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Management System, Organizational Climate and Performance Relationships

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INTRODUCTION

The study of management systems, organizational climate, and organization performance has been the subject of numerous investigations in the last few decades. These organizational factors have been studied in a variety of ways in an attempt to determine their inpact upon and relationship to the management process. However, the research results have been inconclusive in describing the relationship between these factors in various types of industry, including research and development organizations. Relationships among these specific variables as perceived by the employees in the aerospace industry have not been reported. The purpose of this paper is to investigate these relationships in seven aerospace firms.

Having worked in and with the aerospace industry and the National Aeronautics and Space Administration (NASA) for many years, the author has found many practicing managers use various management systems, organizations have noticeably different climates, and organization performance differ accordingly. With large NASA programs such as Saturn-Apollo, Skylab, and Shuttle, practicing aerospace managers 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]. Relatively little is known about the determinants of climate, and additional research is needed to determine the relationships between climate, performance, and various process variables [2]. In discussions and consultations, typical questions still being asked are: which management style or system creates the best climate or best performance, or what is the relationship between organizational climate and performance? Because these are continuing questions, a field study was conducted to examine these variables and the relationships between them in seven aerospace firms that had performance-award-fee type contracts with a NASA Field Center.

RELATED LITERATURE

Management Systems

Likert uses the term management system as a generalized overall management style which organizational members perceive. He found organizations tended to cluster in four different areas on the measuring instruments. These clusters were labeled Systems 1, 2, 3, and 4 which can be characterized as exploitive authoritative, benevolent authoritative, consultative, and participative group, respectively [3]. Many studies conducted by the Institute for Social Research at the University of Michigan found that supervisors characterized as "employee-centered" or utilizing a System 4 management style were more likely to be in charge of high producing groups, whereas, supervisors characterized as "production-centered" or utilizing a System 1 management style were likely to be in charge of low producing groups [4]. Morrow, Bowers, and Seashore [5] present a classic success story for a company introducing a new management system which characterizes and substantiates the works of Likert.

Not all studies have substantiated these specific relationships. In at least one experimental investigation where different management styles were introduced, after one year all groups showed significant increases in productivity, regardless of the management style. The more authoritarian style, in fact, produced a larger increase in productivity than the participative style [6]. Sales [7] and Patchen [8] confirmed these experimental findings in further experiments and in a large plastic manufacturing company test.

Blake and Mouton [9], Young and Summer [10] express the view that an organization's character is cast at the top by the structure, policies, and procedures which top management establishes. 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 [11]. 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].

Very limited research data are available that examine the correlation between management systems and organizational climate. Curtis [12] found a significant positive correlation in a government hospital case study.

Organizational Climate

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. There has been a considerable amount of recent research on the subject of organizational climate as reported by Frederikson, Friedlander, Marguiles, Litwin, Stringer, Schneider, Bartlett, and Tagiuri [2]. Organizational climate has been described 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" [13].

Gellerman [14] states that every company develops its own distinct "personality" or working environment. 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 with the system [15]. Some say that climate is determined by characteristics, conduct, attitudes, and expectations of other people, and by sociological and cultural realities [16].

Frederikson [17] concluded from a 1966 experiment that there was a direct relationship between different types of organizational climates and performance. Pelz and Andrews [18] conducted a large study involving several professions in different industries and found that certain climate characteristics were related to high levels of scientific achievement and innovation.

The previously mentioned studies viewed climate as an independent variable. There is a growing trend for researchers to conceptualize organizational climate as an intervening variable. This is evidenced in the works of Litwin and Stringer [19]; Patton [20]; Schneider [21,22]; Schneider and Hall [23]; Pritchard and Karasick [17]; Gibson, Ivancevich, and Donnelly [13]; and Lawler, Hall, and Oldham [2]. Job activities, leadership styles, organization structure, etc., have been used as independent variables. Dependent variables were usually some output which was considered important either to the organization or individual employee such as organizational performance and job satisfaction.

Litwin and Stringer [19] found that leadership was a very significant determinant of organizational climate experimentally and in industrial field studies. Pritchard and Karasick [17] found that overall organizational policies and practices had a strong positive influence on climate. However, only a very low, positive correlation existed between organizational climate and performance.

Lawler, Hall, and Oldham [2] investigated the relationships among organization structure, organization process, organizational climate, organization performance, and employee job satisfaction. Positive correlations were found between each of these variables. Significant positive relationships existed between organizational process and climate, climate and job satisfaction, and climate and organization performance.

From this literature review, there is strong evidence that a positive relationship exists between organizational climate and performance. However, there is no evidence that such a relationship has been confirmed in an aerospace organization.

Organization Performance

The evaluation of an organization's overall performance is one of the most difficult problems in organization theory [24]. The primary cause of this difficulty lies in the selection of appropriate criteria that can measure performance or effectiveness and yet be applicable to more than one organization.

The traditional concept of organizational effectiveness is the degree of goal achievement. Koontz and O'Donnell [25] conceptualized organization effectiveness in terms of an organization being both effective, relative to goal attainment, and efficient, relative to a productivity ratio. Others have used morale, commitment to the organization, absenteeism, personnel turnover, and employee satisfaction as criteria. Georgopoulos and Tannenbaum [26] report that practically all of these criteria have been found unsatisfactory for various reasons. The issue of which concept, criterion, or criteria that should be used for measuring performance has not yet been resolved. For the purposes of this research, organization performance is defined as 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.

Gibson, Ivancevich, and Donnelly [13] have developed a conceptual framework or model for use in understanding organizational effectiveness in terms of systems theory. This systems theory is based upon the assumptions that: (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. Other contributing theoretical studies that seem to be consistent with this systems approach include the works of Gross [27], Seiler [28], and Caplow [29].

Price [30] 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." He concluded that effectiveness was the degree of goal achievement, a single dependent variable.

Based upon the theoretical studies previously cited and the comparative analysis of Price, it is obvious there is inconsistency in the terminology of measurements. However, the systems approach of Gibson, Ivancevich, and Donnelly attempts to focus on the total complexity of the problem, in providing a way to compare the works of different researchers.

The terms organizational effectiveness and performance have been used in the previous discussions as if they are interchangeable. The researcher recognizes the intuitive relationship between them and that a great deal of freedom is taken in using the terms interchangeably in the literature. Gibson, Ivancevich, and Donnelly 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. Therefore, goal achievement and efficiency are viewed as primary elements in the measurement of performance. Also, Montanari [31] states that "the manager determines the organization's effectiveness by its performance with stated objectives." Organization performance was primarily looked at in terms of goal achievement and efficiency in the short-run in this study. The actual performance data, which NASA had used in evaluating contractor performance, did not provide the means for an overall systematic evaluation of an organization's long-run effectiveness in terms of input, throughput, and output variables. However, the validity and reliability of these performance criteria have been mutually satisfactory to NASA and the aerospace contractors for several years in determining earned fee on cost-plus incentive award fee type contracts.

From this brief literature review, the relationship between management systems and performance is inconclusive. There is little support for any relationship between management systems and organizational climate. However, different leadership styles were found to influence an organization's perceived climate. Since some authors [32] have viewed Likert's management systems as styles of leadership, there is an existing intuitive relationship between management systems and organizational climate believed to be worthy of investigation. A relationship has also been established between organizational climate and performance, but not where performance has been measured in terms of "hard data" by the customer.

The contracting arrangements between the NASA Field Center and seven aerospace organizations have provided a unique opportunity to test the relationship among management systems, organizational climate, and performance. It is unique in that organization members can record their perception of the organization's management system and climate, while the organization's customer, NASA, evaluates their performance per a contractural agreement.

RESEARCH QUESTIONS

The major interest in this research is the interrelationships among the management system, organizational climate, and organization performance. To facilitate this investigation, the following research questions were postulated:

1) Are management systems positively related to organizational climate?

2) Is organizational climate positively related to organizational performance?

3) Are management systems positively related to organization performance?

METHODOLOGY

A field study was selected for this research because it is an ex post facto study and does not involve the manipulation of variables. The sampling survey approach was selected because, considering the objectives, it appeared to be the only practical approach to determine the variable relationships under study in multiple on-going organizations.

The data for this study were collected from seven aerospace organizations. Each organization had an active cost-plus-award fee type contract with a specific NASA Field Center. The seven organizations were geographically located throughout the US. A total of 139 usable responses were received for a 71 percent response rate. Test instruments were randomly distributed within the firms to supervisory and nonsupervisory personnel. Completed test instruments were mailed by the employees directly to the researcher in a self-addressed, stamped envelop. This method of collecting data was chosen primarily to preserve confidentiality and anonymity since respondents were asked not to identify themselves nor their firms.

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. Two basic instruments were used for collecting the management system and organizational climate data. The organizational performance data were obtained directly from NASA.

Management System

The Likert management system test instrument was selected. Its development was based upon research studies that measured and examined different styles of leadership and other related variables used by high performing organizations in contrast to what was used by lower performing organizations. 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. For these reasons Likert was insistent upon developing a test instrument that would be capable of measuring a consistent management system pattern within an organization.

The Likert test instrument has 51 questions divided into eight organizational variables: (1) leadership process, (2) motivational forces, (3) communication process, (4) interaction-influence process, (5) decision-making process, (6) goal setting, (7) control process, and (8) performance goals [3]. It measures the extent to which employees perceive their organization on the System 1 to 4 continua.

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. 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 [3].

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 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 [33]. 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. The surrogate management system scores can range from 1.0 to 4.99.

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.

Organizational Climate

The Litwin and Stringer [19] organizational climate test instrument was selected. 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.

Litwin and Stringer developed and refined their test instrument until it was considered adequate for use in organizational climate research. Schneider and Bartlett [34] analyzed the Litwin and Stringer test instrument and found it to be at least equal to or better than other available test instruments relative to scale consistency and intercorrelation.

This climate test instrument consists of 50 statements with nine dimensional variables: (1) structure, (2) responsibility, (3) rewards, (4) risks, (5) warmth, (6) support, (7) standards, (8) conflict, and (9) identity. These nine variables can be clustered (as shown in the following paragraphs) to identify particular patterns of organizational climate. These patterns were formulated through analysis of scale interrelationships and conceptual similarity [19].

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.

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.

Organizational pattern scores can be used to compare with the American businessmen norm pattern scores that Litwin and Stringer [19] obtained with their test instrument in several field studies.

Each of the 50 statements is scored from 1 to 4 which indicates the degree of agreement with the statement relative to the respondent's perceived organizational climate. The individual scores for each statement within each of the nine variables 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. The mean value of all the respondents 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.

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

Performance

The literature review revealed that an adequate test instrument for measuring the performance of organizations was not currently available. However, NASA has developed and is currently using a method for evaluating contractor's performance.

NASA encourages the use of contracts that have award-fee features for performance. When using this feature NASA must develop performance evaluation criteria that will be used at specific intervals to measure the contractor's

contractual performance. The resulting performance rating determines the amount of award fee the contractor gets for the period of performance being completed.

NASA guidelines for establishing performance criteria require that they be developed under three major categories: (1) technical achievement, (2) management, and (3) cost control. A detailed NASA procedure establishes the operating arrangement for developing the detailed measuring criteria, numerical scoring, identifying specific contractor performance monitors, and finally the operating procedures for a NASA Performance Evaluation Board.

Utilizing "hard" performance data directly from the NASA evaluation process eliminated the need for developing a performance evaluation questionnaire, with an uncertain validity. Actual performance ratings determined through a very formalized and well-established system should provide greater validity than from a newly developed test instrument.

RESULTS

Perceived Management System

Table 1 presents a tabulation of the management system scores for the seven organizations. It is immediately evident from the far right column that each organization has an overall management System 3 (consultative). The mean value calculation for each variable by organization is also provided in the respective columns for ease of comparing organization scores at the variable level.

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, but there is evidence of some supportive relations and group decision making as opposed to hierarchical control with only downward communications. The superior-subordinate relationship is more group-related 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.

TABLE 1. 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	13.335	12.538	13.130	11.854	12.580	9.020	12.345	3.469
C	13.303	12.356	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

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 5 percent chance that the management system scores came from the same population.

Perceived Organizational Climate

Table 2 summarizes the organizational climate scores for the seven sample organizations. The variable scores that Litwin and Stringer found to be the norm for American businessmen are also provided in Table 2 for ease of comparison with the sample variable mean scores.

The organizational climate variable mean scores were subjected to the Friedman two-way analysis of variance test to determine if the climates 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 5 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. This sample data 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 5 percent chance that the two sets of scores came from different populations.

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 into climate pattern scores, as Litwin and Stringer suggested, in Table 3. The norm scores for American businessmen were also summed into the four patterns (Table 3) for comparison with the sample data.

TABLE 2. ORGANIZATIONAL CLIMATE VARIABLE MEAN SCORES BY ORGANIZATION

	PATTERNS OF ORGANIZATIONAL CLIMATE								
	STRUCTURE	CHALLENGE			REWARD AND SUPPORT			SOCIAL INCLUSION	
	VARIABLE MEAN SCORES								
ORGANIZATION	STRUCTURE	RESPONSIBILITY	RISK	STANDARDS	REWARDS	SUPPORT	CONFLICT	WARMTH	IDENTITY
A	21.423	18.846	14.500	18.500	17.000	14.307	9.807	15.461	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	20.900	18.400	14.100	17.900	15.900	14.300	10.400	15.800	12.100

TABLE 3. 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	43.070	42.285	27.999
SAMPLE MEAN	20.986	49.442	42.009	27.555
NORM MEAN	20.900	50.40	40.60	27.90

*SCORES ARE THE SUM OF THE APPLICABLE VARIABLE MEAN SCORES

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 5 percent chance that the organizational climate pattern scores came from the same population.

The organizational climate pattern scores and the norm pattern scores were subjected to the Mann-Whitney U test to determine if the sampled data in this study were statistically different from the norm pattern scores for American businessmen. The organizational climate pattern scores obtained in the study and the norm pattern scores were statistically the same at the 0.05 level of significance ($X_r^2 = 8.0$). This suggests that the two sets of pattern scores came from the same population. This implies that the climate patterns in the seven aerospace organizations in this sample are similar to those found in other American businesses.

Measured Organization Performance

The measured performance ratings, as obtained directly from NASA, are shown in Table 4 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 a period of 2 years.

TABLE 4. ORGANIZATION PERFORMANCE RATINGS

ORGANIZATION	PERFORMANCE RATING (%)
B	99
A	94
F	94
D	91
G	88
C	81
E	70

The performance rating scores ranged from 70 to 99 percent. The statistical difference could not be calculated because the multivariate or sub-criteria data that make up the total performance rating scores are very sensitive, thus, not available from NASA. The organizations receiving the higher ratings had performed at a higher level as measured by the three NASA performance criteria. The higher ratings, likewise, resulted in higher fee awards.

Management System and Organizational Climate Relationships

Correlation coefficients were calculated for each management system and organizational climate variable for the total sample of 139 respondents. This resulted in an eight by nine matrix of data as shown in Table 5. The median correlation between the management system and organizational climate for the sample was found to be +0.31 with less than 0.00003 probability of occurrence. This suggests that there is less than a 0.003 percent chance that these relationships were chance occurrences.

Organizational Climate and Performance Relationships

The organizational climate variable mean scores, Table 2, were correlated with the organization performance ratings, Table 3. These nine correlation values and the associated probability values are shown in Table 6. The surrogate correlation value was +0.20 which has a probability of occurrence level of less than 0.333. Therefore, the relationship between organizational climate and performance is not statistically significant at the 0.05 level.

Management System and Organization Performance Relationships

The management system variable mean scores, Table 1, were correlated with the organization performance ratings, Table 3. 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 7. The surrogate correlation value was +0.35, which is not statistically significant at the 0.05 level. The probability of occurrence value was less than 0.191.

TABLE 5. CORRELATION BETWEEN MANAGEMENT SYSTEM AND ORGANIZATIONAL CLIMATE VARIABLES

MANAGEMENT SYSTEM VARIABLES	ORGANIZATIONAL CLIMATE VARIABLES								
	STRUCTURE	RESPONSIBILITY	REWARDS	RISK	WARMTH	SUPPORT	STANDARDS	CONFLICT	IDENTITY
LEADERSHIP	.15**	.28***	.47***	.23***	.41***	.50***	.22***	.26***	.49***
MOTIVATION	.15**	.29***	.49***	.30***	.39***	.53***	.24***	.23***	.56***
COMMUNICATION	.25***	.24***	.46***	.26***	.29***	.51***	.26***	.28***	.54***
INTERACTION	.20***	.29***	.50***	.31***	.36***	.50***	.30***	.30***	.54***
DECISION-MAKING	.21***	.27***	.47***	.32***	.36***	.49***	.27***	.27***	.54***
GOAL-SETTING	.14*	.22***	.34***	.27***	.36***	.43***	.31***	.23***	.49***
CONTROL	.15*	.27***	.39***	.23***	.30***	.43***	.24***	.19**	.46***
PERFORMANCE GOALS	.22***	.10	.30***	.17**	.21***	.36***	.24***	.20***	.37***

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

MEDIAN CORRELATION VALUE = +0.31 ***

TABLE 6. CORRELATION BETWEEN ORGANIZATIONAL CLIMATE VARIABLES AND PERFORMANCE RATINGS

ORGANIZATIONAL CLIMATE VARIABLES	PERFORMANCE CORRELATION VALUE	PROBABILITY
STRUCTURE	+0.4	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.

TABLE 7. 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 1 provides a graphic representation of the management system and organization performance rating data obtained in this study. The trend indicated by the slope of an imaginary line connecting the seven points clearly establishes a positive relationship, correlational value of +0.35, between the management system and organization performance.

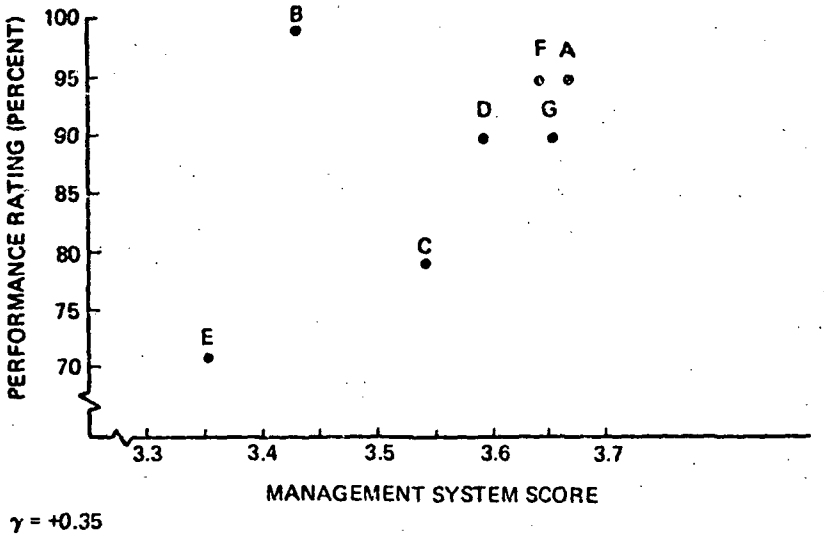

Figure 1. Management system score and organization performance rating relationship.

Finally, the research results are summarized in a composite model, Figure 2, which identifies the variables, correlational values, and probabilities of occurrence.

DISCUSSION

Management System

The seven management system scores were clustered on the Likert management System 3 scale. A more indepth study of the specific management system variable mean scores, Table 1, revealed that organization D had the highest leadership 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.

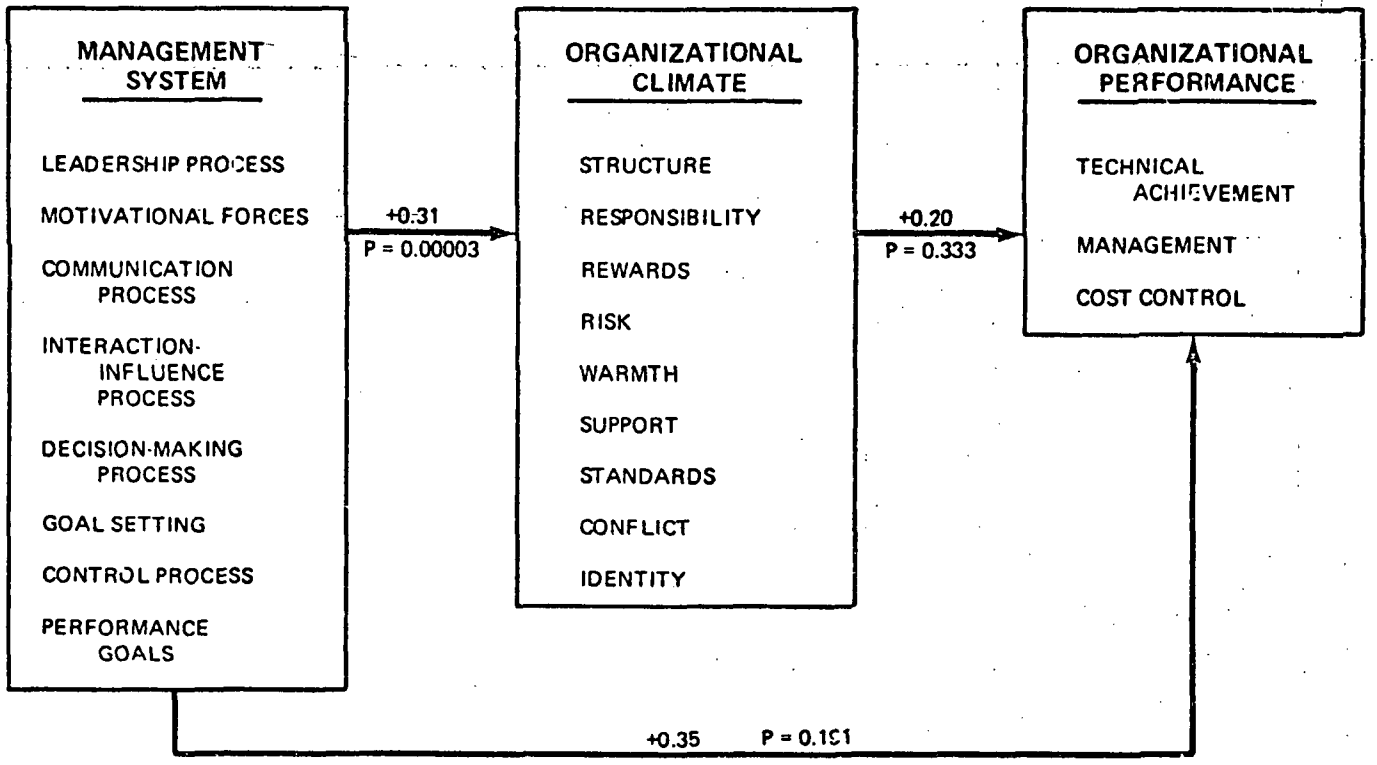

Figure 2. Research model with summary of results.

Organization D had the 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 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.

Organization F had the 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.

Organization F had the highest decision-making process 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.

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 G had the highest control process score. This higher score implies that control of organizational activities was more dispersed within the organization, and more emphasis was placed upon self-control and problem solving.

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.

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 performance goal statements to his test instrument. Likert [3] believed that 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 the three performance goal items 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. 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 significance.

Based upon research data presented by Likert and others, the management system scores 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 [5]. Of the literature reviewed, only Patton [20] 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. 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.

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; i.e., 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 finding that the organizational climates in the seven organizations were statistically different is consistent with the statements of Gellerman [14], Davis [35], and others wherein each organization was reported to have its own distinct climate or personality.

The organizational climate variable mean scores and 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 climates to be higher than the norms for American businessmen. Curtis [12] had previously found that a government hospital organization had an organizational climate that was significantly lower than the norm.

Looking at the specific organizational climate variable mean scores, Table 2, 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 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 these employees perceived a higher degree of responsibility than those in the other organizations sampled. 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 F had the highest risk score which implies that this organization was more likely to take greater risks than the other six organizations. 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 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 six other organizations. Positive rewards rather than punitive measures were apparently more prevalent in organization D.

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 that shows organization D had the friendliest and most informal relations.

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 climate variable scores revealed that every organization in the sample except organization F received their highest climate rating 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 rating 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. Organization B and C employees expressed the lowest perception of 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.

Looking at the specific organizational climate pattern scores, Table 3, 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 [19].

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.

Organization D had the highest reward and support pattern score. This score implies that more emphasis was placed on positive reinforcement than on punishment for task performance. The reward and support portion of this pattern score is positively related to the development of achievement and affiliation motivation, while the conflict portion of this pattern score is more related to power motivation.

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. The social inclusion pattern score is positively related to the development of affiliation and weakly related to the development of achievement motivation.

A further study of the pattern scores 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.

This aerospace sample and the American businessmen norms displayed a larger score on social inclusion than on any of the other climate patterns. 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. 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.

Organization Performance

As stated previously, the statistical differences in organization performance could not be calculated because the multivariate data that make up the total performance rating scores were not available. Because of the relatively wide range, 29 percent, in the performance rating scores, it is intuitively obvious that they are statistically different.

Management System and Organizational Climate Relationships

A statistically significant (probability value <0.00003) correlation value of $+0.31$ was found between the management system variables and organizational climate variables in this study. Since the management systems were statistically different as were the organizational climates, this correlation value implies that

there was a positive and highly interactive relationship between these two major variables. Therefore, respondents who perceived higher levels of management system also perceived higher desirable levels of organizational climate.

These findings support the theoretical conceptualization of Gibson, Ivancevich, and Donnelly [13] since four of the seven variables used as "casual inputs" in their integrative systems model are also in the management system test instrument used in this research. This finding is also in agreement with the findings of Curtis [12] and Meyer [36].

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 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.

The structure climate variable 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.

From an analysis of all the sample correlational values between the management system variables and organizational climate variables, the decision-making variable had the highest overall correlation values with the organizational climate variables. These results imply that the employees who perceived a more decentralized, group type decision making process 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 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. More research is needed to further clarify these relationships.

Even though this correlation value is not statistically significant, the fact that it is positive lends support to the conceptualization of Gibson, Ivancevich, and Donnelly [13] and the simulation work of Kaczka and Kirk [37]. It also supports the findings of Lawler, Hall, and Oldham [2], and Litwin and Stringer [19].

Management System and Performance Relationships

A correlation value of +0.35 was found between the management system variables and performance ratings. This value was not statistically significant (probability value = 0.191). Therefore, in this study the management system variables apparently had very little 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 proper direction and there was a very definite positive trend line between the management system and performance in Figure 1, 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. The nonsignificant relationship lends some support to the finding of Butterfield and Farris [2] that the management system was unrelated to organizational performance.

CONCLUSIONS

This study investigated the relationships among management systems, organizational climate and performance. It affirmatively corroborated the three research questions:

1) A positive and statistically significant correlation ($P < 0.00003$) was found between management systems and organizational climate.

2) A positive and statistically nonsignificant correlation ($P < 0.333$) was found between organizational climate and organization performance.

3) A positive and statistically nonsignificant correlation ($P < 0.191$) was found between management systems and organization performance.

The correlations between all the management system and organizational climate variables were statistically significant at the 0.001 level in 64 of the 72 correlations, an occurrence rate of 89 percent. This is considered to be a very strong, positive correlation between the management system and organizational climate. This correlation implies that those respondents who perceived higher levels of management system also perceived higher levels of organizational climate. 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 do have a positive relationship with organizational climate variables.

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, 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.

The positive nature of the correlation value between the management system and organization performance only indicates direction of correlation under the circumstance. The probability of occurrence value of 0.191 means that there is less than a 19.1 percent probability that this relationship could have happened by chance. This 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 positive correlation implies that there is a direct relation 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.

Based upon the data from this sample, organizational climate did not appear very important as an intervening variable in the research. The behavioral phenomena, identified in the Gibson et al. model [13], that were shown to be resultant of organizational 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.

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