from this data collection technique, which is much higher than the 40 to 50 percent norm suggested by Kerlinger.[1] The actual response rate by organization is shown in Table 14. The percentage of questionnaires returned by organization ranged from 60 to 100. The lowest return rate was still above the norm Kerlinger predicted for mail questionnaires. Of all the questionnaires returned, only three were incomplete and, therefore, unusable. This suggests that most of the respondents wanted to provide useful data about their organizations.

The overall performance evaluation ratings for each organization were obtained directly from the applicable NASA project manager or PEB secretariat through personal contact by the researcher.

Method of Data Analysis

The test instruments selected and developed for this research required the participants to provide very subjective answers. In the behavioral science field, this type of subjective data should not be subjected to rigorous parametric analysis. Siegel states "nonparametric

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57, No. 3 (1973):349-350.

[1]Kerlinger, Foundations of Behavioral Research, p. 414.

TABLE 14

RESPONSE RATE

Organization	Questionnaires Distributed	Questionnaires Returned Number/Percent	Questionnaires Usable Number/Percent
A	40	26/65	25/62.5
B	33	28/85	28/85
C	40	29/72.5	27/67.5
D	35	21/60	21/60
E	15	10/66.6	10/66.6
F	14	14/100	14/100
G	19	14/73.6	14/73.6

techniques are uniquely suited to the data of the behavioral sciences."[1] The reasons Siegel gave are (1) tests are usually distribution-free, and (2) scores are not exact (interval-type data) in any numerical sense. For these reasons, these data were subjected exclusively to nonparametric analysis.

Margulies stated that an important advantage of using nonparametric statistics in research of this nature is in its applicability to small samples. With very small samples, if the nature of the population distribution is not known exactly, there is no alternative to using a nonparametric statistical test.[2]

The researcher recognizes that the questionnaire data in this study were of the ordinal type which makes it appropriate to use medians rather than means. This classification was followed in the correlation analysis that involved the use of individual data. As stated previously, there appeared to be an overriding justification for using data mean scores when the individual scores had to be further consolidated to obtain variable scores at the organizational level and at the sample level. The use of means instead of medians assumes interval-type data with a known distribution. Likert, Litwin, and Stringer have used means in the analysis of data they have collected with their test instruments.[3] Since the researcher has selected these same instruments for use in this

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[1]Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences, (New York: McGraw-Hill Book Company, 1956), p. vii.

[2]Newton A. Margulies, "A Study of Organizational Culture and the Self-Actualizing Process," (Ph. D. dissertation, University of California, 1965), p. 93.

[3]Likert, The Human Organization, p. 36; Litwin and Stringer, Motivation and Organizational Climate, p. 70.

study and if comparative analysis was to be made with data the test instrument developers have published, then there appeared to be no alternative but to use the same type of data, means, for specific analyses. It was advantageous to use data means in some of the statistical tests because it eliminated the clustering of scores so that the data could be ranked without encountering tied scores. In any case, all analyses in this study were made with nonparametric statistics in order to adhere as closely as possible to the statistical test recommendations of Siegel.[1]

Ordinal statistics

The data analyses in this study were restricted to ordinal statistical tests. Ordinal statistics apply in cases where there is a definite order among the categories, as in the climate questionnaire codes: definitely agree, inclined to agree, inclined to disagree, and definitely disagree. With ordinal scaling, correlation coefficients based on rankings, such as the Spearman Rho (r_s), Kendall's Tau (T), or the Goodman-Kruskal Gamma (γ) statistic, are appropriate.[2] Blalock, Hays, and Siegel have provided descriptions, advantages and disadvantages of a number of techniques for examining the relationships between the ranked orders of two variables.[3]

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[1]Siegel, Nonparametric Statistics for the Behavioral Sciences, p. 30.

[2]Ibid., pp. 23-25.

[3]Blalock, Social Statistics, pp. 317-324; William L. Hays, Statistics for Psychologists, (New York: Holt, Rinehart, and Winston, 1963), pp. 655-656; Siegel, Nonparametric Statistics for the Behavioral Sciences, pp. 195-239.

Statistical Test Selection

The Spearman Rho, Kendall's Tau, and Goodman-Kruskal Gamma statistical tests were reviewed for possible use in this study. The Gamma statistic was chosen for the correlation calculations for the following reasons: (1) It is a nonparametric rank ordering statistic which expresses the degree of association between two ordinal variables within a range from -1.0 to +1.0; (2) actual scores of the two variables can be utilized, thus eliminating the need for converting them into ranks, which was an added convenience in writing a computer program to perform all the desired calculations; (3) it ignores ties in either ranking and is appropriate where ties are expected as in this research; (4) it is subject to a simpler interpretation than the Kendall Tau when ties do occur in either ranking; (5) it can be tested for significance the same as Kendall's S; and (6) it is a very useful statistic as a measure for survey data where intensities of opinion are the categories on one or both variables.[1]

Gamma can be expressed simply as the extent of agreement in the ordering of data which have been obtained from a population by two different measurements with the proviso that all tied scores are ignored.[2]

The Gamma correlation analysis was used to determine the relationship between the variables shown in the research model.

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[1]Oliver Benson, Political Science Laboratory-Statistical Supplement, (University of Oklahoma, 1971); Hays, Statistics for Psychologists, p. 655; Roger M. Atherton, Jr., "The Impacts of Centralization on Performance and Supervisory Perceptions of Centralization, Attitudes, Behavior, and Effectiveness," (Ph.D. dissertation, University of Michigan, 1972), p. 81.

[2]Atherton, "The Impacts of Centralization on Performance and Supervisory Perceptions of Centralization, Attitudes, Behavior, and Effectiveness," p. 67.

The management system and organizational climate variable mean scores and pattern scores were determined for each organization from the sample data. To further analyze these data, an analysis of variance test was performed to determine if the management system scores were statistically different and if the organizational climate scores were statistically different. The Friedman nonparametric analysis of variance test was reviewed for possible use since it is the only test Siegel recommended for determining whether K related samples could probably have come from the same population.[1] The samples in this study were considered to be related for several reasons: (1) all were in the same industry, (2) all had the same type of contract with the same NASA Field Center, (3) all were governed by the same type of government/NASA and contract regulations, and (4) all performed at approximately the same technology level. The Friedman test was appropriate for the following reasons: (1) It is the most powerful nonparametric test available, (2) it is a two-way analysis of variance test, (3) it uses ordinal data, and (4) it is a test that determines whether ranked data differ significantly.[2] All of these reasons match the requirements of this study.

A two-way analysis of variance seemed the most appropriate because it allowed each management system variable, organizational climate variable, and organizational climate pattern score to be independently ranked across all organizations. Both the within-organization variance for all variables and the between-organization variance for like variables were considered in the calculations.

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[1]Siegel, Nonparametric Statistics, pp. 166-172.

[2]Ibid.

The seven organization's organizational climate variable mean scores and pattern scores from this study were also compared with the norm variable and pattern scores for American businessmen, respectively, as reported by Litwin and Stringer, to determine if there was any statistical difference between the scores of the two samples. The Mann-Whitney U test and Kolmogorov-Smirnov two-sample nonparametric tests were reviewed for possible use. Although both tests are recommended by Siegel to test whether there is a significant difference in data obtained from two independent samples, the Mann-Whitney U test was selected because it is slightly more efficient unless the sample sizes are very small.[1] The populations were considered to be independent since the norms for American businessmen were obtained from several different industries that were not necessarily related to aerospace.[2]

The 0.05 level was used in testing for statistical significance. This means that there are five chances out of 100 of making a Type I error (rejecting the proposition when it is true). If this level is increased to 0.01, there is an increased possibility of making a Type II error (accepting the proposition when it is false). The 0.05 appears to be a typical level of significance that is often used in behavioral research.[3] However, the probability levels have also been provided for those that may be interested in the exact levels obtained.

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[1]Ibid., pp. 116-136.

[2]Litwin and Stringer, Motivation and Organizational Climate, pp. 145-166.

[3]Allen L. Edwards, Experimental Design in Psychological Research, 4th ed., (New York: Holt, Rinehart, and Winston, Inc., 1972), pp. 21-22.

Statistical analysis

The Gamma statistical correlation analysis was performed on a Hewlett-Packard 9830A computer system. A special computer program was written in "basic" computer language to perform the calculations.

The Gamma test was used to calculate the statistical relationships between the eight management system variables, using individual median scores, and the nine organizational climate variables, using individual raw scores. This calculation resulted in an eight by nine matrix of correlation values, or a total of 72 for each organization. The median correlation value was calculated from this list of 72 for each organization. Therefore, a statistical relationship between the management system and organizational climate was calculated for each of the seven organizations in the study. The surrogate relationship for the total sample was obtained by calculating the median value from the total list of correlation values. The total list consisted of seven organizations with 72 different values which totaled 504 correlations. This value was used to answer the research question, are management systems positively related to perceived organizational climate?

The Gamma test was used to calculate the statistical relationships between the organization's nine organizational climate variable mean scores and all of the performance rating scores. This calculation resulted in nine correlation values. The median correlation was calculated from this list of nine. This value was used to answer the research question, is organizational climate positively related to organizational performance?

The Gamma test was used to calculate the statistical relationships between the organization's eight management system variable mean scores

and all of the performance rating scores. This calculation resulted in eight correlation values. The median correlation value was calculated from this list of eight. This value was used to answer the research question, are management systems positively related to organizational performance?

The Gamma test was also used to calculate the statistical relationships between (1) performance and the organizational climate pattern scores, and (2) performance and age of all the contracts. This additional analysis was not required to answer the research questions but was conducted to determine the strength of other relationships in this study.

The seven organization's management system variable mean scores were subjected to the Friedman two-way analysis of variance test to determine if the management systems were statistically different. The organization's management system variable mean scores were obtained by calculating the mean value of each participant's scores on the questions within each variable and then calculating the mean of these individual variable scores.

The seven organization's organizational climate variable mean scores and pattern scores were also subjected to the Friedman two-way analysis of variance test to determine if the organizational climates were statistically different. The organization's organizational climate variable mean scores were obtained by calculating the mean of the individual variable scores.

The Mann-Whitney U test was used to determine if the seven organization's organizational climate variable mean scores and pattern scores were significantly different from the Litwin and Stringer norm variable

mean scores and pattern scores, respectively. The variable mean scores were used in order to be compatible with the Litwin and Stringer scores.

To summarize this section, the data collection, sampling procedure, method of data analysis, and the statistical analysis were reviewed and discussed. The sample included the contractor project manager, his immediate supervisory subordinates, plus a randomly selected sample of all other organizational employees. Each selected participant was asked to complete two questionnaires about their perceptions of their work environment and mail them directly to the researcher. Strict anonymity was maintained. The Gamma, nonparametric, statistic was defended for testing the statistical relationships identified in the research model and the research questions. The Friedman two-way analysis of variance test was defended for testing the statistical difference between the organization's management system scores and for testing the statistical difference between the organization's climate scores. The Mann-Whitney U test was defended for testing the relationship between the organizational climate scores and the norm scores for American businessmen.

Research Limitations

This section will discuss some of the constraints and limitations which have been imposed by the nature of this research.

The researcher recognizes that there are limitations imposed by exogenous variables such as economic conditions that were likely different for each organization or individual participant. Economic and behavioral influences were involved to a smaller or larger extent depending upon whether the contractor organization was in a growing or

declining status. Some of the sampled organizations were growing, some were static, and some were declining in size. None of these conditions could be controlled by the researcher. Likewise, it is not known to what extent they influenced the data. But since there were growing and declining organizations, there tends to be a cancelling effect in the total analysis.

The research design and methodology that were used created some limitations, some of which overlap with the above concerns. In a field study, there are variables that will not be as controllable as they could be in a laboratory. However, it does have the advantage over purer research methods, such as laboratory controlled experiments, because of its more substantial linkage with the problems of reality. Additionally, the nature of an exploratory field study does not really permit statements about causality. It will only attempt to provide information to the study of causation. The methodology used in this research facilitates a testing for relationships which, once determined, can provide information to make predictions about future behavior.[1] Therefore, the direction of dependency cannot be determined. Directions of causality may be implied, but actual proof cannot be supplied from an exploratory field study of this nature.

The researcher's position of employment with NASA may have had some influence on the results as well as on the interpretation of them. It should be pointed out, however, that the researcher did not have any responsibility for any of the contracts nor direct contact with any of

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[1]Martin Blaine Lee, "An Investigation Into The Relationship of Cognitive Dissonance, Organizational Climate, and Organization Set to Self-Perceived Utilization of Middle-Management Potential," (Ph.D. dissertation, University of Colorado, 1972), p. 54.

the organizations immediately before or during this research project. All of the company coordinators were fully aware of the researcher's status, but the questionnaire distribution letter merely stated that the researcher was a doctoral candidate. Therefore, many of the participants were never aware that the questionnaire was being mailed to a NASA employee. This was the desired intent to avoid any influence upon the data.

Nonparametric statistics, as used in this study, lack the power of parametric statistics. The small sample size of organizations also limits the power of the statistics still further. The power of a test is the probability of rejecting the null hypothesis when it is false.[1] The power can be increased by using a larger sample size. Since hypotheses are not being tested in this research, there is less concern over the power of the test. The probability of the occurrence by chance is provided in the data analysis, where statistical tests are made, for the convenience of the reader. Nonparametric statistics are well suited for small samples and is a very useful statistic in behavioral research of this type.

Different sample sizes were obtained from some organizations. The sample sizes ranged from 10 to 28. The effect this difference may have caused was considered to be eliminated since weighted averages were not used and each organization's scores were treated as equals. Therefore, each organization was weighted equally in calculating the surrogate correlation value which removed any bias based on size of the sample.

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[1]Siegel, Nonparametric Statistics, p. 10.

The mail questionnaire and maintenance of anonymity did not allow the researcher to follow up on the non-responses. Therefore, it is not known if the non-response population was similar to or different from the respondents. However, the researcher considered that maintaining anonymity and not following up on non-respondents had offsetting effects upon the data. Kerlinger warned that response to mail questionnaires are typically less than 50 percent. The researcher considered that the overall response rate of 71 percent clearly provided an adequate representation of the population to accomplish the objectives of this research.

The data from each organization were collected within a span of two weeks. The data from all organizations were collected over a span of approximately two months, from mid-October to mid-December 1974. Therefore, the researcher considered that there was not any impact on the data because of any changes during the data collection period.

All of the organizations contacted, both participants and non-participants, are nationally known aerospace contractors located throughout the United States. Those organizations that did not participate cannot be considered any different from those that did participate, relative to size, location, and type of work. The researcher considered that those non-participating organizations were equally representative of the aerospace industry as those that did participate.

Even though there were several possible limitations or constraints on this research, the researcher concluded that there were both positive and negative attributes. Generally, they have not imposed any restrictions on the research, but are factors which should be considered during interpretation of the findings.

Summary

In this chapter there was a brief discussion of various research designs along with the reason the field study was selected. The various methodologies were identified and reasons given for selecting the survey method and mail questionnaire. The specific test instruments were discussed along with the reasons for their selection. The NASA method for measuring organization performance was discussed and described along with justification for using the available "hard" data instead of developing a special measuring instrument. The research design, methodology, and instrumentation selected have been defended as being appropriate for this research.

The organizations that agreed to participate and the number of research participants appear to provide all of the necessary inputs for conducting a study to accomplish the objectives of this research project. The study of seven different organizations will provide a variety of analyses for comparative purposes.

The data collection and analysis methods were reviewed. Each organization assigned a research coordinator that was used as the point of contact and distributed the questionnaires. Emphasis was placed upon maintaining strict confidentiality and anonymity. The use of nonparametric statistics was defended on the basis that all of the collected data were ordinal. Nonparametric statistics is distribution-free and very appropriate for small sample sizes. The Gamma, Friedman, and Mann-Whitney U statistical tests were defended as appropriate to accomplish the statistical analyses required in this study.

Recognizable limitations imposed upon the research were discussed. The researcher concluded that there were no constraints imposed upon the research that has substantially biased the data. However, the limitations discussed must be recognized when interpreting the findings.

CHAPTER IV

RESEARCH RESULTS

Introduction

The purpose of this chapter is to present the research results. There are four major sections in this chapter: (1) the perceived management system, (2) the perceived organizational climate, (3) the measured organizational performance, and (4) the statistical correlations relative to the research questions.

Perceived Management System

The management system data were collected by asking each questionnaire recipient to complete the Likert Profile of Organizational Characteristics test instrument. Table 15 displays the summary data in matrix form.

Recalling from Chapter III that the scores for management System 2 range from 6 to 10 and management System 3 range from 11 to 15, it is immediately evident from Table 15 that each organization has an overall management System 3 (consultative) based upon the mean score for that organization's eight management system variables. These mean scores are shown in a separate column in Table 15 for each organization. The mean score for each organization was also converted to the corresponding management system score to provide a direct comparison with the Likert System 1 - 4 scale. As an example, organization A management

TABLE 15

MANAGEMENT SYSTEM VARIABLE MEAN SCORES

ORGANIZATION	MANAGEMENT SYSTEM VARIABLES								MEAN SCORE	MANAGEMENT SYSTEM SCORE
	LEADERSHIP	MOTIVATION	COMMUNICATION	INTERACTION-INFLUENCE	DECISION MAKING	GOAL SETTING	CONTROL	PERFORMANCE GOALS		
A	13.784	13.572	14.425	14.004	13.068	13.675	14.092	11.036	13.457	3.691
B	13.814	12.496	13.336	12.538	13.130	11.854	12.580	9.020	12.345	3.469
C	13.303	12.365	13.077	13.422	12.839	12.737	13.259	10.723	12.714	3.542
D	13.933	13.661	13.924	13.591	13.081	13.202	14.047	8.583	13.002	3.600
E	13.580	11.642	12.870	12.070	11.785	11.898	12.840	7.497	11.772	3.354
F	13.428	13.285	14.071	14.071	13.571	13.714	13.428	10.071	13.204	3.640
G	13.714	13.639	13.170	13.257	12.907	13.210	14.171	12.138	13.275	3.655

NOTE: MANAGEMENT SYSTEM SCORE = MEAN SCORE (4/20) + 1.0

system score was calculated as follows: 13.457 X 4/20 + 1.0 = 3.691. The management system scores for the seven organizations all cluster near the middle of the System 3 scoring range.

As discussed in Chapter II, a consultative management System 3 reflects the desire of management to involve the organizational members into some group-related processes in lieu of complete authoritative domination. Members do not perceive complete confidence and trust between superiors and subordinates in System 3 organizations, but there is evidence of some supportive relations and group decision making as opposed to hierarchical control with only downward communication. The superior-subordinate relationship is more group-oriented than in the bureaucratic one-to-one relationship. Each of the organizations in this sample should then receive relatively high performance ratings, but still somewhat less than what is still achievable if Likert's theory is totally supported.

The management system variable scores were subjected to the Friedman two-way analysis of variance test to determine if the management system scores of the seven organizations were statistically different. The seven management systems were statistically different at the 0.05 level of significance ($X_r^2 = 22.58$). This suggests that there is less than a five percent chance that the management system scores came from the same population.

Looking at the specific variable mean scores by organization, Table 15, organization D had the highest leadership process score, which implies that there were more trust and confidence between the supervisors and their subordinates than in the other six organizations. Organization C reflected the lowest amount of trust and confidence, although all of

the organizations are within the management System 3 scoring range on the leadership process variable.

Organization D had the slightly highest motivational forces score, which implies that a more complete range of personal motives such as physical, security, economic, and ego were tapped and utilized to accomplish the organizational goals. Organization E, with the lowest motivation score, had fewer personal motives involved in accomplishing its organizational goals. Again, all of the motivation scores are within the management System 3 scoring range.

Organization A had the highest communication process score, while organization E had the lowest score. The higher score implies that the communication process was more open, with information flowing more freely up, down, and laterally. All of the communication process scores are within the management System 3 scoring range.

Organization F had the slightly highest interaction-influence score, while organization E had the lowest score. This implies that employees in organization F perceived a higher degree of influence in their ability to affect organizational goals, methods, and activities. All of the interaction-influence scores, likewise, are within the management System 3 scoring range.

Organization F had the highest decision-making process score. Organization E had the lowest score. The higher score implies more decentralization and group decision making within the organization at a level where the most information and pertinent facts were located. The decision making scores for all of the organizations are within the management System 3 scoring range.

Organization F had the highest goal setting score. The higher goal setting score implies that there was more group participation in setting realistic goals for the organization. Organization B had the lowest score; however, all of the seven organizations had scores that fall within the management System 3 scoring range.

Organization G had the highest control process score. Organization B had the lowest score. The higher score in organization G implies that control of organizational activities was more dispersed within the organization, and also more emphasis was placed upon self-control and problem solving. All of the control process scores are within the management System 3 scoring range.

Organization G had the highest performance goals score. Only four organizations had performance goal scores that are within the management System 3 scoring range. Organizations B, D, and E had scores that are within the management System 2 scoring range. Management System 2 scores imply a benevolent authoritative view toward establishing achievable organizational goals and developing human resources. The score for organization G implies that this organization provided a better opportunity for human resource development than that provided in the other organizations.

In summary, organization A reflected a slightly higher level management system than the others in the sample, although four organizations had scores in the 3.6 range. Organization E had the lowest management system score. In each organization, the score for performance goals was the lowest of all variables.

Perceived Organizational Climate

To collect the organizational climate data, each questionnaire recipient was asked to complete the Litwin and Stringer test instrument. Table 16 summarizes the data in matrix form. The variable scores that Litwin and Stringer found to be the norm for American businessmen are also provided in Table 16 for comparison with the sample variable mean scores. Both the sample variable data and norm variable scores were normalized, as discussed in Chapter III, and are shown in Table 17.

The organizational climate variable mean scores were subjected to the Friedman two-way analysis of variance test to determine if the climate of the seven organizations were statistically different. The seven organizational climates were statistically different at the 0.05 level of significance ($X_r^2 = 16.61$). This suggests that there is less than a five percent chance that the organizational climate variable scores came from the same population.

The organizational climate variable mean scores and the Litwin and Stringer variable norm scores were subjected to the Mann-Whitney U test to determine if the sample data in this study were statistically different from the norm scores. The seven organizational climate variable mean scores and the norm scores were statistically the same at the 0.05 level of significance ($U = 40$). This suggests that there is less than a five percent chance that the two sets of scores came from different populations.

Looking at the specific variable mean scores by organization, Table 16, organization D had a slightly higher structure score than the other six organizations. This score implies that there were more constraints, rules, and regulations in this organization because the

TABLE 16
ORGANIZATIONAL CLIMATE VARIABLE MEAN SCORES BY ORGANIZATION

ORGANIZATION	PATTERNS OF ORGANIZATIONAL CLIMATE								
	STRUCTURE	CHALLENGE			REWARD AND SUPPORT			SOCIAL INCLUSION	
	VARIABLE MEAN SCORES								
	STRUCTURE	RESPONSIBILITY	RISK	STANDARDS	REWARDS	SUPPORT	CONFLICT	WARMTH	IDENTITY
A	21.423	18.846	14.500	18.500	17.000	14.307	9.807	16.461	12.653
B	21.392	17.000	13.571	16.000	16.035	13.500	9.750	15.857	11.321
C	21.370	14.814	14.814	17.555	16.962	13.555	11.074	15.074	11.370
D	21.476	19.047	13.380	17.047	18.523	15.619	10.952	16.857	12.428
E	20.100	20.100	12.800	15.700	17.300	12.800	10.600	16.600	9.700
F	20.642	20.571	15.357	18.428	17.928	15.214	10.857	15.214	11.357
G	20.500	17.571	12.142	18.357	17.571	14.214	10.500	16.142	11.857
VARIABLE MEAN SCORE	20.986	18.278	13.794	17.369	17.331	14.172	10.504	16.029	11.526
MEAN NORM FOR AMERICAN BUSINESSMEN[a]	20.900	18.400	14.100	17.900	15.900	14.300	10.400	15.800	12.100

[a]PERSONAL CORRESPONDENCE FROM ROBERT A. STRINGER, JR. MARCH 1974.

TABLE 17
NORMALIZED ORGANIZATIONAL CLIMATE VARIABLE SCORES BY ORGANIZATION

	PATTERNS OF ORGANIZATIONAL CLIMATE								
	STRUCTURE	CHALLENGE			REWARD AND SUPPORT			SOCIAL INCLUSION	
	VARIABLE NORMALIZED SCORES								
ORGANIZATION	STRUCTURE	RESPONSIBILITY	RISK	STANDARDS	REWARDS	SUPPORT	CONFLICT	WARMTH	IDENTITY
A	66.9%	67.3%	72.5%	77.0%	70.8%	71.5%	61.2%	82.3%	79.0%
B	66.8%	60.7%	67.8%	66.6%	66.8%	67.5%	60.9%	79.2%	70.7%
C	66.7%	52.9%	74.0%	73.1%	70.6%	67.7%	69.2%	75.3%	71.0%
D	67.1%	68.0%	66.9%	71.0%	77.1%	78.0%	68.4%	84.2%	77.6%
E	62.8%	71.7%	64.0%	65.4%	72.0%	64.0%	66.2%	83.0%	60.6%
F	64.5%	73.4%	76.7%	76.6%	74.7%	76.0%	67.8%	76.0%	70.9%
G	64.0%	62.7%	60.7%	76.4%	73.2%	71.0%	65.6%	80.7%	74.1%
VARIABLE SCORE	65.5%	65.2%	68.9%	72.3%	72.2%	70.8%	65.6%	80.1%	72.0%
NORM FOR AMERICAN BUSINESSMEN	65.3%	65.7%	70.5%	74.5%	66.2%	71.5%	65.0%	79.0%	75.6%

higher the score the greater the degree of formality and constraint perceived by the employees.

Organization F had the highest responsibility score. This score implies that the employees in organization F perceived a higher degree of responsibility than those in the other six organizations. The higher the responsibility score the more an employee feels that he is his own boss, a job is his, and all of his decisions are not double-checked. Organization C had the lowest responsibility score.

Organization F had the highest risk score which implies that this organization was more likely to take greater risks than the other six organizations in the sample. Organization G had the lowest risk score, which implies that the employees perceived a lower feeling of risk and challenge in the job than those in the other organizations. The lower the risk score the more likely the organization is inclined to play it safe rather than take calculated risks.

Organization A had the highest standards score. This score implies that this organization had the highest emphasis on doing a good job with a higher degree of importance attached to attaining implicit and explicit goals and performance standards. Organization E had the lowest standards score in this sample.

Organization D had the highest rewards score. This score implies that the feeling of reward for a job well done was higher in this organization than in the others in this sample. Positive rewards rather than punitive measures were apparently more prevalent in organization D. Organization B had the lowest rewards score.

Organization D also had the highest support score. This score implies that organization D displayed the highest degree of support,

perceived helpfulness of the managers, and other employees in this sample. This result is consistent with the finding below that shows organization D had the friendliest and most informal relations. Organization E had the lowest support score in this sample.

Organization C had the highest conflict score, while organization B had the lowest score. The higher score implies that managers and other workers wanted to hear different opinions. There was apparently less emphasis placed on getting problems out in the open in organization B. This organization was more likely to smooth the problems over or ignore them.

Organization D had the highest warmth score. This score implies that the greatest feeling of general good fellowship prevailed in organization D. The least emphasis on being well-liked was prevalent in organization C.

Organization A had the highest identity score. This score implies that the greatest feeling of belonging to the company and of being a valuable member of a working team was more prevalent in this organization. The importance of being a team member was apparently less prevalent in organization E, which had the lowest identity score.

A further study of the normalized climate variable scores in Table 17 revealed that every organization in the sample except organization F received their highest score on the warmth variable. This score implies that the employees had the strongest perception of feeling well-liked with an atmosphere of general good fellowship. Organization F had the highest score on risk which implies that the employees had the strongest perception of taking calculated risks in their work to accomplish the organizational objectives. Looking at the lowest perceptions,

organization A employees expressed the lowest perception for conflict. Organizations B and C employees expressed the lowest perception for responsibility. Organization F employees expressed the lowest perception for structure. Organizations D and G employees expressed the lowest perception for risk. Organization E employees expressed the lowest perception for identity.

Since the organizational climate variable mean scores were statistically the same as the norm variable scores for American businessmen, this implies that the climate in the seven aerospace organizations in this study is similar to that found in other American businesses.

The organizational climate variable mean scores were summed, as described in Chapter III, into climate pattern scores, as Litwin and Stringer suggested, in Table 18. The Litwin and Stringer norm scores for American businessmen were also summed into the four patterns and shown in Table 18 for comparison with the sample data. The sample and norm scores were normalized, as discussed in Chapter III, and are shown in Table 19.

The organizational climate pattern scores were subjected to the Friedman two-way analysis of variance test to determine if the climate patterns of the seven organizations were statistically different. The organizational climate patterns were statistically different at the 0.05 level of significance ($X_r^2 = 12.85$). This suggests that there is less than a five percent chance that the organizational climate pattern scores came from the same population.

The organizational climate pattern scores and Litwin and Stringer's norm pattern scores were subjected to the Mann-Whitney U test to determine if the sampled data in this study were statistically different

TABLE 18
ORGANIZATIONAL CLIMATE PATTERN SCORES*

ORGANIZATION	STRUCTURE	CHALLENGE	REWARD AND SUPPORT	SOCIAL INCLUSION
A	21.423	51.846	41.114	29.114
B	21.392	46.571	39.285	27.178
C	21.370	47.183	41.591	26.444
D	21.476	49.474	45.094	29.285
E	20.100	48.600	40.700	26.300
F	20.642	54.356	43.999	26.571
G	20.500	48.070	42.285	27.999
SAMPLE MEAN	20.986	49.442	42.009	27.555
NORM MEAN	20.90	50.40	40.60	27.90

*SCORES ARE THE SUM OF THE APPLICABLE VARIABLE MEAN SCORES

TABLE 19
NORMALIZED ORGANIZATIONAL CLIMATE PATTERN SCORES

ORGANIZATION	STRUCTURE	CHALLENGE	REWARD AND SUPPORT	SOCIAL INCLUSION
A	66.9%	72.0%	68.5%	80.8%
B	66.8%	64.6%	65.4%	75.4%
C	66.7%	65.5%	69.3%	73.4%
D	67.1%	68.7%	75.1%	81.3%
E	62.8%	67.5%	67.8%	73.0%
F	64.5%	75.4%	73.3%	73.8%
G	64.0%	66.7%	70.4%	77.7%
SAMPLE MEAN	65.5%	68.6%	70.0%	76.5%
NORM FOR AMERICAN BUSINESS	65.3%	70.0%	67.6%	77.5%

from the norm pattern scores for American businessmen. The organizational climate pattern scores obtained in this study and the norm pattern scores were statistically the same at the 0.05 level of significance (U = 8.0). This suggests that the two sets of pattern scores came from the same population.

Looking at the specific pattern scores by organization, Table 18, organization D had the highest structure pattern score in the sample. This score implies that this organization had more constraints and formality than the other six organizations. The structure pattern scores are positively related to the development of power motivation.[1]

Organization F had the highest challenge pattern score. This implies that organization F employees had a higher perception of challenge, demand for work, and opportunity for a sense of achievement than the employees in the other six organizations. The challenge scores are positively related to the development of achievement motivation and unrelated to the development of affiliation motivation.[2] Organization B had the lowest challenge pattern score.

Organization D had the highest reward and support pattern score. This score implies that in organization D more emphasis was placed on positive reinforcement than on punishment for task performance. Organization B had the lowest score in this pattern. The reward and support portion of this pattern score is positively related to the development

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[1]Litwin and Stringer, Motivation and Organizational Climate, p. 146.

[2]Ibid.

of both achievement and affiliation motivation, while the conflict portion of this pattern score is more related to power motivation.[1]

Organization D had the highest social inclusion pattern score. This score implies that there was more emphasis placed on sociability, belonging, and group membership in organization D than in the other six organizations. Organization E had the lowest score in this pattern. The social inclusion pattern score is positively related to the development of affiliation and weakly related to the development of achievement motivation.[2]

A further study of the normalized pattern scores in Table 19 revealed that every organization in the sample with the exception of organization F placed the most emphasis on social inclusion. This score implies that warmth and identity were the most prevailing of the climate variables, and the employees of these organizations expressed a higher perception of affiliation motivation than of power and achievement motivation. Organization F placed more emphasis on challenge, which implies that the employees had a higher perception of achievement motivation. Every organization in the sample with the exception of organization B placed the lowest emphasis on structure. This score implies that the employees expressed a lower perception of power motivation. Organization B had the lowest score in the challenge pattern. This score implies that the employees in organization B expressed the lowest perception of achievement motivation.

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[1]Ibid.

[2]Ibid.

Since the organizational climate pattern scores were statistically the same as the norm pattern scores for American businessmen, this implies that the climate patterns in the seven aerospace organizations in this sample are similar to those found in other American businesses.

Measured Organizational Performance

The measured performance ratings, as obtained directly from NASA, are shown in Table 20 in ranked order. The rating is a percentage value based upon a perfect score of 100 percent. The specific performance rating in each case is an average rating over the past two years (1973 and 1974) if the contract had been in existence for that long. If the contract was less than two years old, the rating is for the actual period of the contract's existence.

The performance rating scores ranged from 70 to 99 percent. The statistical difference could not be calculated because the multivariate data that make up the total performance rating scores were not available since they are NASA-sensitive, as discussed previously. Organization B achieved the highest performance rating, while organization E received the lowest rating. The organizations receiving the higher ratings had performed at a higher level as measured by the three NASA performance criteria of technical achievement, overall project management, and cost control. The higher ratings, likewise, resulted in higher fee awards as previously explained with an example in Chapter III.

Statistical Correlations

The statistical correlation values between the variables in the research model are presented in this section.

TABLE 20

ORGANIZATION PERFORMANCE RATINGS

Organization	Performance Rating
B	99%
A	94%
F	94%
D	91%
G	88%
C*	81%
E*	70%

*Contract less than two years old

Management System and Organizational Climate Relationships

The correlation coefficients shown in the tables of data below are a measure of the degree of consistency with which organizational members tended to perceive one management system variable as compared to another organizational climate variable. The findings are discussed by organization in alphabetical order.

Organization A, Table 21, had very low and several negative correlations between the structure climate variable and all management system variables. These correlations imply that there was a high degree of group participation without constraint. The highest correlations were found between identity and the management system variables. These correlations indicate that members of the organization were proud to be a part of the company, and perceived a management system that was conducive to a team effort. The highest single correlation was between rewards and decision making. This correlation implies that the employees who felt that proper decisions were made, at the proper organizational level, and with the correct amount of information, also felt that the rewards for such were fair and positive. The median correlation value was +0.44, which is statistically significant at the 0.01 level.

Organization B, likewise, reflected low correlations between structure and the management system variables as shown in Table 22. Very high correlations existed between the management system and climate variables of rewards, support, and identity. These correlations imply that the employees who perceived a management system oriented toward providing positive rewards for a job well done also had a feeling of supportive relations in a team environment. The highest single

TABLE 21

CORRELATION BETWEEN MANAGEMENT SYSTEM AND ORGANIZATIONAL CLIMATE VARIABLES FOR ORGANIZATION A

MANAGEMENT SYSTEM VARIABLES	ORGANIZATIONAL CLIMATE VARIABLES								
	STRUCTURE	RESPONSIBILITY	REWARDS	RISK	WARMTH	SUPPORT	STANDARDS	CONFLICT	IDENTITY
LEADERSHIP	-.03	.36*	.63***	.59***	.51**	.60***	.13	.45**	.57**
MOTIVATION	.05	.35*	.46**	.33*	.58**	.60***	.18	.59***	.57**
COMMUNICATION	.01	.34*	.55**	.50**	.54**	.44**	.08	.61***	.60***
INTERACTION	-.10	.28	.56**	.44**	.50**	.50**	.16	.51**	.56**
DECISION-MAKING	-.03	.35*	.65***	.58***	.61***	.45**	.03	.46**	.64***
GOAL-SETTING	.09	.20	.38*	.23	.44**	.29	-.08	.47**	.57**
CONTROL	-.03	.50**	.48**	.42**	.54**	.33*	.08	.50**	.48**
PERFORMANCE GOALS	.12	-.26	.13	.18	.07	.23	.04	.21	.21

* $P < 0.05$ ** $P < 0.01$, *** $P < 0.001$

MEDIAN CORRELATION VALUE = +0.44**

TABLE 22
CORRELATION BETWEEN MANAGEMENT SYSTEM AND ORGANIZATIONAL CLIMATE VARIABLES FOR ORGANIZATION B

MANAGEMENT SYSTEM VARIABLES	ORGANIZATIONAL CLIMATE VARIABLES								
	STRUCTURE	RESPONSIBILITY	REWARDS	RISK	WARMTH	SUPPORT	STANDARDS	CONFLICT	IDENTITY
LEADERSHIP	.09	.37**	.68***	.21	.50***	.63***	.21	.18	.60***
MOTIVATION	.11	.43**	.58***	.26	.37**	.58***	.29*	.02	.64***
COMMUNICATION	.14	.34*	.66***	.27*	.43**	.57***	.40**	.26	.53***
INTERACTION	.20	.32*	.56***	.14	.25	.62***	.33*	.11	.55***
DECISION-MAKING	.04	.41**	.51***	.18	.33*	.61***	.45**	−.01	.65***
GOAL-SETTING	.04	.34*	.46***	.13	.23	.47**	.51***	.02	.60***
CONTROL	.18	.45**	.37**	.28*	.08	.43**	.41**	−.02	.40**
PERFORMANCE GOALS	−.01	.37**	.63***	.18	.36**	.56***	.38**	−.04	.57***

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$
MEDIAN CORRELATION VALUE = +0.37 **

correlation value was between rewards and leadership and rewards and communication. This correlation implies that employees who felt the most positively rewarded also perceived communications and leadership as being highly open and participative. The median correlation value was +0.37, which is statistically significant at the 0.01 level.

Organization C, Table 23, had the lowest overall correlation values between risk and the management system. These correlations imply that employees who perceived the most risk also perceived a management system that was not highly participative but more authoritarian. However, the highest correlations were between identity and the management system variables. These correlations imply that the employees who felt proud to belong to the organization also perceived a higher level management system. The highest single correlation value was found between interaction and identity. This correlation implies that those individuals who perceived a strong team relationship also agreed that an individual could affect department goals and activities. The median correlation value was +0.24, which is not statistically significant.

Organization D, Table 24, had the lowest correlation values between responsibility and the management system, although a majority were statistically significant at the 0.05 level. Therefore, it is not felt that this implies a lack of individual responsibility, because this organization obtained a high responsibility score on the organizational climate questionnaire. The highest correlations were found between rewards and the management system. These correlations imply that the management system was oriented toward providing positive rewards for a job well done. The highest correlation was between identity and communication. Employees who were proud to be organizational members also

TABLE 23
CORRELATION BETWEEN MANAGEMENT SYSTEM AND ORGANIZATIONAL CLIMATE VARIABLES FOR ORGANIZATION C

MANAGEMENT SYSTEM VARIABLES	ORGANIZATIONAL CLIMATE VARIABLES								
	STRUCTURE	RESPONSIBILITY	REWARDS	RISK	WARMTH	SUPPORT	STANDARDS	CONFLICT	IDENTITY
LEADERSHIP	.47**	.07	.39*	.01	.10	.34*	−.07	.07	.51**
MOTIVATION	.31*	.30*	.50**	.22	.15	.63***	.17	.17	.57***
COMMUNICATION	.51**	.29*	.50**	.06	−.11	.50**	.32*	.20	.46**
INTERACTION	.49**	.27	.43**	.03	.11	.38*	.20	.20	.64***
DECISION-MAKING	.50**	.37*	.57***	.12	.09	.49**	.24	.31*	.56***
GOAL-SETTING	.30*	.06	.36*	.27	.15	.42**	.16	.01	.37*
CONTROL	.34*	.13	.36*	.02	.16	.34*	−.10	.00	.26
PERFORMANCE GOALS	.11	.16	.14	−.12	.16	.16	.19	.27	.22

* $P < 0.05$ ** $P < 0.01$, *** $P < 0.001$
MEDIAN CORRELATION VALUE = +0.24

TABLE 24
CORRELATION BETWEEN MANAGEMENT SYSTEM AND ORGANIZATIONAL CLIMATE VARIABLES FOR ORGANIZATION D

MANAGEMENT SYSTEM VARIABLES	ORGANIZATIONAL CLIMATE VARIABLES								
	STRUCTURE	RESPONSIBILITY	REWARDS	RISK	WARMTH	SUPPORT	STANDARDS	CONFLICT	IDENTITY
LEADERSHIP	.38*	.40*	.68***	.43*	.44*	.55**	.42*	.32	.62***
MOTIVATION	.46**	.27	.70***	.33*	.50**	.59**	.38*	.35*	.76***
COMMUNICATION	.55**	.30	.82***	.47**	.56**	.65***	.50**	.43*	.85***
INTERACTION	.29	.44**	.70***	.47**	.39*	.53**	.45**	.37*	.60***
DECISION-MAKING	.11	.44*	.64***	.46**	.32*	.52**	.43*	.41*	.64***
GOAL-SETTING	.51**	.21	.72***	.35*	.64***	.62***	.40*	.34*	.74***
CONTROL	.38*	.40*	.63***	.34*	.34*	.43*	.41*	.13	.67***
PERFORMANCE GOALS	.46**	.35*	.44**	.32*	.28	.45**	.29	.41*	.38

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$
MEDIAN CORRELATION VALUE = +0.44*

perceived an open communication system that operated upward, downward, and laterally. The median correlation value was +0.44, which is statistically significant at the 0.05 level.

Organization E, Table 25, had the lowest overall correlation values between structure and the management system. In fact, all the correlation values were negative. These correlations imply that employees who perceived a highly structured organization also perceived a more highly authoritarian management system. The fact that the highest correlations were observed between support and the management system implies that employees who perceived a management system that tended to be participative also perceived a feeling of helpfulness from managers and other employees. The highest single correlation was found between interaction and conflict. The individuals who perceived a feeling of openness, with the influence to affect departmental goals, methods, and activities, also believed there was a considerable amount of conflict experienced in these interactions. The median correlation value was +0.37, which is not statistically significant.

Organization F, Table 26, had the lowest overall correlational values between responsibility and the management system. These correlations suggest that employees who perceived a very small amount of responsibility also perceived a more authoritarian management system. The highest correlation values were found between identity and the management system variables. These correlations imply that employees who were proud to be a member of the team perceived a management system that dispersed control throughout the organization and placed emphasis on self-control and problem solving. The median correlation value was +0.33, which is not statistically significant.

TABLE 25

CORRELATION BETWEEN MANAGEMENT SYSTEM AND ORGANIZATIONAL CLIMATE VARIABLES FOR ORGANIZATION E

MANAGEMENT SYSTEM VARIABLES	ORGANIZATIONAL CLIMATE VARIABLES								
	STRUCTURE	RESPONSIBILITY	REWARDS	RISK	WARMTH	SUPPORT	STANDARDS	CONFLICT	IDENTITY
LEADERSHIP	−.07	.23	.15	.33	.55*	.40	−.08	.33	−.12
MOTIVATION	−.05	.36	.15	.01*	.43	.38	−.35	.11	.36
COMMUNICATION	−.05	.39	.20	.61*	.70*	.75**	−.11	.51*	.12
INTERACTION	−.21	.56*	.81**	.71*	.79**	.85**	.38	.88**	.26
DECISION-MAKING	−.18	.55*	.41	.70*	.73**	.84**	.03	.71*	.16
GOAL-SETTING	−.23	.38	.23	.54*	.70*	.60*	−.20	.35	.05
CONTROL	−.16	.39	.29	.62*	.36	.56*	−.11	.35	.40
PERFORMANCE GOALS	−.17	.33	.41	.31	.40	.46*	.40	.78**	−.02

* $P < 0.05$ ** $P < 0.01$, *** $P < 0.001$

MEDIAN CORRELATION VALUE = +0.37

TABLE 26

CORRELATION BETWEEN MANAGEMENT SYSTEM AND ORGANIZATIONAL CLIMATE VARIABLES FOR ORGANIZATION F

MANAGEMENT SYSTEM VARIABLES	ORGANIZATIONAL CLIMATE VARIABLES								
	STRUCTURE	RESPONSIBILITY	REWARDS	RISK	WARMTH	SUPPORT	STANDARDS	CONFLICT	IDENTITY
LEADERSHIP	.25	.01	.19	.29	.42*	.54*	.61**	.18	.58*
MOTIVATION	.17	.06	.38	.26	.15	.42*	.27	.41	.55*
COMMUNICATION	.29	−.08	.28	.27	.29	.37	.51*	.16	.57*
INTERACTION	.10	.11	.40	.38	.46*	.38	.52*	.12	.54*
DECISION-MAKING	.30	.06	.15	.22	.44*	.51*	.64**	.19	.54*
GOAL-SETTING	.12	.29	.24	.22	.72***	.57*	.63**	.37	.59*
CONTROL	.10	.14	.35	.33	.46*	.52*	.52*	.32	.76***
PERFORMANCE GOALS	.30	−.07	.13	.30	.31	.43*	.33	.34	.61**

*$p < 0.05$ **$p < 0.01$, ***$p < .0.001$
MEDIAN CORRELATION VALUE = +0.33

Organization G, Table 27, had the lowest overall correlational values between responsibility and the management system. These correlations imply that employees who perceived a very low degree of responsibility also perceived a management system that had a centralized decision-making process. The highest correlational values were between support and the management system. Employees who perceived the most management and peer helpfulness apparently perceived a more democratic, less authoritarian management system. The highest single correlation value was between identity and communication. The people who were the most proud of being an organization member also perceived an open communication system. The lowest single correlation value was between performance goals and responsibility. This correlation implies that employees who perceived the least responsibility believed the organization had positive, identifiable performance goals relative to human resources development and organizational objectives. The median correlation value was +0.32, which is not statistically significant.

The median correlation values and associated probabilities of occurrence between the management system variables and organizational climate variables for each organization were collected from the above discussion and are shown in Table 28 for ease of comparison. The surrogate correlation value of all the 504 total correlation values shown in Tables 21-27 was +0.36, which is statistically significant at the 0.001 level. The probability of occurrence value was less than 0.0002. This value means that there is less than a 0.02 percent probability that this relationship could have happened by chance.

TABLE 27

CORRELATION BETWEEN MANAGEMENT SYSTEM AND ORGANIZATIONAL CLIMATE VARIABLES FOR ORGANIZATION G

MANAGEMENT SYSTEM VARIABLES	ORGANIZATIONAL CLIMATE VARIABLES								
	STRUCTURE	RESPONSIBILITY	REWARDS	RISK	WARMTH	SUPPORT	STANDARDS	CONFLICT	IDENTITY
LEADERSHIP	.16	.33	.40	.36	.60**	.60**	.12	.25	.42
MOTIVATION	.10	.00	.31	.52*	.36	.62*	.25	.20	.63**
COMMUNICATION	.34	.00	.43	.34	.53*	.71**	.31	.33	.83***
INTERACTION	.12	.13	.30	.29	.35	.53*	.35	.15	.59**
DECISION-MAKING	.20	.03	.36	.41	.50*	.57**	.40	.25	.72**
GOAL-SETTING	.02	.21	.22	.34	.32	.37	.15	.03	.20
CONTROL	−.05	.37	.17	.46*	.37	.58**	.54*	.29	.36
PERFORMANCE GOALS	.08	−.21	.18	−.02	.60**	.10	−.15	−.13	.00

*P < 0.05 **P < 0.01, *** P < 0.001
MEDIAN CORRELATION VALUE = +0.32

TABLE 28

MEDIAN CORRELATION VALUES BETWEEN
MANAGEMENT SYSTEM VARIABLES AND
ORGANIZATIONAL CLIMATE VARIABLES

Organization	Median Correlation Value	Probability
A	+0.44	0.009
B	+0.37	0.008
C	+0.24	0.088
D	+0.44	0.050
E	+0.37	0.090
F	+0.33	0.086
G	+0.32	0.086

NOTE: The level of statistical significance is dependent on the sample size and calculated value of S in the Gamma equation. The median correlation value for the sample = +0.36 and probability = 0.0002.

The detailed data for each organization show that correlational values were predominantly positive (93 percent) with 11 percent that were statistically significant at the 0.001 level. There were some negative correlations, 7 percent, but not a single one was statistically significant at the 0.05 level. As shown in Table 28, the median correlation values for organizations C, E, F, and G were not statistically significant at the 0.05 level but they were all statistically significant at the 0.09 level. This implies that there is less than a 9 percent chance that these relationships could have happened by chance. Since some researchers say that a 0.10 level of significance may be used in behavioral research,[1] this suggests that there was a very strong probability of relationship between these variables in this exploratory research.

Organizational Climate and Performance Relationships

The organizational climate variable mean scores, shown in Table 16, were correlated with the organizational performance ratings, shown in Table 20. These data are combined in Table 29 for ease of reference. The correlations were made by individually correlating the performance ratings with each of the organizational climate variable mean scores across all organizations. These nine correlation values and the associated probability values are shown in Table 30. The surrogate correlation value was +0.20, which is the median of the nine individual correlation values shown in Table 30. The probability of occurrence level was less than 0.333. This means that there is less than a 33.33

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[1]Kerlinger, Foundations of Behavioral Research, p. 170.

TABLE 29
ORGANIZATIONAL CLIMATE VARIABLE MEAN SCORES AND ORGANIZATION PERFORMANCE RATINGS BY ORGANIZATION

ORGANIZATION	ORGANIZATIONAL CLIMATE VARIABLE MEAN SCORES									ORG. PERFORMANCE RATING (PERCENT)
	STRUCTURE	RESPONSIBILITY	RISK	STANDARDS	REWARDS	SUPPORT	CONFLICT	WARMTH	IDENTITY	
A	21.423	18.846	14.500	18.500	17.000	14.307	9.807	16.461	12.653	94
B	21.392	17.000	13.571	16.000	16.035	13.500	9.750	15.857	11.321	99
C	21.370	14.819	14.814	17.555	16.962	13.555	11.074	15.074	11.370	81
D	21.476	19.047	13.380	17.047	18.523	15.619	10.952	16.857	12.428	91
E	20.100	20.100	12.800	15.700	17.300	12.800	10.600	16.600	9.700	70
F	20.642	20.571	15.357	18.428	17.928	15.214	10.857	15.214	11.357	94
G	20.500	17.571	12.142	18.357	17.571	14.214	10.500	16.142	11.857	88

TABLE 30

CORRELATION BETWEEN ORGANIZATIONAL CLIMATE VARIABLES AND PERFORMANCE RATINGS

Organizational Climate Variables	Performance Correlation Value	Probability
Structure	+0.40	0.115
Responsibility	0	0.500
Risk	+0.30	0.184
Standards	+0.30	0.184
Rewards	-0.10	0.382
Support	+0.30	0.184
Conflict	-0.50	0.066
Warmth	-0.10	0.382
Identity	+0.20	0.274

The median correlation value for the sample = +0.20 and probability = 0.333.

percent probability that this relationship could have happened by chance. Therefore, the relationship between organizational climate and performance is not statistically significant at the 0.05 level. In fact, none of the correlation values between the organizational climate variables and performance reached statistical significance in either direction.

Management System and Organizational Performance Relationships

The management system variable mean scores, shown in Table 15, were correlated with the organizational performance ratings, shown in Table 20. These data were combined in Table 31 for ease of reference. The correlations were made by individually correlating the performance ratings with each of the management system variable mean scores across all organizations. These eight correlation values and the associated probability values are shown in Table 32. The surrogate correlation value was +0.35, which is the median of the eight correlation values shown in Table 32. This sample correlation value is not statistically significant at the 0.05 level. The probability of occurrence value was less than 0.191, which means that there is less than a 19.1 percent probability that this relationship happened by chance. However, the performance correlations with two of the management system variables, communication and decision making, did reach statistical significance, as shown in Table 32.

Figure 7 provides a graphic presentation of the management system and organizational performance rating data obtained in this study. The data used in plotting Figure 7 were obtained from Tables 15 and 20. These data are tabulated in Table 33 for ease of reference. Organization A had the highest management system score, while organization B

TABLE 31
MANAGEMENT SYSTEM VARIABLE MEAN SCORES AND ORGANIZATION PERFORMANCE RATINGS BY ORGANIZATION

ORGANIZATION	MANAGEMENT SYSTEM VARIABLE MEAN SCORES								ORGANIZATION PERFORMANCE RATING (PERCENT)
	LEADERSHIP	MOTIVATION	COMMUNICATION	INTERACTION-INFLUENCE	DECISION MAKING	GOAL SETTING	CONTROL	PERFORMANCE GOALS	
A	13.784	13.572	14.425	14.004	13.068	13.675	14.092	11.036	94
B	13.814	12.496	13.335	12.538	13.130	11.854	12.580	9.020	99
C	13.303	12.355	13.077	13.422	12.839	12.737	13.259	10.723	81
D	13.933	13.661	13.924	13.591	13.081	13.202	14.047	8.583	91
E	13.580	11.642	12.870	12.070	11.785	11.898	12.840	7.497	70
F	13.428	13.285	14.071	14.071	13.571	13.714	13.428	10.071	94
G	13.714	13.639	13.170	13.257	12.907	13.210	14.171	12.138	88

TABLE 32

CORRELATION BETWEEN MANAGEMENT SYSTEM VARIABLES AND PERFORMANCE RATINGS

Management System Variables	Performance Correlation Value	Probability
Leadership	+0.40	0.115
Motivation	+0.20	0.274
Communication	+0.70	0.017
Interaction-influence	+0.40	0.115
Decision making	+0.80	0.008
Goal setting	+0.30	0.184
Control	0	0.500
Performance goals	+0.10	0.382

The median correlation value for the sample = +0.35 and probability = 0.191.

FIGURE 7

MANAGEMENT SYSTEM SCORE AND ORGANIZATIONAL PERFORMANCE RATING RELATIONSHIP

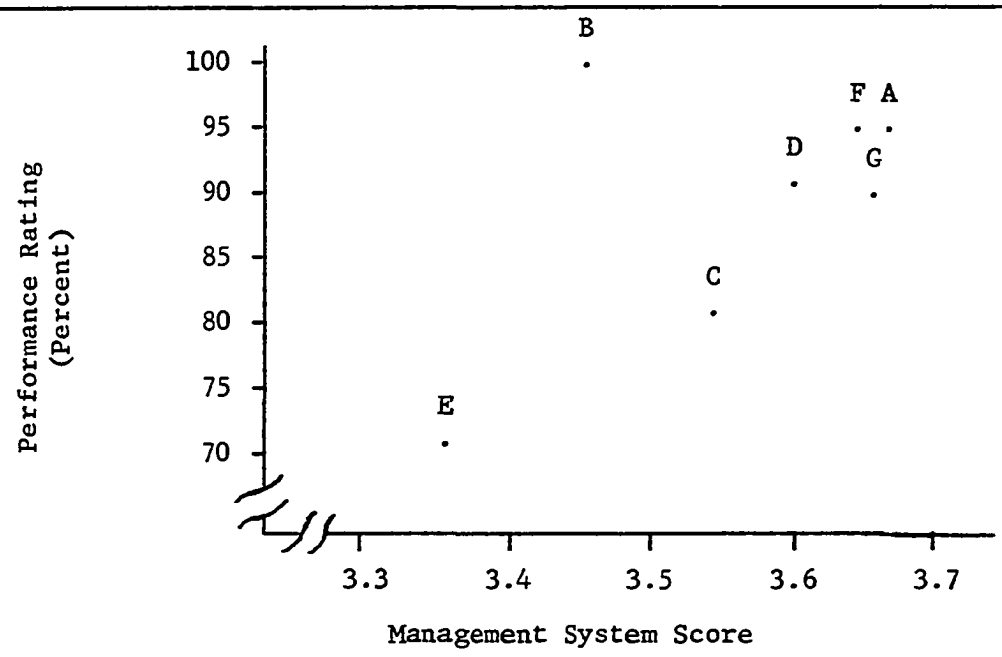

TABLE 33

MANAGEMENT SYSTEM SCORES AND ORGANIZATIONAL PERFORMANCE RATINGS

Organization	Management System Score	Performance Rating
A	3.691	94%
B	3.469	99%
C	3.542	81%
D	3.600	91%
E	3.354	70%
F	3.640	94%
G	3.655	88%

had the highest performance rating. Organization E had the lowest performance rating and also the lowest management system score. Since there is a positive correlation between the management system score and performance ratings, if a "best fit" line was drawn through the data points in Figure 7, it would have a positive slope.

Summary

This concluding section briefly summarizes major findings in the previous four sections to provide an overview of the research results.

The management system scores for all seven organizations clustered in the middle of the management System 3 scale. The management system variable scores were significantly different at the 0.05 level.

Both the organizational climate variable mean scores and the climate pattern scores for the seven organizations were significantly different at the 0.05 level. The organizational climate variable mean scores were not significantly different from the norm variable scores for American businessmen. The organizational climate pattern scores were also not significantly different from the pattern scores for American businessmen.

The performance ratings ranged from 70 to 99 percent.

The surrogate correlation values between the major variables in the research model were as follows:

Management system - organizational climate: +0.36

Organizational climate - performance: +0.20

Management system - performance: +0.35

Only the +0.36 value was statistically significant at the 0.05 level.

In the next chapter, the researcher will further analyze these findings and discuss the possible implications. There will also be some recommendations as to possibilities for future research.

CHAPTER V

DISCUSSION OF RESULTS, SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Introduction

The purposes of this chapter are to provide a discussion of the research results, summarize the findings, and discuss the conclusions, implications, and recommendations. In the first section, the researcher will discuss the results to clarify what has been learned about the concepts and variables investigated. In the second section, a summarization of the research findings will be presented for the purpose of reviewing the overall research results. In the third section, the researcher will discuss his observations and conclusions of the results based upon his knowledge of the research and the organizations studied, as well as the constraints and limitations. In the fourth section, there will be a discussion of the implications these findings may have for practicing managers and academicians. In the fifth section, the researcher will make recommendations for further research investigations.

Discussion of Results

Management System

The seven management systems were found to be statistically different, even though the management system scores clustered between 3.354 and 3.691 on the Likert scale. The scores of the eight management

system variables were examined to determine if any one variable was causing the statistical differences. It was determined that no one variable caused the management systems to be statistically different.

The scores for performance goals were always the lowest variable score in each organization. This finding is consistent with Likert's reasoning for adding the three statements to his questionnaire relative to performance goals.[1] Likert stated that he expected responses to these three statements would be somewhat different than those on the other 48 statements. But if an organization, in fact, had a management System 4, then the responses to these three items on performance goals would be at the favorable end of the continuum, because the effective application of the principle of supportive relations would require this condition. "This does not apply to other systems of management. It is possible for an organization or manager using any of the Systems from 1 through 3 to hold various levels of performance goals or to provide various amounts of management and other training. There is no particular reason to expect a System 3 organization to score higher or lower on these three items than a System 2 organization."[2] Since none of the organizations studied had a System 4, with the performance goals variable removed, then the lower scores on this one variable is apparently of no important significance.

Based upon research data presented by Likert, Butterfield, Farris, Golembiewski et al., Patton, and Curtis,[3] the management system scores

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[1]Likert, The Human Organization, pp. 118-119.

[2]Ibid., p. 119.

[3]Likert, The Human Organization, pp. 26-27; Butterfield and Farris, "The Likert Organizational Profile: Methodological Analysis and

in this sample are higher than those usually found in American business unless there has been a specific effort to move an organization toward a System 4 as reported by Morrow, Bowers, and Seashore.[1] Of the literature reviewed, only Patton has reported the management system found in another aerospace organization. He found a management system score of 2.9 in the organization studied in 1969. The other works cited above reported finding management system scores that were usually less than 3.5. Since the management system scores were generally higher than most of the ones previously reported, it is not known whether these particular organizations had management systems that were higher than the average for all aerospace organizations or whether aerospace organizations would generally have higher scores. Since these organizations were believed to be representative of many aerospace organizations, the latter seems more likely. Aerospace management may generally have recognized the professionalism and individualism in their employees and this was reflected in the amount of trust, confidence, and group participation within the organizations under study. The clustering of the management system scores implies that the more consultative approach is not coming from just one firm or locale, but rather it appears to be more generalized through all the organizations in this sample of aerospace organizations.

Test of System 4 Theory in Brazil," p. 17; Robert T. Golembiewski, Robert Munzenrider, Arthur Blumberg, Stokes B. Carrigan, and Walter R. Mead, "Changing Climate in a Complex Organization: Interactions Between a Learning Design and an Environment," Academy of Management Journal 14 (December 1971):465-481; Patton, "Interrelationship of Organization Leadership Style, Type of Work Accomplished, and Organizational Climate with Extrinsic and Intrinsic Motivation Developed within the Organization," p. 84; Curtis, "The Management System and Its Impact on The Organization," p. 145.

[1]Morrow, Bowers, and Seashore, Management By Participation, pp. 145-220.

The eight variable scores obtained with the management system test instrument were reviewed to determine if any one variable appeared more significant in determining the overall management system score. None of the variable scores was always consistent with the overall management system scores. In other words, the ranking of lowest to highest scores on any variable did not match an equivalent order of the organization's management system scores in the sample.

Organizational Climate

The organizational climates were found to be statistically different among the seven organizations. The climate variable scores were statistically different and also the climate pattern scores were statistically different among the seven organizations. The scores of the nine climate variables were examined to determine if any one variable was causing the statistical differences. It was determined that no one variable caused the climates to be statistically different.

The finding that the organizational climates in the seven organizations were statistically different is consistent with the statements of Gellerman, Davis, and others wherein each organization was reported to have its own distinct climate or personality.[1]

The organizational climate variable mean scores and the pattern scores in this sample were statistically the same as the norm variable scores and pattern scores, respectively, for American businessmen. Because of the professionalism and dedication which is evident in the aerospace industry, the researcher expected the organizational climate

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[1]Gellerman, "The Company Personality," p. 5; Davis, "Rules, Hierarchy, and Organizational Climates," pp. 50-55.

to be higher than the norms for American businessmen. Curtis had previously found that a government hospital organization had an organizational climate that was significantly lower than the norm.[1] Additional research is needed to further clarify these relationships.

As previously stated, the aerospace sample displayed a larger score on social inclusion than on any of the other climate patterns. The Litwin and Stringer norm scores are also higher on the social inclusion pattern. Social inclusion includes the warmth and identity climate variables. From the Litwin and Stringer findings, the social inclusion factor is positively related to the development of affiliation motivation, unrelated to the development of power motivation, and weakly related to the development of achievement motivation.[2] The social inclusion score in this study suggests that these aerospace employees perceived a climate that was more related to affiliation motivation than to power or achievement motivation. Affiliation motivation can be aroused by management's building a stronger feeling of mutual support and encouragement. A manager can stimulate affiliation motivation by taking a warmer and more personal interest in his employees.[3]

Organization Performance

As stated previously, the performance ratings ranged from 70 to 99 percent. The statistical differences could not be calculated because the multivariate data that make up the total performance rating scores

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[1]Curtis, "The Management System and Its Impact on The Organization," pp. 178-179.

[2]Litwin and Stringer, Motivation and Organizational Climate, p. 146.

[3]Ibid., pp. 169-170.

were not available since they are NASA-sensitive. Because of the relatively wide range, 29 percent, in the performance rating scores, it is the researcher's opinion that they are statistically different.

The period of time the organizations under study had been under contract with the NASA Field Center ranged from approximately six months to seven years with a mean of about three years. In comparing the performance rating score and the age of the contract, it became apparent that a definite pattern existed. As might be expected, when dealing with a single customer, the longer the association is in existence the better the performance rating becomes. This may occur because the desires of the customer are passed on to the contracting organization during the many program reviews and performance evaluation discussions. The trend in performance ratings over a period of time is usually upward unless there are technical problems in hardware operation late in the contract period. This intuitive observation was verified by determining the Gamma correlation between the age of the contracts and organizational performance. The data for this comparison are listed in Table 34. A strong relationship of +0.70 was found, which is statistically significant at the 0.05 level. The probability of occurrence value of this relationship was 0.015, which means that there is less than a 1.5 percent probability that this relationship could have happened by chance. This determination suggests that the length of time under contract is a good indicator of performance, under an award fee contract, where there is a single customer.

TABLE 34

ORGANIZATIONAL PERFORMANCE AND AGE OF CONTRACT

Organization	Performance Rating	Age of Contract (Years)
B	99%	4.5
A	94%	3.0
F	94%	3.0
D	91%	7.0
G	88%	2.0
C	81%	1.0
E	70%	0.5

Management System and Organizational Climate Relationships

A statistically significant (probability value = 0.0002) correlation value of +0.36 was found between the management system variables and organizational climate variables in this study. Since the management systems in the seven organizations were statistically different and the seven organizational climates were statistically different, this correlation value implies that there was a positive, interactive relationship between these two major variables. Therefore, respondents who perceived higher levels of management system also perceived higher levels of organizational climate.

The above finding supports the theoretical conceptualization of Gibson, Ivancevich, and Donnelly[1] since four of the seven variables they used as "causal inputs" in their integrative systems model are also in the management system test instrument that was used in this research. This finding is also in agreement with the findings of Curtis and Meyer.[2]

The highest positive correlation values in this study were found between the "identity" climate variable and the management system. These values imply that the employees who had relatively more pride in being members of the organization and felt more a part of the aerospace team also perceived relatively higher management systems. This characteristic was a NASA goal during the manned space flight programs. The manned flight awareness program was implemented by NASA to instill a feeling of

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[1]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, p. 328.

[2]Curtis, "The Management System and Its Impact on The Organization," pp. 219-220; Meyer, "Achievement Motivation and Industrial Climates," pp. 151-166.

significance and importance to every job. The NASA astronauts helped stimulate the NASA awareness program by visiting the applicable plants to personally meet the employees and inspect the flight hardware during its manufacture. It is reassuring to see this characteristic reflected in this study.

Two climate variables, structure and responsibility, tended to have the lowest correlational values with the management system. This finding implies that employees who perceived a more highly structured organization also perceived a less participative type of management system. Likewise, this finding implies that employees who perceived a higher degree of responsibility also perceived a less participative type of management system. This finding also tended to reflect a recognizable characteristic of the aerospace industry; that is, individuals have been continually reminded of their responsibility to do a good job correctly the first time. Likewise, NASA quality controls and awareness standards are so stringent that many people must check and double-check every action. A feeling of individual responsibility is emphasized, but a highly structured review system may have tended to cause some to perceive less participation, and, therefore, less responsibility in their organizations.

From an analysis of all the sample correlational values between the management system variables and organizational climate variables, the communication variable had the highest overall correlation values with the organizational climate variables. These results imply that the employees who perceived a more open, multi-directional communication system within their organizations were most likely to also perceive the higher degrees of organizational climate.

Organizational Climate and Performance Relationships

A correlation value of +0.20 (Table 30) was found between the organizational climate variables and performance. This value was not statistically significant (probability value = 0.333). Therefore, in this study, even though the organizational climates were statistically different and the performance ratings had a 29 percent spread, organizational climate apparently had a negligible impact upon performance. This result may reflect what actually exists in aerospace organizations because of the task holding the organization together. Another explanation for this result could be that since there is a high degree of professionalism and pride in performing the job, the typical behavioral aspects of climate that normally apply may not be as relevant in this highly technical, complex industry. Still another and more likely cause for not obtaining a statistically significant correlation is the small sample size. With only seven organizations from which to obtain data, a higher correlation is required to reach statistical significance. It is not known whether this correlation is meaningful or not, since the sample size requires higher levels of correlation for statistical significance. It is also possible that the previously discussed variance with the length of contract is a compounding variable, making the bivariate relationship less obvious. More research is needed to further clarify these relationships.

Since the above correlation value is not statistically significant, the fact that it is positive is of little real significance. However, the positive relationship supports the conceptualization of Gibson,

Ivancevich, and Donnelly[1] and the simulation work of Kaczka and Kirk.[2] It also supports the findings of Lawler et al., Litwin, and Stringer.[3]

Additional analyses, using the Gamma statistic, were performed to determine the correlation between the organizational climate pattern scores and performance ratings obtained in this study. The following correlations and corresponding probabilities were found but none was statistically significant at the 0.05 level:

1. Structure scores and performance = +0.27, P = 0.1788
2. Challenge scores and performance = +0.20, P = 0.2611
3. Reward and support scores and performance = 0, P = 0.500
4. Social inclusion scores and performance = +0.40, P = 0.1093

From a review of these data, it is evident that since none of the relationships is statistically significant, the direct comparison of these correlations with theory and other related research becomes highly speculative. These findings do imply that there are positive relationships between three of the pattern scores and performance.

Management System and Performance Relationships

A correlation value of +0.35 (Table 32) was found between the management system variables and performance ratings. This value was not statistically significant (probability value = 0.191). Therefore, in

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[1]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, p. 328.

[2]Kaczka and Kirk, "Managerial Climate, Work Groups, and Organizational Performance," pp. 254-272.

[3]Lawler, Hall, and Oldham, "Organizational Climate: Relationship to Organizational Structure, Process, and Performance," p. 139; Litwin and Stringer, Motivation and Organizational Climate, pp. 138-140.

this study, even though the seven management systems were statistically different and the performance ratings had a 29 percent spread, the management system variables apparently had a negligible impact upon performance. From the size of the correlation value, the researcher is of the opinion that a possible reason for not obtaining statistical significance is the small sample size.

Even though the correlation value is in the correct direction, its failure to achieve statistical significance in this relationship does not fully support Likert's contention that organizations with the higher management system is also the higher producing.[1] This nonsignificant relationship tends to support the finding of Butterfield and Farris where they found that the management system was unrelated to organizational performance.[2]

The correlation values between two of the management system variables (communication and decision-making processes) and performance in this study were positive and statistically significant. The correlation between communication and performance was +0.70 with a probability value of 0.017. The correlation between decision making and performance was +0.80 with a probability value of 0.008. These correlations imply that there is a strong, positive relationship between higher levels of organization performance and (1) higher levels and multiple directionality of communications in an organization, and (2) decentralized decision making.

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[1]Likert, The Human Organization, p. 3.

[2]Butterfield and Farris, "The Likert Organizational Profile: Methodological Analysis and Test of System 4 Theory in Brazil," pp. 15-23.

Summary Review of Research Results

The summary presentation of findings in this section will address the specific research questions from Chapter I. After stating each question, the appropriate findings will be summarized relative to that question. Finally, the research model is used to summarize the research results.

Research question 1 asked if management svstems are positively related to perceived organizational climate.

The results of this study affirmatively support this question. A positive and statistically significant correlation value of +0.36 was found between the management system and organizational climate variables in this investigation of seven aerospace organizations. The probability of occurrence value for this correlation was 0.0002. This value means that there is less than a 0.02 percent probability that this relationship could have happened by chance.

The management system variables were statistically different as were the organizational climate variables. At the organization level, the correlation between these two variables showed a number of relatively strong relationships. In fact, 11 percent of all the correlation values obtained were statistically significant at the 0.001 level. This is considered by the researcher to be a relatively strong, positive correlation between the management system and organizational climate. This correlation implies that those respondents who perceived higher levels of management system variables also perceived higher levels of organizational climate variables. Therefore, a very positive and interactive relationship existed between these two major variables in this sample,

a finding which implies that the management system variables have a positive relationship with organizational climate variables.

Research question 2 asked if organizational climate is positively related to organizational performance.

The results of this study affirmatively support this question only in direction. A statistically nonsignificant correlation value of +0.20 was found between organizational climate variables and organization performance in this investigation. The probability of occurrence value was 0.333, which means that there is less than a 33.3 percent probability that this relationship could have happened by chance.

The organizational climate variables were statistically different, and although the performance values could not be tested for statistical difference, it is the researcher's opinion that they are different since there is a 29 percent spread in the performance ratings. However, this low and nonsignificant correlation value suggests that, in this sample, organizational climate did not really have much impact on performance. The relatively high probability value also suggests that there could be a one-in-three chance that the relationship identified could have happened by chance. However, the negative correlations, three out of nine (Table 30), cannot be ignored. This fact implies that there may be an inverse relationship between some of the organizational climate variables and performance ratings in this sample of aerospace organizations.

Research question 3 asked if management systems are positively related to organizational performance.

The results of this study could affirmatively support only the positive direction portion of the question, since the correlation value of +0.35 was not statistically significant. The positive nature of the

correlation can only be considered indicative under the circumstance. The probability of occurrence value was 0.191, which means that there is less than a 19.1 percent probability that this relationship could have happened by chance. This probability of occurrence value suggests that there could be a one-in-five chance that the relationship could have happened by chance. However, this positive surrogate correlation value and the fact that all of the correlation values between the management system variables and performance were positive should be recognized. This fact implies that there may be a direct relationship between the management system and performance for this sample of aerospace organizations. There were two positive and statistically significant correlation values, +0.70 and +0.80, with probabilities of 0.017 and 0.008, between the communication and decision-making process variables of the management system and organization performance, respectively. These correlations imply that the direction and amount of communication and the degree of decentralized decision making had an impact on organization performance in the seven organizations under study.

The research model, Figure 8, is used to summarize the findings of this study by identifying the surrogate correlation values and probabilities derived from the data which were collected from seven organizations in the aerospace industry and their single customer (NASA) to answer three research questions.

Based upon the data from this sample, as discussed above, organizational climate did not appear very important as an intervening variable in the research model. The behavioral phenomena, identified in the Gibson et al. model,[1] that were shown to be a resultant of organizational

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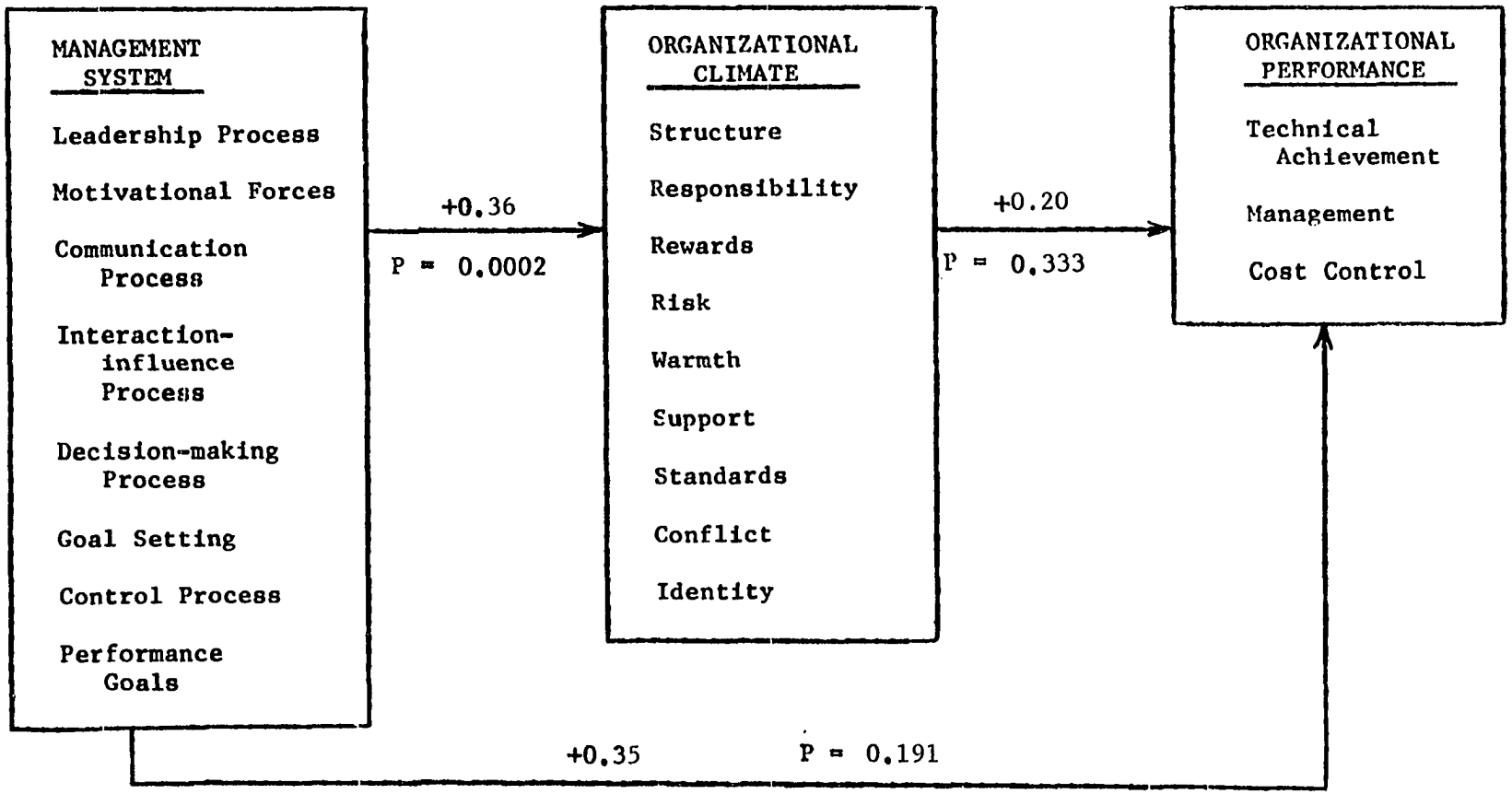
[1]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior," p. 328.

FIGURE 8

RESEARCH MODEL WITH SUMMARY OF RESULTS



climate apparently had little impact upon the organization's performance rating in this study. It is the researcher's opinion that the low and statistically nonsignificant correlation values obtained is a direct result of the small number of organizations. There may also be other contributing factors, such as (1) the organizational climate test instrument may not be valid in this industry, (2) higher correlations may be more dependent upon long-term rather than short-term performance evaluations, (3) the age of the contracts may be an overriding factor, and (4) univariate and bivariate analyses may not be powerful enough given the complexity of the research. More research of this nature is needed in the aerospace industry to confirm or deny this evaluation.

Observations and Conclusions

This section includes the researcher's observations and conclusions about the research project. These opinions recognize the constraints and limitations imposed upon the study.

Since this investigation was designed to be exploratory in nature, any inference that a cause and effect relationship has been found cannot be made. Inferences to organizations outside this sample relative to findings stated herein would also be erroneous.

The use of nonparametric statistics may have contributed to the inability to obtain statistical significance because nonparametric statistics lack the power and efficiency of parametric statistics. This is not to suggest that nonparametric statistics is not appropriate, but only points out a problem that must be recognized when using nonparametric statistics.

Larger sample sizes from each organization, as well as a larger number of participating organizations, would have also been helpful. In fact, the small number of participants, especially in the smaller organizations, and the small number of organizations may be major contributing factors to the lack of statistically significant relationships. It becomes obvious how important a sample size of 28 versus 10 becomes by reviewing the individual correlation values and their level of statistical significance in the correlations between management system variables and organizational climate variables. As an example, in Table 22 where there was a sample size of 28, a correlation value of 0.27 was statistically significant at the 0.05 level. But in Table 25 where there was a sample size of 10, it took a correlation value of 0.46 to be statistically significant. In Table 22, this 0.46 value would have been statistically significant at the 0.01 level. This problem is compounded in the performance correlations where a single value for each of the seven organizations was used. A very high correlation value is required in order to reach statistical significance with only a sample size of seven. The researcher concludes that given the test instruments and performance data of this study, the seven organizations and small number of participants in some of the organizations do not provide a good statistical base for the comparative analysis that was attempted.

The researcher further recognizes a problem in the manner of using the correlation values obtained from data that were calculated from different sample sizes. Since the organizations were different in size, the number of data points being used for correlations were different. This difference in number could impact the "S" value in the Gamma

statistic equation which directly influences the size of the correlation value. The "S" value is defined as "(the number of times rankings agree about a pair) - (number of times rankings disagree)."[1] Since there was an unequal number of participants in each organization, the number of rankings, which affect the size of the "S" value, was also different in each organization. Therefore, the surrogate median correlation value for the management system and organizational climate had to be tested for statistical significance by referring the total number of observations to the normal distribution. The surrogate median correlation values between organizational climate and performance, as well as between the management system and performance, were obtained by correlating the organization's variable mean scores with the organization performance ratings. In these two cases, the number of rankings was seven which was also the organization sample size. The statistical probability could be obtained directly from Tables provided by Siegel since the sample size was less than 10.[2] For these concerns, unless there are a large number of organizations, there should be a large and equal number of participants in each organization for a comparative analysis of this nature in future research.

The 71 percent average return rate of questionnaires was considered very good in comparison to Kerlinger's prediction of 40 to 50 percent.[3] Because of the researcher's position with NASA and the requirement to maintain strict confidentiality and anonymity, there appears to have been very little choice in the manner of questionnaire

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[1]Hays, Statistics For Psychologists, p. 647.

[2]Siegel, Nonparametric Statistics, p. 285.

[3]Kerlinger, Foundations of Behavioral Research, p. 414.

distribution and return. An alternative that possibly would have resulted in a larger number of returned, usable questionnaires from the same recipients would be to have used a stand-in from the university to explain or answer any questions while the recipients completed the questionnaires on company time.

The two questionnaires consisted of nine pages and 101 different statements. This package may have appeared too time consuming by some of the non-respondents. Some researchers have stated that the primary reason for non-response is that the recipients feel that the questionnaires are too long.[1] The size of the questionnaires could have been reduced by using Likert's Form S (20 questions) and, as suggested by Litwin and Stringer, deleting the conflict section of the organizational climate test instrument. This package would have then consisted of 66 questions instead of 101. This reduction in questionnaire size is an alternative, but the researcher considered that using the total questionnaires as they now exist was the most appropriate for a complete research project, as well as for consistency and comparability.

Given the difficulty and complexity of developing a performance evaluation measuring instrument, the use of "hard" performance data is still considered by the researcher to be the most appropriate method for obtaining performance data where only one customer is involved. The NASA performance evaluation process has been in continual and growing use for over ten years. Its use has proven to be mutually satisfactory to both NASA and the contractors. NASA uses the award fee feature of contracting as a motivator toward better performance. It is seen by both as having reliability, validity, and consistency.

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[1]Glen Petry and Stanly Quackenbush, "The Conservation of The Questionnaire as a Research Resource," Business Horizons 17, No. 4 (August 1974):43-47.

The performance ratings were measured by NASA criteria in the short-run. Therefore, as stated previously, conclusions about long-term organization effectiveness cannot be made. There is an unproven relationship between a true, long-term qualitative, quantitative, and systemic evaluation of effectiveness and performance that needs further investigation.

Even though the management systems were statistically different, had there been larger differences, for instance a range from 2.0 to 3.8, there may have been a significant impact on organizational performance. Likewise, had there been larger differences in the organizational climate variable scores, a significant relationship may have occurred between climate and performance even with the small sample size.

Some brief background may help in understanding why only a small number of contractors agreed to participate in this study and also why several of the participating organizations were so small. Two of the seven participating organizations had once been rather large but had been reduced considerably in size as their contracts were nearing completion. Two of the seven participating organizations were in a build-up phase, increasing the number of employees. The other four participating contractors were in a rather static period where the employment level was stable with expectations of remaining stable for some time. Therefore, from an economic standpoint, the researcher is of the opinion that the participating organizations were representative of the aerospace environment and also provided a balanced representation between declining and growing organizations. The economic conditions should not have adversely biased the results of this study, since each organization

was treated equally in the use of its data to arrive at a surrogate correlation value.

As stated previously, the aerospace industry has been economically depressed for several years because of the continual decrease in the total NASA budget for research and development. The agency's money is continually being more widely distributed to many different and smaller programs. As an example, large numbers of Space Shuttle payloads are in the development stage. This involves many contractors competing for relatively small, short-term contracts which involve several phases of activities prior to the final competition on the "production" contract. Production is really a misnomer in the sense that maybe only a total of three or less particular instruments or experiments will be built. However, because of their complexity, the contract cost may still be in the multiple millions of dollars spread over several years.

Because of the above described environment of the aerospace industry, the size of the organizations to accomplish these smaller jobs is much smaller than previously required on the larger space vehicles. The complexity of the job and the expertise to conceptualize, design, and build the experiments, for instance, are still increasing. Because of the small contracts involved, contractors cannot afford to spend proposal money and time trying to respond to each request for proposal that NASA releases. As a result, firms attempt to build up their expertise and capability in selected areas to improve their competitive position in those areas. These capabilities become known in the industry, and as a result, it is not uncommon to receive three or less proposals in response to a NASA request for proposal.

The question of technology differences in the participating organizations was addressed in Chapter III. The basic conclusion was that technology was equally high and not measurably different. Further, the NASA method of always evaluating performance in terms of the same three criteria tended to equalize any real technology differences. Support for not considering technology as a variable in this research was based upon the work of Mahoney and Frost, who found no statistical relationship between technology and organizational effectiveness.[1] The researcher is of the opinion that any differences in level of technology that may be discernible in the participating organizations did not bias the results of this study. A detailed description of the work in each organization to highlight any differences or similarities is prohibited if anonymity is to be maintained. However, from the researcher's personal knowledge of the type of work that was being done in each organization and the manner in which the detailed performance evaluation criteria are selected, he is convinced that the technology was equally high and not measurably different in the participating organizations.

From the results of this study, the researcher concludes that management systems do have an impact on organizational climate. Although the research results do not substantiate a significant influential relationship between the management system and performance, there is an intuitive feeling that this relationship existed, based upon all the positive, yet not statistically significant, correlations between the management system variables and performance. A larger sample size

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[1]Mahoney and Frost, "The Role of Technology in Models of Organizational Effectiveness," p. 76.

might have substantiated this feeling. A positive and statistically significant relationship between organizational climate and performance was expected. Even though the strength of the correlation and probability levels were most assuredly dependent upon the small sample size, the several negative correlation values between the organizational climate variables and performance were not considerably different from similar data recently reported by others.[1]

Implications

This section includes a discussion of what implications the results of this study may have to both the practicing manager and the academician. Although the data from this study alone do not fully support all of the implications and conclusions made in this section (primarily because of the small sample size), the general tendencies found, and the researcher's knowledge of the aerospace industry lead him to believe the following:

To the practicing manager, the results of this study tend to show that the management system he establishes could have an impact on the organization's performance. When that organization has only one customer, there is a period of learning what that customer expects. Therefore, in the very early stages of a contract, there should be a significant interchange of communication between the contractor and NASA project manager to plan, to their mutual satisfaction, the work to be done.

The aerospace project manager must assess the types, numbers, and caliber of people needed to perform the contract work. The initial

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[1]Lawler, Hall, and Oldham, "Organizational Climate: Relationship to Organizational Structure, Process, and Performance," p. 150.

impressions the manager and his subordinates make upon this new organization are critical. At the outset is the best time to establish the desired management system. The sooner a participative type of management system is established and the desires of the customer are determined, the more likely the organization's performance ratings will be to start high and continue to increase.

The fact that all of the organizations in this study had a management system that was perceived to be in the middle of Likert's management System 3 scale reflects aerospace management's belief in human recognition. These relatively high management systems imply that aerospace management is recognizing the implications of company policy and procedures relative to the human organization. Because of very liberal moving allowances and offers of larger salaries by competing firms in the last fifteen years in the aerospace industry, there appears to be less importance attached to the organization and more importance attached to the work itself and the associated professionalism. The lure of more fascinating assignments with other firms has decreased with the current economic conditions and fewer large contracts.[1] But the die has apparently been cast relative to recognizing the professional's desire to be a member of an active team in establishing the goals of the organization so that they are more compatible with the individual's goals and objectives. The implication from this finding is that aerospace management should consider the human organization when establishing a management system that will be conducive to maximum effectiveness and be attractive to future employees.

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[1]Dan Miller, "Firms Cut Down on Extra To Move Relocated Worker," The Huntsville Times (August 17, 1975):33.

The clustering of the management system scores implies that the considerable movement of personnel and management has tended to provide a degree of homogenization to the management policies and practices. A portion of this standardization in policies could also be attributed to certain government regulations that are applicable to contractors, as well as personal influences that the particular NASA Field Center personnel may have established over a period of time with closely associated contractors. Another possible explanation of why the management system scores clustered in the middle of management System 3 is the situation often found where the organization is managed by engineers that have come up through the ranks. In this respect, they may be more likely to continue a peer relationship with all members of the organization rather than the more formal superior-subordinate type of relationship. The peer relationship appears to be compatible with the consultative type of management system found in this research.

The engineer-manager who has not been trained in human relations should note the importance of a participative organization built through mutual trust, respect, and open communications. The human organization must be treated as a valued asset in much the same way that delicate machinery must be continually maintained to meet critical production rates and schedules. Men, like machines, can often be driven for long periods without attention and care, but this is a form of liquidation, and cash from liquidation is not earnings. Much time and sizable investments are required to rebuild a liquidated human organization.

The practicing manager must be cognizant of what impact his policies and actions have on the human organization. Likert[1] and others

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[1]Likert, The Human Organization, p. 26-28.

have repeatedly shown that employees desire a management System 4, based upon data obtained with the Likert test instrument. A study of the Likert test instrument questions indicates the type of policies, procedures, and working relationships required of management in order to move toward a management System 4. Basically, a manager must adopt the supervisory principle of supportive relations, establish high performance goals through human development training programs, practice group methods of involvement and participation, decentralize decision making, and maintain a very open communication system where there is evidence of confidence and trust. The degree of interaction-influence employees perceive is also an important element in the overall management system. Interaction-influence can be enhanced by allowing employees to contribute their own ideas and be a party to establishing the organization's goals, as well as the methods for achieving them. This is the same principle that Coch and French discovered at the Harwood Manufacturing Company in 1948 where participation was used to overcome resistance to change.[1]

Organizational climate, both the variables and patterns, in this study were not significantly different from the climate norms of other American businesses, even though the management systems were higher than expected. The implication of this finding is that the task or work at hand was more important than the behavioral aspects of the organization. As stated previously, the "identity" climate variable appeared to have a consistently higher correlation value with the management system than any other variable. This suggests that employees in this highly complex

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[1]Wren, The Evolution of Management Thought, p. 334.

industry desired a management system that recognized individual as well as team accomplishments. Perhaps a highly technical work force needs a better climate than that found in other businesses, and since the climates in this study were clustered so closely to the American business norms, the climate variable scores did not have sufficient variation to provide significant correlation and probability values. Additional research will be needed to confirm or deny this implication.

The project manager may increase his performance ratings by arousing the type of motivation that his employees need. Although Litwin and Stringer stress that the best particular climate depends upon the motivational needs of the employees, the results of this study tend to focus those needs toward affiliation motivation in this aerospace sample. Affiliation motivation can be aroused by management's taking a warmer and more personal interest in the employees. Employees that have a need for affiliation motivation like to perceive high levels of warmth, friendliness, approval, support, and group identity. They normally do not like to work alone and prefer to have the feeling that each person in the organization is a significant member of an important and successful team.[1] The climate perceived by the employees is also perceived by prospective employees. Prospective employees tend to seek climates that meet their motivational needs.[2]

To the academicians, the results of this study indicate some support of Likert's theory that the more participative organizations are

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[1]Litwin and Stringer, Motivation and Organizational Climate, p. 180.

[2]Schneider, "Organizational Climate: Individual Preferences and Organizational Realities," pp. 211-217.

the higher performing organizations. This indication is evidenced by the positive correlations between the management system variables and organizational performance. However, when organizational climate is used as the intervening variable as shown in the research model, these data do not fully support the Gibson, Ivancevich, and Donnelly integrative systems model,[1] since the correlation values between performance and the other two major variables were not statistically significant. This conclusion is based upon the initial assumption that organizational performance, as used herein, is synonymous with their effectiveness factors. Several conclusions could be drawn: (1) Performance and their effectiveness factors are not synonymous, (2) their integrative systems model does not reflect the proper relationships between the major variables, (3) these sample data are not representative of the industry, (4) the aerospace industry is not characterized by this model, (5) performance as measured here is not the same as the effectiveness measured by Gibson et al. when they use such variables as productivity, satisfaction, absenteeism, and turnover, (6) there was an insufficient number of organizations studied to provide an adequate level of statistical significance, (7) there were other compounding variables unrecognized by the researcher, or (8) the variance in the independent variable was not broad enough (although statistically significant) to produce a meaningful or measurable impact on the intervening or the dependent variable. It is thought to be a combination of the above, but additional research is needed to substantiate this thinking.

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[1]Gibson, Ivancevich, and Donnelly, Organizations: Structure, Processes, Behavior, p. 328.

This study supports the views of Forehand, Gilmer, Davis, Gellerman, and Schneider in their contention that all organizations have noted differences and distinct climates.[1] Each of the seven organizations under study had noted differences in their organizational climate variable scores and pattern scores since they were statistically different. No two organizations had climates exactly alike, although there were many similarities. One of the most notable similarities was the perceived organizational structure scores which were clustered between 20.1 and 21.476. This finding lends support to the conclusions reached by Lawrence and Lorsch[2] on the contingency relationships between organization structure and the turbulence/uncertainty of the environment which in this case should be quite similar for each organization.

This study does not substantiate the Litwin and Stringer[3] experimental finding that showed climate having a significant impact on performance, but their study was a laboratory experiment where they could control all the variables. In this case there were many factors which could affect performance other than behavior and the management system such as negotiating good contracts; making timely technological breakthroughs; and political, legal, and environmental factors which may be beyond management control.

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[1]Forehand and Gilmer, "Environmental Variation in Studies of Organizational Behavior," pp. 361-382; Gellerman, "The Company Personality," pp. 5-9; Davis, "Rules, Hierarchy, and Organization Climate," pp. 50-55; Schneider, "Organizational Climate: Individual Preferences and Organizational Realities," pp. 211-217.

[2]Lawrence and Lorsch, Organization and Environment, pp. 180-184.

[3]Litwin and Stringer, Motivation and Organizational Climate, pp. 138-144.

If the concept of Wendell French[1] is used wherein Likert's management systems are treated as different leadership styles, the Litwin and Stringer experimental finding that different leadership styles create different organizational climates still cannot be fully supported by the findings of this investigation. Although the management systems were statistically different, they did not have a significant impact on performance.

The findings in this research suggest that the management system may be an important variable relative to improving organizational climate and obtaining a high level of performance. The importance of organizational climate variables relative to the management system variables and to performance was rather inconclusive; however, the results suggest that performance tends to be related to organizational climate variables. Since neither of these findings were statistically significant, there needs to be further clarification of this inconsistency.

Additional research should be conducted to further clarify some of the relationships examined in this study. Repetitive results with predictive value are needed to support a theory of organizational performance.

Recommendations For Future Research

Future research should include a study of this nature that uses a time series of measurements that would help show how the management system and organizational climate changes over the period of time the organization is adapting to the performance requirements of the single customer while monitoring any changes in performance ratings.

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[1]French, The Personnel Management Process, p. 108.

An appropriate research project to further the efforts of this research would be a follow-up evaluation on a project manager and his organization which had achieved good performance ratings on one contract but is now initiating a new project. Correlation of the results from the two projects could help provide the predictive evidence needed to support a theoretical concept.

Another appropriate study should use the entire Gibson, Ivancevich, and Donnelly model, as presented in Chapter I, in formulating a more detailed investigation to fully substantiate the integrative systems model. A study of this depth could be more appropriately conducted in the field rather than experimentally, but such an effort would be a major research program beyond the scope of a typical dissertation that is lacking in research funding. An experiment that properly simulated all the indentifiable variables in the model would appear to require an inordinate amount of time. However, more experimental work is needed to determine the relationship between organizational climate and performance as well as management systems and performance in the aerospace industry.

A more modest research project would be to replicate this study with a larger number of organizations having similar contracts. A larger sample size within each organization would increase the power of the nonparametric statistics. The researcher would recommend that a member of the university staff administer the questionnaire on company time as suggested previously. Additionally, the organizational members should be asked for their evaluation of the organization's performance against the same multivariate criteria that are used by NASA. This additional data could be used to determine the accuracy of using employee

perceptions in evaluating organizational performance. As a means of evaluating the NASA's performance criteria as measures of effectiveness, a research project could be conducted to fully explore the relationships. However, since the detailed performance criteria on active contracts are NASA-sensitive, such a study would probably have to be conducted internally to NASA. Given the importance of achieving successful missions and the importance of effectiveness in this complex industry, a continual effort should be applied to discover the key variables and their relationships to other variables which may affect the management system, organizational climate, and organizational effectiveness, in both the short and long-run.

APPENDIX I

AUTHORIZATIONS FOR USE OF QUESTIONNAIRES

Profile of Organizational Characteristics

Organizational Climate

614 Hillmont Street

October 30, 1974

McGraw-Hill Book Company
1221 Avenue of the Americas
New York, N. Y. 10021

Dear Sir:

The Profile of Organizational Characteristics Questionnaire developed by Dr. Rensis Likert, and published in The Human Organization: Its Management and Value, 1967, is applicable to a research study I am conducting to complete the requirements for a doctoral degree at the University of Oklahoma.

I am interested in examining the degree of association between management systems, organizational climate, and performance in several organizations in the aerospace industry. The Profile of Organizational Characteristics Questionnaire has been selected as an appropriate instrument for measuring the management system variables in this organizational study.

Request your permission to use the Profile of Organizational Characteristics Questionnaire, as shown in Appendix II of The Human Organization: Its Management and Value, for the purpose stated. I will receive no remuneration for the study and will use the material and data only for incorporation into my dissertation. The source of the questionnaire will be clearly stated. May I also have permission to bind a copy of the questionnaire into my dissertation?

Sincerely,

Bervil D. Davis

Bervil D. Davis

McGraw-Hill Book Company

1221 Avenue of the Americas
New York, New York 10020
Telephone 212/997-1221

November 7, 1974

Bervil D. Davis
614 Hillmont Street

Dear Ms. Davis:

We are pleased to grant permission to use material from the following work in the manner indicated in your request of October 30; for inclusion in your limited non-commercial thesis:

Likert: THE HUMAN ORGANIZATION: ITS MANAGEMENT AND VALUE
The Profile of Organizational Characteristics Questionnaire

This permission is given with the understanding that your reproduction of the material is limited to the use specified in your letter. It is also understood the permission is granted on the condition that a credit line will be footnoted on the first page of each quotation covered by this permission, or on the copyright page of the volume in which it is included. Where illustrations are involved, the credit line should appear after the legend. Your acknowledgment must include the following information:

"From (title of work) by (author). Copyright (date & owner). Used with permission of McGraw-Hill Book Company."

Sincerely yours,

Marjorie Mitchell
Manager, Copyrights & Permissions

MM:ekd

614 Hillmont Street

October 30, 1974

Mr. Bertrand Fox, Director
Division of Research
Graduate School of Business Administration
Harvard University, Soldiers Field
Boston, Massachusetts

Dear Mr. Fox:

The Organizational Climate Questionnaire developed by George Litwin and Robert Stringer, and published in Motivation and Organization Climate, 1968, is applicable to a study I am conducting to complete the requirements for a doctoral degree at the University of Oklahoma.

I am interested in examining the degree of association between management systems, organizational climate, and performance in several aerospace organizations. The Organizational Climate Questionnaire (Form B) has been selected as an appropriate instrument for measuring the climate variables in this organizational study.

Request your permission to use the Organizational Climate Questionnaire (Form B) for the purpose stated. I will receive no remuneration for the study and will use the material and data only for incorporation into my dissertation. The source of the questionnaire will be clearly stated. May I also have permission to bind a copy of the questionnaire into my dissertation?

Sincerely,

Bervil D. Davis

Bervil D. Davis

HARVARD UNIVERSITY

GRADUATE SCHOOL OF BUSINESS ADMINISTRATION

GEORGE F. BAKER FOUNDATION

DIVISION OF RESEARCH

SOLDIERS FIELD
BOSTON, MASSACHUSETTS 02163

November 18, 1974

Mr. Bervil D. Davis
614 Hillmont Street

Dear Mr. Davis:

Your letter of October 30 addressed to Mr. Bertrand Fox, Director, has just reached my desk for reply.

Permission is hereby granted to use for your doctoral dissertation only the Organizational Climate Questionnaire (Form B) from MOTIVATION AND ORGANIZATIONAL CLIMATE, by George H. Litwin and Robert A. Stringer, Jr. (Division of Research, Harvard Business School, 1968 - Boston, Mass.).

Please make sure that the page reference is given in your source and that the publisher is given as indicated above. (Note the title; it is ORGANIZATIONAL not ORGANIZATION.)

Permission is also granted to bind a copy of the questionnaire into your dissertation provided that the proper source is given.

Sincerely yours,

Hilma Holton

Hilma Holton
Associate Editor

APPENDIX II

QUESTIONNAIRE DISTRIBUTION LETTER

TO: (Employee by name)

FROM: (Organization Coordinator)

SUBJECT: Organizational Research Project

We have an unusual opportunity to participate in a research project aimed at identifying the factors in our working environment which do or can contribute to a better overall working relationship and a more effective organization. (Company name) is interested in learning and benefiting from this research in order that it may provide the best possible benefits for you.

The research is being conducted by Mr. Bervil Davis, a doctoral candidate in management at the University of Oklahoma. A selected number of employees, of which you are one, have been identified to participate in the study. The identity of each participant's responses will be kept completely anonymous. We hope this will encourage you to answer each question on the attached questionnaires as thoughtfully and frankly as possible. This is not a test and there are no wrong answers.

The questionnaires should be completed by (two weeks from distribution date), and mailed directly to Mr. Davis in the self-addressed and stamped envelope. Do not identify yourself on the questionnaire, but return this letter to me via our internal mail system when you mail the completed questionnaire. Your total cooperation is needed to provide a sufficient sampling to make this a valid study.

We will receive the results of this study in a copy of Mr. Davis' dissertation. Thanks for your interest and participation.

APPENDIX III

PROFILE OF ORGANIZATIONAL CHARACTERISTICS

PROFILE OF ORGANIZATIONAL CHARACTERISTICS[1]

INSTRUCTIONS:
On the lines below each organizational variable (item), please place an n at the point which, in your experience, describes your organization at the present time (n = now). Treat each item as a continuous variable from the extreme at one end to that at the other.

Organizational Variable					Item No.
1. Leadership processes used					
a. Extent to which superiors have confidence and trust in subordinates	Have no confidence and trust in subordinates	Have condescending confidence and trust, such as master has in servant	Substantial but not complete confidence and trust; still wishes to keep control of decisions	Complete confidence and trust in all matters	1
b. Extent to which subordinates, in turn, have confidence and trust in superiors	Have no confidence and trust in superiors	Have subservient confidence and trust, such as servant has to master	Substantial but not complete confidence and trust	Complete confidence and trust	2
c. Extent to which superiors display supportive behavior toward others	Display no supportive behavior or virtually none	Display supportive behavior in condescending manner and situations only	Display supportive behavior quite generally	Display supportive behavior fully and in all situations	3

[1] Rensis Likert, The Human Organization, (New York: McGraw-Hill Book Company, Inc., 1967), pp. 197-211. Used with permission of McGraw-Hill Book Company.

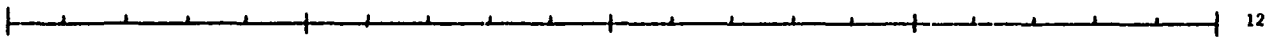
d. Extent to which superiors behave so that subordinates feel free to discuss important things about their jobs with their immediate superior	Subordinates feel completely free to discuss things about the job with their superior	Subordinates feel rather free to discuss things about the job with their superior	Subordinates do not feel very free to discuss things about the job with their superior	Subordinates do not feel at all free to discuss things about the job with their superior	4
e. Extent to which immediate superior in solving job problems generally tries to get subordinates' ideas and opinions and make constructive use of them	Always gets ideas and opinions and always tries to make constructive use of them	Usually gets ideas and opinions and usually tries to make constructive use of them	Sometimes gets ideas and opinions of subordinates in solving job problems	Seldom gets ideas and opinions of subordinates in solving job problems	5

2. Character of motivational forces

a. Underlying motives tapped	Physical security, economic needs, and some use of the desire for status	Economic needs and moderate use of ego motives, e.g., desire for status, affiliation and achievement	Economic needs and considerable use of ego and other major motives, e.g., desire for new experiences	Full use of economic, ego, and other major motives, as, for example, motivational forces arising from group goals	6
b. Manner in which motives are used	Fear, threats, punishment, and occasional rewards	Rewards and some actual or potential punishment	Rewards, occasional punishment, and some involvement	Economic rewards based on compensation system developed through participation; group participation and involvement in setting goals, improving methods, appraising progress toward goals, etc.	7

c.	Kinds of attitudes developed toward organization and its goals	Attitudes are strongly favorable and provide powerful stimulation to behavior implementing organization's goals	Attitudes usually are favorable and support behavior implementing organization's goals	Attitudes are sometimes hostile and counter to organization's goals and are sometimes favorable to the organization's goals and support the behavior necessary to achievement them	Attitudes usually are hostile and counter to organization's goals
					8
d.	Extent to which motivational forces conflict with or reinforce one another	Marked conflict of forces substantially reducing those motivational forces leading to behavior in support of the organization's goals	Conflict often exists; occasionally forces will reinforce each other, at least partially	Some conflict, but often motivational forces will reinforce each other	Motivational forces generally reinforce each other in a substantial and cumulative manner
					9
e.	Amount of responsibility felt by each member of organization for achieving organization's goals	Personnel at all levels feel real responsibility for organization's goals and behave in ways to implement them	Substantial proportion of personnel, especially at higher levels, feel responsibility and generally behave in ways to achieve the organization's goals	Managerial personnel usually feel responsibility; rank and file usually feel relatively little responsibility for achieving organization's goals	High levels of management feel responsibility; lower levels feel less; rank and file feel little and often welcome opportunity to behave in ways to defeat organization's goals
					10
f.	Attitudes toward other members of the organization	Favorable, cooperative attitudes throughout the organization with mutual trust and confidence	Cooperative, reasonably favorably attitudes toward others in organization; may be some competition between peers with resulting hostility and some condescension toward subordinates	Subservient attitudes toward superiors; competition for status resulting in hostility toward peers; condescension toward subordinates	Subservient attitudes toward superiors coupled with hostility; hostility toward peers and contempt for subordinates; distrust is widespread
					11

g. Satisfaction derived	Relatively high satisfaction throughout the organization with regard to membership in the organization, supervision, and one's own achievements	Some dissatisfaction to moderately high satisfaction with regard to membership in the organization, supervision, and one's own achievements	Dissatisfaction to moderate satisfaction with regard to membership in the organization, supervision, and one's own achievements	Usually dissatisfaction with membership in the organization, with supervision, and with one's own achievements



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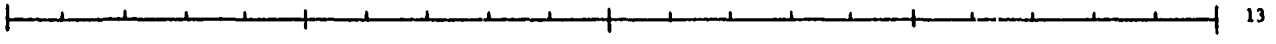
3. Character of communication process

a. Amount of interaction and communication aimed at achieving organization's objectives	Very little	Little	Quite a bit	Much with both individuals and groups



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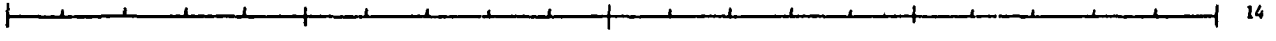
b. Direction of information flow	Downward	Mostly downward	Down and up	Down, up, and with peers



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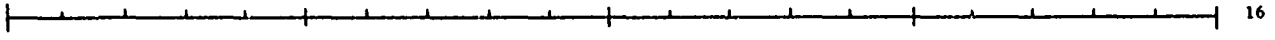
c. Downward communication (1) Where initiated	Initiated at all levels	Patterned on communication from top but with some initiative at lower levels	Primarily at top or patterned on communication from top	At top of organization or to implement top directive



15

(2) Extent to which superiors willingly share information with subordinates	Provide minimum of information	Gives subordinates only information superior feels they need	Gives information needed and answers most questions	Seeks to give subordinates all relevant information and all information they want



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(3) Extent to which communications are accepted by subordinates	Generally accepted, but if not, openly and candidly questioned	Often accepted, but if not, may or may not be openly questioned	Some accepted and some viewed with suspicion	Viewed with great suspicion	17
d. Upward communication					
(1) Adequacy of upward communication via line organization	Very little	Limited	Some	A great deal	18
(2) Subordinates' feeling of responsibility for initiating accurate upward communication	None at all	Relatively little, usually communicates "filtered" information and only when requested; may "yes" the boss	Some to moderate degree of responsibility to initiate accurate upward communication	Considerable responsibility felt and much initiative; group communicates all relevant information	19
(3) Forces leading to accurate or distorted upward information	Virtually no forces to distort and powerful forces to communicate accurately	Occasional forces to distort along with many forces to communicate accurately	Many forces to distort; also forces for honest communication	Powerful forces to distort information and deceive superiors	20
(4) Accuracy of upward communication via line	Accurate	Information that boss wants to hear flows; other information may be limited or cautiously given	Information that boss wants to hear flows; other information is restricted and filtered	Tends to be inaccurate	21
(5) Need for supplementary upward communication system	No need for any supplementary system	Slight need for supplementary system; suggestion systems may be used	Upward communication often supplemented by suggestion system and similar devices	Great need to supplement upward communication by spy system, suggestion system, and similar devices	22

e. Sideward communication, its adequacy and accuracy

Usually poor because of competition between peers, corresponding hostility | Fairly poor because of competition between peers | Fair to good | Good to excellent

23

f. Psychological closeness of superiors to subordinates (i.e. friendliness between superiors and subordinates)

Usually very close | Fairly close | Can be moderately close if proper roles are kept | Far apart

24

(1) How well does superior know and understand problems faced by subordinates?

Knows and understands problems of subordinates very well | Knows and understands problems of subordinates quite well | Has some knowledge and understanding of problems of subordinates | Has no knowledge or understanding of problems of subordinates

25

(2) How accurate are the perceptions by superiors and subordinates of each other?

Often in error | Often in error on some points | Moderately accurate | Usually quite accurate

26

4. Character of interaction-influence process

a. Amount and character of interaction

Extensive, friendly interaction with high degree of confidence and trust | Moderate interaction, often with fair amount of confidence and trust | Little interaction and usually with some condescension by superiors; fear and caution by subordinates | Little interaction and always with fear and distrust

27

b. Amount of cooperative teamwork present

Very substantial amount throughout the organization | A moderate amount | Relatively little | None

28

c. Extent to which subordinates can influence the goals, methods, and activity of their units and departments					
	(1) As seen by superiors	None	Virtually none	Moderate amount	A great deal
					29
	(2) As seen by subordinates	None except through "informal organization" or via unionization	Little except through "informal organization" or via unionization	Moderate amount both directly and via unionization (where it exists)	Substantial amount both directly and via unionization (where it exists)
					30
d. Amount of actual influence which superiors can exercise over the goals, activity, and methods of their units and departments		Believed to be substantial but actually moderate unless capacity to exercise severe punishment is present	Moderate to somewhat more than moderate, especially for higher levels in organization	Moderate to substantial, especially for higher levels in organization	Substantial but often done indirectly, as, for example, by superior building effective interaction-system
					31
e. Extent to which an effective structure exists enabling one part of organization to exert influence upon other parts		Highly effective structure exists enabling exercise of influence in all directions	Moderately effective structure exists; influence exerted largely through vertical lines	Limited capacity exists; influence exerted largely via vertical lines and primarily downward	Effective structure virtually not present
					32
5. Character of decision-making process					
a. At what level in organization are decisions formally made?		Bulk of decisions at top of organization	Policy at top, many decisions within prescribed framework made at lower levels but usually checked with top before action	Broad policy decisions at top, more specific decisions at lower levels	Decision making widely done throughout organization, although well integrated through linking process provided by overlapping groups
					33

b. How adequate and accurate is the information available for decision making at the place where decisions are made?	Information is generally inadequate and inaccurate	Information is often somewhat inadequate and inaccurate	Reasonably adequate and accurate information available	Relatively complete and accurate information available based both on measurements and efficient flow of information in organization	34
c. To what extent are decision makers aware of problems, particularly those at lower levels in the organization?	Generally quite well aware of problems	Moderately aware of problems	Aware of some, unaware of others	Often are unaware or only partially aware	35
d. Extent to which technical and professional knowledge is used in decision making	Used only if possessed at higher levels	Much of what is available in higher and middle levels is used	Much of what is available in higher, middle, and lower levels is used	Most of what is available anywhere within the organization is used	36
e. Are decisions made at the best level in the organization as far as					
(1) Availability of the most adequate information bearing on the decision	Overlapping groups and group decision processes tend to push decisions to point where information is most adequate or to pass the relevant information to the decision-making point	Some tendency for decisions to be made at higher levels than where most adequate and accurate information exists	Decisions often made at levels appreciably higher than levels where most adequate and accurate information exists	Decisions usually made at levels appreciably higher than levels where most adequate and accurate information exists	37

(2) The motivational consequences (i.e., does the decision-making process help to create the necessary motivations in those persons who have to carry out the decisions?)	Substantial contribution by decision-making processes to motivation to implement	Some contribution by decision-making to motivation to implement	Decision-making contributes relatively little motivation	Decision-making contributes little or nothing to the motivation to implement the decision, usually yields adverse motivation	38
f. To what extent are subordinates involved in decisions related to their work?	Not at all	Never involved in decisions; occasionally consulted	Usually are consulted but ordinarily not involved in the decision making	Are involved fully in all decisions related to their work	39
g. Is decision making based on man-to-man or group pattern of operation? Does it encourage or discourage teamwork?	Man-to-man only, discourages teamwork	Man-to-man almost entirely, discourages teamwork	Both man-to-man and group, partially encourages teamwork	Largely based on group pattern, encourages teamwork	40
6. Character of goal setting or ordering					
a. Manner in which usually done	Except in emergencies, goals are usually established by means of group participation	Goals are set or orders issued after discussion with subordinates of problems and planned action	Orders issued, opportunity to comment may or may not exist	Orders issued	41
b. To what extent do the different hierarchical levels tend to strive for high performance goals?	High goals sought by all levels, with lower levels sometimes pressing for higher goals than top levels	High goals sought by higher levels but with occasional resistance by lower levels	High goals sought by top and often resisted moderately by subordinates	High goals pressed by top, generally resisted by subordinates	42

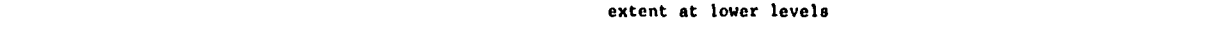
c. Are there forces to accept, resist, or reject goals?	Goals are overtly accepted but are covertly resisted strongly	Goals are overtly accepted but often covertly resisted to at least a moderate degree	Goals are overtly accepted but at times with some covert resistance	Goals are fully accepted both overtly and covertly



43

7. Character of control processes

a. At what hierarchical levels in organization does major or primary concern exist with regard to the performance of the control function	At the very top only	Primarily or largely at the top	Primarily at the top but some shared feeling of responsibility felt at middle and to a lesser extent at lower levels	Concern for performance of control functions likely to be felt throughout organization



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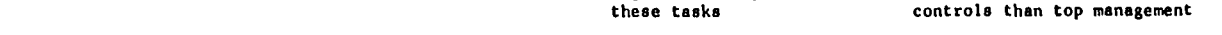
b. How accurate are the measurements and information used to guide and perform the control function, and to what extent do forces exist in the organization to distort and falsify this information?	Strong pressures to obtain complete and accurate information to guide own behavior and behavior of own and related work groups; hence information and measurements tend to be complete and accurate	Some pressure to protect self and colleagues and hence some pressures to distort; information is only moderately complete and contains some inaccuracies	Fairly strong forces exist to distort and falsify; hence measurements and information are often incomplete and inaccurate	Very strong forces exist to distort and falsify; as a consequence, measurements and information are usually incomplete and often inaccurate



45

c. Extent to which the review and control functions are concentrated	Highly concentrated in top management	Relatively highly concentrated, with some delegated control to middle and lower levels	Moderate downward delegation of review and control processes; lower as well as higher levels perform these tasks	Review and control done at all levels with lower units at times imposing more vigorous reviews and tighter controls than top management



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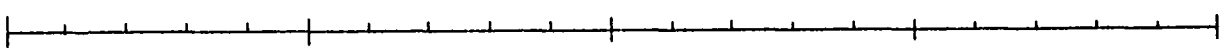
d. Extent to which there is an informal organization present and supporting or opposing goals of formal organization	Informal organization present and opposing goals of formal organization	Informal organization usually present and partially resisting goals	Informal organization may be present and may either support or partially resist goals of formal organization	Informal and formal organization are one and the same; hence all social forces support efforts to achieve organization's goals



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e. Extent to which control data (e.g., accounting, productivity, cost, etc.) are used for self-guidance or group problem solving by managers and non-supervisory employees, or used by superiors in a punitive, policing manner

Used for policing and in punitive manner | Used for policing coupled with reward and punishment, sometimes punitively; used somewhat for guidance but in accord with orders | Used for policing with emphasis usually on reward but with some punishment; used for guidance in accord with orders; some use also for self-guidance | Used for self-guidance and for coordinated problem solving and guidance; not used punitively

48

8. Performance goals and training

a. Level of performance goals which superiors seek to have organization achieve

Seek to achieve extremely high goals | Seek very high goals | Seek high goals | Seek average goals

49

b. Extent to which you have been given the kind of management training you desire

Have received no management training of kind I desire | Have received some management training of kind I desire | Have received quite a bit of management training of kind I desire | Have received a great deal of management training of kind I desire

50

c. Adequacy of training resources provided to assist you in training your subordinates

Training resources provided are excellent | Training resources provided are very good | Training resources provided are good | Training resources provided are only fairly good

51

APPENDIX IV

ORGANIZATIONAL CLIMATE QUESTIONNAIRE

ORGANIZATIONAL CLIMATE QUESTIONNAIRE[1]

INSTRUCTIONS: We are interested in your feelings about certain aspects of your work atmosphere. Please answer each question as you feel work conditions actually exist in this organization at the present time. Read each statement and circle the appropriate number according to the following code:

Number codes

1 = Definitely Agree
2 = Inclined to Agree
3 = Inclined to Disagree
4 = Definitely Disagree

1. The jobs in this organization are clearly defined and logically structured . . . 1 2 3 4

2. In this organization it is sometimes unclear who has the formal authority to make a decision . . . 1 2 3 4

3. The policies and organization structure of the organization have been clearly explained . . . 1 2 3 4

4. Red-tape is kept to a minimum in this organization . . . 1 2 3 4

5. Excessive rules, administrative details, and red-tape make it difficult for new and original ideas to receive consideration . . . 1 2 3 4

6. Our productivity sometimes suffers from lack of organization and planning . . . 1 2 3 4

7. In some of the projects I've been on, I haven't been sure exactly who my boss was . . . 1 2 3 4

8. Our management isn't so concerned about formal organization and authority, but concentrates instead on getting the right people together to do the job . . . 1 2 3 4

9. We don't rely too heavily on individual judgement in this organization; almost everything is double-checked . . . 1 2 3 4

10. Around here management resents your checking everything with them; if you think you've got the right approach you just go ahead . . . 1 2 3 4

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[1]George H. Litwin and Robert A. Stringer, Jr., Motivation and Organizational Climate, (Boston: Division of Research, Graduate School of Business Administration, Harvard University, 1968), pp. 204-207.

Number codes

1 = Definitely Agree
2 = Inclined to Agree
3 = Inclined to Disagree
4 = Definitely Disagree

11. Supervision in this organization is mainly a matter of setting guidelines for your subordinates; you let them take responsibility for the job . . . 1 2 3 4

12. You won't get ahead in this organization unless you stick your neck out and try things on your own sometimes . . . 1 2 3 4

13. Our philosophy emphasizes that people should solve their problems by themselves . . . 1 2 3 4

14. There are an awful lot of excuses around here when somebody makes a mistake . . . 1 2 3 4

15. One of the problems in this organization is that individuals won't take responsibility . . . 1 2 3 4

16. We have a promotion system here that helps the best man to rise to the top . . . 1 2 3 4

17. In this organization the rewards and encouragements you get usually outweigh the threats and the criticism . . . 1 2 3 4

18. In this organization people are rewarded in proportion to the excellence of their job performance . . . 1 2 3 4

19. There is a great deal of criticism in this organization . . . 1 2 3 4

20. There is not enough reward and recognition given in this organization for doing good work . . . 1 2 3 4

21. If you make a mistake in this organization you will be punished . . . 1 2 3 4

22. The philosophy of our management is that in the long run we get ahead fastest by playing it slow, safe, and sure . . . 1 2 3 4

23. Our business has been built up by taking calculated risks at the right time . . . 1 2 3 4

24. Decision making in this organization is too cautious for maximum effectiveness . . . 1 2 3 4

25. Our management is willing to take a chance on a good idea . . . 1 2 3 4

Number codes

1 = Definitely Agree
2 = Inclined to Agree
3 = Inclined to Disagree
4 = Definitely Disagree

26. We have to take some pretty big risks occasionally to keep ahead of the competition in the business we're in . . . 1 2 3 4

27. A friendly atmosphere prevails among the people in this organization . . . 1 2 3 4

28. This organization is characterized by a relaxed, easy-going working climate . . . 1 2 3 4

29. It's very hard to get to know people in this organization . . . 1 2 3 4

30. People in this organization tend to be cool and aloof toward each other . . . 1 2 3 4

31. There is a lot of warmth in the relationships between management and workers in this organization . . . 1 2 3 4

32. You don't get much sympathy from higher-ups in this organization if you make a mistake . . . 1 2 3 4

33. Management makes an effort to talk with you about your career aspirations within the organization . . . 1 2 3 4

34. People in this organization don't really trust each other enough . . . 1 2 3 4

35. The philosophy of our management emphasizes the human factor, how people feel, etc. . . . 1 2 3 4

36. When I am on a difficult assignment I can usually count on getting assistance from my boss and co-workers . . . 1 2 3 4

37. In this organization we set very high standards for performance . . . 1 2 3 4

38. Our management believes that no job is so well done that it couldn't be done better . . . 1 2 3 4

39. Around here there is a feeling of pressure to continually improve our personal and group performance . . . 1 2 3 4

40. Management believes that if the people are happy, productivity will take care of itself . . . 1 2 3 4

41. To get ahead in this organization it's more important to get along than it is to be a high producer . . . 1 2 3 4

Number codes

1 = Definitely Agree
2 = Inclined to Agree
3 = Inclined to Disagree
4 = Definitely Disagree

42. In this organization people don't seem to take much pride in their performance . . . 1 2 3 4

43. The best way to make a good impression around here is to steer clear of open arguments and disagreements . . . 1 2 3 4

44. The attitude of our management is that conflict between competing units and individuals can be very healthy . . . 1 2 3 4

45. We are encouraged to speak our minds, even if it means disagreeing with our superiors . . . 1 2 3 4

46. In management meetings the goals is to arrive at a decision as smoothly and quickly as possible . . . 1 2 3 4

47. People are proud of belonging to this organization . . .
1 2 3 4

48. I feel that I am a member of a well functioning team . . .
1 2 3 4

49. As far as I can see, there isn't very much personal loyalty to the company . . . 1 2 3 4

50. In this organization people pretty much look out for their own interests . . . 1 2 3 4

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