

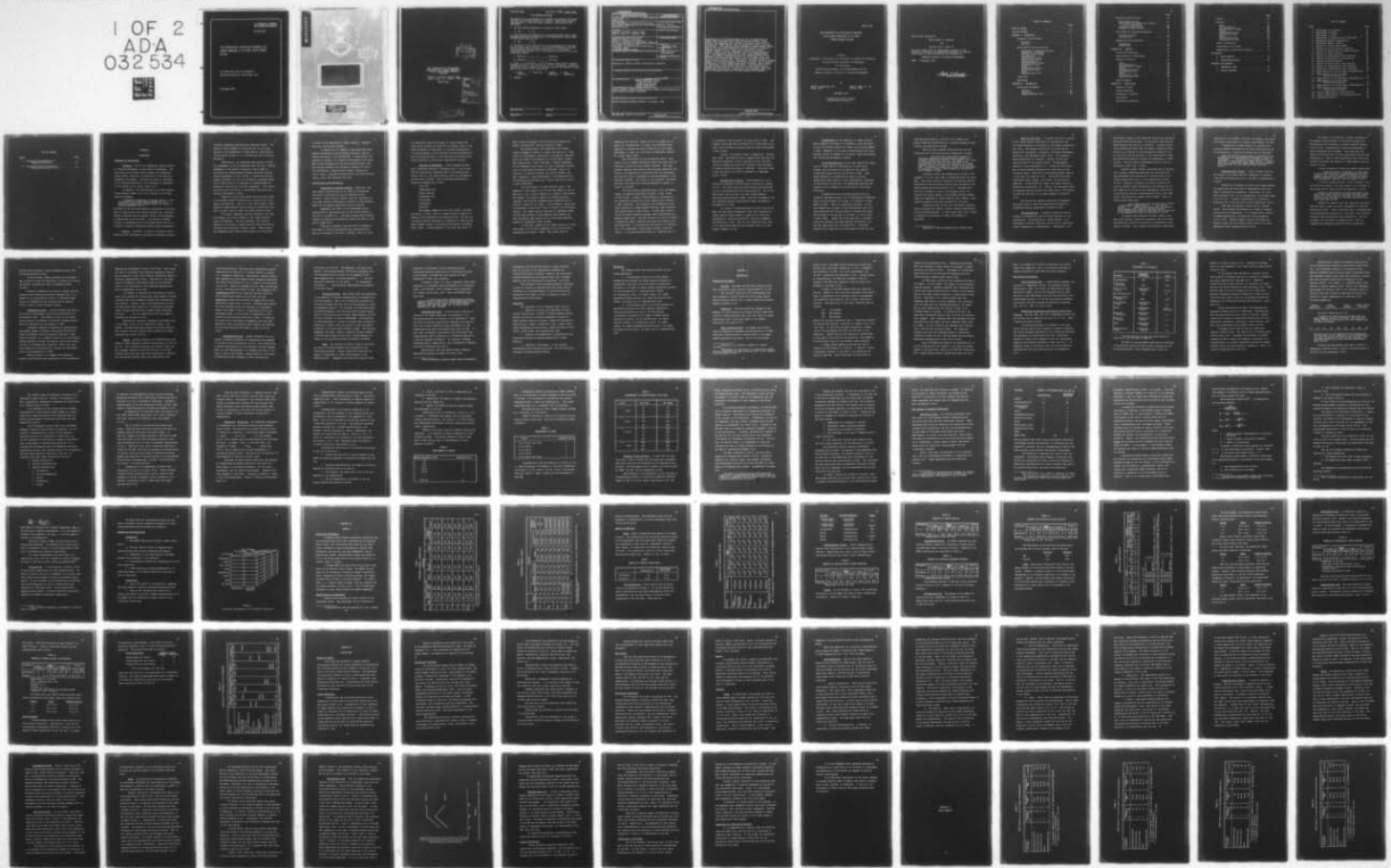
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THE INTERACTION OF JOB-RELATED VARIABLES WITH  
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AIR FORCE INSTITUTE OF TECHNOLOGY  
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

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THE INTERACTION OF JOB-RELATED  
VARIABLES WITH LEADER DIMENSIONS  
IN AIR FORCE SYSTEM PROGRAM  
OFFICES

Dwight G. Peterson, Major, USAF  
John W. Vogt, Jr., Captain, USAF

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Consideration and Initiating Structure are two dimensions of leader behavior identified by the Ohio State studies. Other studies have suggested that certain job-related variables may interact with Consideration and Initiating Structure in the job environment. This research effort proposed a relationship between each of the two leader dimensions and the variables of phase of weapons acquisition life cycle, job satisfaction, organizational climate, tenure, assignment status, military/civilian status, leader grade, hierarchical level, and organizational size. The sample consisted of Air Force System Program Office managers located at Wright-Patterson Air Force Base, Ohio, and the data were obtained from questionnaire responses gathered by three previous thesis teams. Analysis of the data failed to provide support for the hypothesized relationships between the situational variables and the two leader dimensions, although a small number of significant relationships were found. The existence of an overall pattern could not be inferred from this small number of significant interactions, resulting in the conclusion that there was no consistent basis for the hypothesized relationships.

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THE INTERACTION OF JOB-RELATED VARIABLES  
WITH LEADER DIMENSIONS IN AIR FORCE  
SYSTEM PROGRAM OFFICES

A Thesis

Presented to the Faculty of the School of Systems and Logistics  
of the Air Force Institute of Technology  
Air University

In Partial Fulfillment of the Requirements for the  
Degree of Master of Science in Logistics Management

By

Dwight G. Peterson, AB  
Major, USAF

John W. Vogt, Jr., BA  
Captain, USAF

September 1976

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distribution unlimited

This thesis, written by

Major Dwight G. Peterson

and

Captain John W. Vogt, Jr.

has been accepted by the undersigned on behalf of the  
faculty of the School of Systems and Logistics in partial  
fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN LOGISTICS MANAGEMENT

DATE: 7 September 1976

  
COMMITTEE CHAIRMAN

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## CHAPTER I

### BACKGROUND

#### Statement of the Problem

Relevance. One of the fundamental characteristics of logistics management is the nature of leadership. Any study which can provide further insight into leadership theory should, therefore, be beneficial to the logistics management environment. Although the study of leadership is of recognized importance, the "knowledge of leadership is both sparse and of recent origin [5:1]."

In addition, the effectiveness of Air Force System Program Offices (SPOs) is of vital interest to Air Force logistics managers.

A fundamental Department of Defense policy is that the acquisition of major weapon systems will be directed by responsible managers under the concept of program management [31:4].

The SPOs are the Air Force agencies responsible for procurement of large dollar-value weapons systems, and, therefore, receive attention from the highest levels of the Department of Defense and of the Air Force. Any specific findings relative to leadership in Air Force SPOs should then be of interest in terms of responsible weapon system procurement.

Utility. In general, a study of leadership characteristics will contribute to the body of knowledge currently

available regarding leadership and leadership theory. The specific areas proposed for study can have utility when applied to the dimensions of leader behavior identified by the Ohio State studies (i.e., Consideration and Initiating Structure).

Additionally, the importance and potential of project management is fully recognized today (20:142). Project management is the system of operation used by SPOs in developing the complex weapons systems currently required. Project management is also, however, a relatively new management technique, so that any information regarding leadership in SPOs could be of importance in understanding the managerial implications of project management. This information may also be of value in establishing guidelines for effective management in SPOs.

There may also be some benefit derived from a study of the problem should it develop that certain of the variables are predictive. That is, if one could predict a more effective leader behavior given a specific situational variable in a SPO, then the study would have further utility.

Of several leadership theories advanced in the past few decades, one of the foremost is the leader behavior theory (25:423-424). The most systematic and rigorous approach to the study of leader behavior theory has been in the Ohio State University studies (1:484). These studies have suggested that leader effectiveness can be explained

in terms of two dimensions of leader behavior: Consideration and Initiating Structure.

It appears that an inherent relationship may exist between Consideration and Initiating Structure, and job-related variables (17:33; 25:424-425). In particular, the problem of interest is a possible relationship in Air Force SPOs between Consideration and Initiating Structure, and job-related variables such as phase of system life cycle, job satisfaction, organizational climate, hierarchical level, tenure, assigned/collocated status, military/civilian status, grade, and organizational size.

#### Justification and Delimitation

Uniqueness of proposed research. There have been some studies concentrating on the impact of situational variables on Consideration and Initiating Structure (17:32-3). These studies, however, have not addressed the two leader behavior dimensions in relation to the different phases of the weapons acquisition cycle in the SPO.

Coggeshall and Jasso, in an unpublished thesis, concentrated on leadership style in the various phases in the life of the SPO (2:1). Two other related thesis efforts focused on climate and satisfaction versus the phase of life cycle in SPOs (2:5).

There has, therefore, been one effort (Coggeshall and Jasso) to relate Consideration and Initiating Structure to the phase of life cycle. However, there is a need

for additional study of the phase of weapon system life cycle (2:61) as well as a need for an original study of the other variables as they relate in a System Program Office. A clear gap exists in the literature relating Consideration and Initiating Structure to the previously mentioned situational variables in the project organization setting.

Theories of Leadership. A brief summary of seven major leadership theories is presented here to set in context the theoretical framework used in the research hypothesis; that is, the leader behavior theory as developed in the Ohio State studies. Seven leadership theories enumerated by Albanese are (1:480):

- Great man
- Leadership trait
- Leader behavior
- Leadership role
- Situational
- Contingency
- Path goal

The primary emphasis of the first theory, the great man theory, is that a man is a leader because of who he is, because of his personality and characteristics, and that one can acquire greater awareness of leadership by observing how great leaders reacted to situations and persons confronting them (1:480). A major weakness of the great man theory is

that it does not account for the interaction between the leader, the followers, and the situation (1:492).

The second theory, the leadership trait theory, focuses on what the leader is, rather than who he is. Such traits as intelligence, personality, and physical characteristics are taken to be measures of an individual's leadership capabilities (1:482; 9:294-295). Primary weaknesses of the leadership trait theory are that a seemingly endless list of traits keeps developing (9:295-296), that it is difficult to accurately measure the traits (29:227), and that, apparently, leader performance is influenced more by the situation and personalities involved than by his traits (1:484; 29:227-228).

The third theory is leader behavior theory. The emphasis in this theory is not on who the leader is, nor on what he is, but on how he behaves as a leader (1:484; 9:296). For example, the leader's behavior in making decisions, planning, and accepting responsibility determines how effective a leader he is (1:484). Leader behavior theory will be discussed in more detail later in terms of the Ohio State studies. The leader behavior approach to leadership theory has had some success in explaining why some leaders are more successful than others, and in citing some important aspects of leadership (1:486; 29:230).

A view that a person is the leader because of a role that needs to be filled is embodied in the fourth theory, leadership role theory (1:486). This theory does not

emphasize the "official" leader as the true leader in all cases, but contends that in a group, the individual most qualified to perform the task at hand will be the leader. Leadership is, then, the "role that an individual occupies at a given time [1:486]."

The fifth theory is the situational theory. This theory tries to combine information about the leader and the situation in which he finds himself (29:230). The "open systems" approach identified by Katz and Kahn emphasizes the leader in an organization intertwined with its environment and sees the acts of leadership as varying dependent on the situation (29:230). The theory is quite general, and there has been little empirical evidence gathered to support or refute it (29:230).

The sixth theory summarized here is the contingency theory, an approach pioneered by Fiedler (1:489; 9:303). In this theory, a leader's effectiveness is determined by his capability to match his "style" against the situation (1:489; 8:303-305). The situation can be measured by the three variables of leader-member relations, task structure, and position power (1:489; 9:304). Fiedler uses a device called the Least Preferred Coworker (LPC) questionnaire to measure leader style. The LPC consists of a set of 17 pairs of adjectives used to describe the person with whom he can work least well. If he describes this person in a positive way, he is considered "relationship oriented" (high LPC score). If he describes this person in a negative way, he

is considered "task oriented" (low LPC score) (1:489). Contingency theory has been criticized but it does seem to provide a well-validated conceptual base for future development (1:490; 9:305).

Finally, the seventh theory is summarized. The path goal theory, developed by House, suggests that employees use subjective estimates in their approach to work, and that effective leaders can positively influence these estimates to achieve desired work goals (1:490-491). Path goal theory is new, but may be an effective approach to leadership theory (1:491).

The Ohio State Studies. These studies set out to define the behavioral characteristics exhibited by leaders (7:5-7). The study group developed several questionnaires to use in verifying behavioral characteristics. Two of the most widely used have been the Ideal Leader Behavior Description Questionnaire (LBDQ), developed by Hemphill, and the Leadership Opinion Questionnaire (LOQ), developed by Fleishman (3:7; 6:48).

As a result of administering an earlier form of the LBDQ, the Ohio State researchers found four dimensions of leader behavior which seemed to underlie all situations: Consideration, Initiating Structure, Production Emphasis, and Sensitivity (3:8). The last two dimensions were found to be consistently weak and were dropped from use in subsequent research (17:30).

Consideration is the dimension of leader behavior which indicates the degree of friendship, trust and warmth in the relationship between the leader and the group members (1:485). Examples of acts high in Consideration are doing personal favors for members of the group, explaining actions, and treating group members as equals.

Initiating Structure is the other significant dimension of leader behavior identified by the Ohio State studies, and is defined as the degree of the leader's orientation toward getting the job done (1:485). Such leader behaviors as scheduling the work to be done, emphasizing leader position in the organization, insisting on the meeting of deadlines, and emphasizing employee performance are all examples of actions high in Initiating Structure.

Consideration and Initiating Structure are not viewed as opposing concepts, but as complementary dimensions which are both present in a leader to a greater or lesser degree (1:485). There is considerable evidence, in fact, that leaders who are high in both Consideration and Initiating Structure will be more effective leaders than those who are high in one and low in the other, or low in both (1:485; 9:299). Leaders who score high only in Consideration will probably have high employee satisfaction, but may have employees with low productivity. Conversely, leaders with a high score in Initiating Structure may have

high employee production, but will also probably have greater employee dissatisfaction, evidenced perhaps by high turnover and absenteeism (9:299).

There are some problems associated with the Consideration and Initiating Structure dimensional concepts:

. . . . there have been few studies showing how initiating structure and consideration operate in different situational contexts. For example, the effect of these behaviors may vary with the size of the organization, the status of the executive, the organizational climate and tradition, and the nature of the task. Situational variables are likely to be important to determine a leader's effectiveness in interacting with followers [1:485].

A previous thesis team administered the LOQ to 182 managers<sup>1</sup> in 13 Air Force SPOs at Wright-Patterson Air Force Base. The thesis explored a possible relationship between Consideration and Initiating Structure and the phase of the weapon system acquisition process (2:1). Although there was little evidence of such a relationship (2:60), the question was raised whether a relationship existed between these two dimensions of leader behavior and a number of job-related variables other than the phase of life cycle.

Jacobs has noted (17:33) that situational variables should influence the "proper" balance between Consideration and Initiating Structure. It would seem, then, that a study to identify the existence of these relationships is warranted.

---

<sup>1</sup>Managers is used synonymously with leaders here.

Phase of Life Cycle. A variable that may be related to the leader behavior dimensions of Consideration and Initiating Structure is the phase of the weapons acquisition life cycle. The weapons acquisition life cycle may be divided into conceptual, validation, full-scale development, production, and deployment phases (2:4). The conceptual phase establishes the technical, economic and military specifications of the weapons system. The management approach is also determined (2:4). Validation and refinement of major program characteristics take place in the validation phase. Resolving or minimizing program risks is a vital part of validation (2:4). During the full-scale development phase, design, fabrication, and testing are completed. In the production phase, the weapon system is produced for operational use. Finally, the deployment phase is concerned with the operational ready state of the system. In addition, delivery to the using command is initiated (2:5).

The statistical analysis performed by Coggeshall and Jasso failed to show any significant difference in leadership behavior among phase categories (2:60).

Job Satisfaction. A second variable that may be related to Consideration and Initiating Structure is job satisfaction. Job satisfaction, simply defined, is an individual's attitude toward his job and can be approached either conceptually or operationally. Conceptually, job

satisfaction refers to the comparison between the employee's perceived needs and outcomes, and the actual needs and outcomes acquired from his job (1:463-464). A study of white collar workers has shown that the amount of employee satisfaction is a function of both how much his needs are fulfilled by his job and how much is left unfulfilled (1:463). The operational approach concerns the measurement of satisfaction. The most popular measurement device is the Job Descriptive Index (JDI) (1:465).

Studies by Mann, Nealey, and Blood seem to indicate that different leadership behaviors are associated with high performance and satisfaction of subordinates at different hierarchical levels in the organization (13:86; 14:173). Research by Stogdill has shown a positive correlation between leader Consideration and satisfaction in both high and low levels of the organization, while Initiating Structure was not correlated positively at the lower levels, but could be at higher levels (13:87). Hunt, in another study found that:

. . . satisfaction with work was positively related to the manager's consideration . . . [at several levels]. . . Worker groups whose first and second-level managers were high in consideration were significantly more satisfied than they were if only one of the managers was high in consideration [13:87].

A further study conducted by Rizzo, based on the Ohio State studies, tested the hypothesis that Initiating Structure had a positive correlation to subordinate satisfaction (13:154). Four separate relationships (advancement

opportunity, job autonomy, intrinsic job rewards, and social environment) were shown to correlate significantly (13:154).

Although most evidence points to a positive correlation between Consideration and Initiating Structure and job satisfaction, a caution by Fiedler must be addressed:

While the positive relationship of consideration to satisfaction has been generally confirmed, it must be questioned . . . We are not sure of the direction of causality in these industrial field studies. It may be true that a considerate leader makes his group members more satisfied, but the opposite might also hold [6:53].

Organizational Climate. A third variable that may be related to the leader behavior dimensions of Consideration and Initiating Structure in the SPO is organizational climate.

Research by Fleishman has shown that foremen working for supervisors who were high in Consideration were also high in Consideration themselves. Conversely, if a foreman's supervisor was low in Consideration, the foreman tended to be low also. A similar trend existed in Initiating Structure, but it was not statistically significant (17:31).

This type of behavior is known as the "climate" effect. Each foreman was working in a climate of expectations held by his supervisor. If a foreman did not abide by these expectations, his supervisor would disapprove (7:19; 17:31). Several research studies (Fleishman and Halpin to name two) have shown climate effects to be more substantial than training effects (17:32).

The impact of situational (climate) variables on the relative effectiveness of Initiating Structure and Consideration has been shown in several research studies (7:20; 17:32). Organizational stress was researched in 1964 by Oaklander and Fleishman. They found that the effects of Structure may be more situationally defined than Consideration. These studies demonstrate that situational variables influence the balance of leader behavior that is desired (17:33).

A study by Halpin of Korean war combat flying crews

. . . provides further confirmation [of the impact of situational variables] through demonstrating that a change in the situation changed the desires of group members regarding the balance of initiating structure and consideration behavior from the leader [17:33].

In further studies by Katz, it was concluded, as in the Ohio State studies, that there seemed to be evidence of the climate effect among foremen and supervisor (17:35).

Foremen of big productivity sections tended to be more secure about their own standing with their supervisors, felt less pressure from them, and were more satisfied with the amount of authority they had to get their jobs done [17:38].

Research by Chemers found that Americans characterized the "good" leader as either considerate or basically structuring (6:50). Stanton indicated that in organizations with authoritarian-type policies, there was a more positive attitude toward structuring than consideration. Not surprisingly, he also found the opposite true. That is, organizations possessing democratic-type (considerate)

policies were inclined to value Consideration more than Initiating Structure (6:50).

A study by Kahn (1960) concluded that the worker must be able to trust his supervisors, and must feel that he can protest (successfully) what he considers unfair (17:295).

Fiedler's research in the area of climate and Consideration and Initiating Structure indicates that, if a leader is in an unfavorable climate, "a different combination of consideration and structure may be required [5:61]," than in a more favorable climate.

Hierarchical Level. A fourth variable that may be correlated to Consideration and Initiating Structure is hierarchical level. "The number of levels in an organization refers to the number of different rankings between operative employees and top managers [1:309]."

Consistent findings in research on organizational development suggest a definite relationship between attitudes at different levels and employee behavior (1:309). Porter and Lawler, in a research review on the relationship between employee attitudes and behavior and various characteristics of organizational structure, report that "perceived employee job satisfaction increases at each higher level in the organization [1:309]."

Results by Hunt et al suggest that managerial behavior can influence need satisfaction of the subordinates

spanning two hierarchical levels (13:101-102). Hunt points out that it is probable that different managerial behavior may be required to deal with different subordinate needs at different organizational levels. Specifically, the importance of recognizing subordinate needs at the different levels in the organization, and responding appropriately, must be emphasized (13:101-102).

In relation to Consideration and Structure, Halpin found in his Korean War studies that crews seemed to be more satisfied when their commanders showed more consideration-type behavior. However, these relationships did not show the same pattern when supervisory ratings were considered. "Their ratings correlated more strongly with initiating structure, . . . but not significantly with the leader's consideration behavior [17:30]."

Research has indicated, generally, that supervisors in the higher levels in the organization "expect, and approve, initiating structure behavior from their subordinate leaders, and this tendency gets stronger with higher organizational levels [17:31]."

Tenure. Another variable to be investigated in the context of SPO leadership could be called tenure, or time in the job. This variable would mean the length of time that the incumbent manager has held his position in the SPO. Although there have been few studies specifically examining the relationship between tenure and Consideration and

Initiating Structure, there has been considerable research conducted on the effects of a variable similar to tenure, i.e., managerial experience. Specifically, several studies have examined the relationship between managerial experience and leader effectiveness in terms of high or low LPC scores (6:127-137). Studies by McNamara (6:131), Bons and Hastings (6:130), and Csoka and Fiedler (6:134), have suggested that inexperienced leaders with a high LPC are more effective than inexperienced leaders with low LPC, and that experienced leaders with high LPC are less effective than experienced leaders with a low LPC. Although these studies have been analyzed within the framework of contingency theory, the leader's "style", as measured by LPC in the contingency model, is not unlike the dimensions of Consideration and Initiating Structure (1:489). In addition, the study of Air Force SPOs by Coggeshall and Jasso suggested that some relationship exists between the dimension of Initiating Structure and length of time in the job (2:59).

Assigned/Collocated. Another variable to be considered is whether personnel are administratively assigned to the job or are collocated on the job. This variable has a specific applicability to the problems of project management, in that some personnel are assigned full-time to the project office, while others, though working on the project, are administratively assigned to their own particular

functional area (23:53). The Coggeshall and Jasso study showed a relationship between the Structure dimension and the assigned/collocated status of the managers (2:58). They suggested that "collocated personnel . . . may have perceived themselves as less bound . . . by established directives . . . than personnel administratively assigned to the SPO [2:58]."

Military/Civilian. Many studies have been performed on the behavior of military managers and on the behavior of civilian managers. Some of the studies have analyzed the correlation between military and civilian managers in terms of managerial behavior. For instance, the well-known Blake and Mouton Managerial Grid has been used as equally applicable to both military and civilian leader behavior (4:5-39 to 5-48; 9:356-357; 17:34-35; 29:265-266). This grid has the two dimensions of "concern for people" and "concern for production" (9:356), which are similar to the two primary dimensions in the Ohio State studies (1:499). The study by Coggeshall and Jasso, however, suggested "strong evidence" of differences between military and civilian managers in regard to the Initiating Structure dimension (2:58-59).

Grade. The variable of grade or rank is one which may have an interrelationship with Consideration and Initiating Structure. Several studies have explored the impact of rank/grade on leader effectiveness (17:25; 28:36-41,81-87). Coggeshall and Jasso have indicated that

there may be differences in both Consideration and Initiating Structure associated with differences in grade of the leaders, although they have pointed out some weaknesses in their data (2:59-60).

In general, there is a lack of agreement about which dimensions of leadership should predominate in an effective leader, and similarly, which dimension should predominate as a leader attains high grade. Scott and Mitchell have noted that:

. . . in some cases being interpersonally oriented [Consideration] is related to effectiveness while others support a task-oriented style [Initiating Structure] and some find that the leader who is high on both dimensions is best [29:229].

Organizational Size. A final variable that may be related to the leader dimensions of Consideration and Initiating Structure is the size of the organization. There have been few studies specifically examining this relationship, but a study conducted by Hunt and Osborne in 1974 demonstrated that some relationship does exist (16:12). In part, Hunt and Osborne investigated task environment<sup>2</sup> and organizational size as predictors of leadership behavior in a national business fraternity. All chapters, although operating under a common policy, were considered as separate entities of differing size (16:1).

Specifically, Hunt and Osborne found a marginal significant correlation between the size of the

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<sup>2</sup>Task environment included leader behavior dimensions.

organization and Initiating Structure, which indicated that as the size of the organization increased the Initiating Structure increased. However, the correlation between Consideration and organizational size, although positive, was not statistically significant (16:11-12).

The findings of Hunt and Osborne appear reasonable, in that an increase in organizational size would seem to necessitate an increased degree of Initiating Structure exhibited by the leader in order to maintain a level of organizational effectiveness.

### Objectives

The objectives of this research effort were to:

1. Identify the nature and importance of situational (job-related) variables in System Program Offices. Specific situational variables considered are phase of weapon system acquisition process, leader job satisfaction, organizational climate, hierarchical level, leader tenure, leader assigned/collocated status, leader military/civilian status, leader grade, and organizational size.
2. Identify the predominance of Consideration and Initiating Structure in System Program Office leader behavior.
3. Identify a relationship, if any, between Consideration and Initiating Structure, and the situational variables in System Program Offices.

### Hypotheses

The research effort was directed toward the following hypotheses:

1. A relationship exists in Air Force System Program Offices between the leader behavior dimension of Consideration and each of the job-related (situational) variables of (a) phase of weapon system acquisition process, (b) job satisfaction, (c) organizational climate, (d) hierarchical level, (e) leader tenure, (f) leader assigned/collocated status, (g) leader military/civilian status, (h) grade, and (i) organizational size.

2. A relationship exists in Air Force System Program Offices between the leader behavior dimension of Initiating Structure and each of the job-related (situational) variables of (a) phase of weapon system acquisition process, (b) job satisfaction, (c) organizational climate, (d) hierarchical level, (e) leader tenure, (f) leader assigned/collocated status, (g) leader military/civilian status, (h) grade, and (i) organizational size.

## CHAPTER II

### METHODOLOGY

#### Population and Sample

Universe. The data used for this research effort were collected by three previous thesis teams (2; 19; 26).

The universe<sup>3</sup> consisted of all SPO managers that were "assigned to United States Air Force weapon system program offices involved with a single identifiable weapon system or product [2:17]."

Population. The population<sup>4</sup> was composed of SPO managers in those Aeronautical Systems Division (ASD) SPOs located at Wright-Patterson AFB, Ohio that could be readily identifiable with a particular phase of the weapons acquisition life cycle (2:17).

Sample selection plan. The sample was selected from the population of managers performing duty in 13 SPOs which were identified with a certain phase of the weapon system acquisition life cycle. Due to its overlapping

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<sup>3</sup>Defined as all possible elements of concern (12:326).

<sup>4</sup>Defined as the "entire set of values which results from the measurement of some characteristics of all elements of the universe [12:326]."

nature (2:18), the weapon system acquisition process was divided into three major categories: (1) C/V - conceptual and validation, (2) FSD - full scale development, and (3) P/D - production and deployment (2:18). As the outcome of categorization, two SPOs were assigned to the C/V category, four SPOs were assigned to FSD and seven were assigned to P/D phase (2:20).

A sample of 100 SPO managers from each phase was desired. Samples of this size were considered sufficiently large to compensate for the possibilities of nonresponses and incomplete questionnaires, and to permit statistical analysis. The populations of the phase categories were as follows:

C/V	29 managers
FSD	456 managers
P/D	585 managers

Because of the small population size, a census was necessary for the C/V SPO category, resulting in a sample size of 29 (vice 100). In the other two phase categories, a sample size of 100 represented 22% (FSD) and 17% (P/D) of the population. Sample sizes of this magnitude, representing on the order of one-fifth of the population, were deemed to be sufficiently large for the research being conducted.

A simple random sampling technique was used to identify the SPO managers of interest. A complete listing of personnel assigned to each SPO in the population was acquired from ASD. Those individuals not qualifying as

managers were eliminated (2:21). "Remaining individuals were each assigned a unique number for purposes of sample selection and control [2:22]." The sample of 100 SPO managers from each of the FSD and P/D categories was then selected using a random number table (2:22).

An additional concern was the representativeness of the sample. In this regard, the subject of non-respondent bias was germane. Oppenheim suggests that respondents who return their questionnaires late are similar to non-respondents in that they respond similarly to questionnaire items (24:34). Therefore, if it could be shown that late responses were similar to early responses, the conclusion could be drawn that the representativeness of the sample had not been destroyed by the failure of some of the intended sample to respond. In gathering the data, two weeks were considered adequate time to return the questionnaire package. Early responses were then adjudged as those returned within two weeks, and late responses those after two weeks. A total of 69% of the responses were returned early, and 79% were returned overall. The comparison between early and late responses showed no substantial difference between the two, and the sample was accordingly considered representative (2:39; 19:47; 26:38).

Since the sample was shown to be representative, it can be concluded that the results of the study are generalizable to the population, which is all ASD SPO's associated with a single weapon system at Wright-Patterson Air Force

Base. No attempt will be made to generalize the results beyond this population, due to the possible existence of unknown variables at other SPOs and other locations.

#### Data Source and Validity

Data Collection Plan. A questionnaire package, consisting of a demographic survey, the Leadership Opinion Questionnaire (LOQ), the Profile of Organizational Characteristics (POOC), and the Job Diagnostic Survey (JDS), was sent to each SPO manager that had been selected by the random sample process. Of the 230 questionnaire packages distributed, 175 were returned satisfactorily completed (22 - C/V, 78 - FSD, 75 - P/D) (2:24).

Measurement Instruments and Interval Level Justification. The LOQ, POOC, JDS, and a demographic survey were the devices used to summarize the data (2; 11; 19). Table 1 depicts the data obtained.

The LOQ was developed by Fleishman in the early 1950's and was specifically designed to measure leadership attributes regarding Consideration and Initiating Structure. The instrument was constructed such that "individuals respond in terms of how frequently they feel they should engage in the behavior described in each item [8:1]." An important aspect of the LOQ is that the scales measuring Consideration and Initiating Structure are independent (8:1).

TABLE 1  
MEASUREMENT OF VARIABLES

VARIABLE	MEASURING INSTRUMENT	SCALE
Consideration	LOQ	0-80
Initiating Structure	LOQ	0-80
Phase of Life Cycle	Demographic Survey	I, II, III
Job Satisfaction <sup>1</sup>	JDS	1-7
Organizational Climate	POOC	0-40
Hierarchical Level	Demographic Survey	1-5
Tenure	Demographic Survey	$\frac{1}{4}$ Yr Intervals
Assigned/ Collocated	Demographic Survey	0,1
Military/ Civilian	Demographic Survey	0,1
Grade	Demographic Survey	1-5
Organizational Size	Demographic Survey	1-4

<sup>1</sup>Job Satisfaction includes the seven affective reactions to the job shown on page 28.

The LOQ is a forced-answer questionnaire consisting of 40 questions equally divided between Consideration and Initiating Structure. Each respondent must choose one

answer on a scale of zero to four. Although the maximum score for each dimension is 80, scores usually range between 30 and 70 (8:1).

In its present form the LOQ is a "product of more than 18 years of research and use in a variety of industrial and other organizational settings [8:1]." Numerous reliability and validity studies, in a diversity of organizations, have been conducted on this instrument (8:5). Bass used the LOQ to rate sales supervisors in a 1958 study. Multiple regression techniques requiring at least interval level data were used to show the relationship between Consideration and Initiating Structure and success as a salesman (8:5).

Parker administered the LOQ to 80 pharmaceutical warehouse foremen as part of a 1963 study. Consideration and Initiating Structure were found to correlate "significantly with a number of group-effectiveness criteria [8:5]." Statistical correlation, requiring at least interval level data, was accomplished with reliable results (8:5-6).

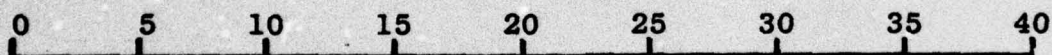
Fleishman and Ko used the LOQ in a 1962 petrochemical refinery study. The results were correlated using interval data (8:6). Fleishman and Oaklander also administered the LOQ to nurses and nonmedical supervisors in a research effort to evaluate leadership patterns and organizational stress and effectiveness in hospitals. Again, correlation techniques were used (8:6).

Organizational climate was measured using the Profile of Organizational Characteristics Form S (short form) (21). The instrument consists of 18 questions, with possible responses equally spaced across a continuous scale. The respondent places a mark along the continuum at a point that most accurately describes his perception of the question (19:28). For example, if a question asked: "How accurate is upward communication?" (19:72), the respondent would answer by placing a mark on the continuous scale at the point that most accurately describes his idea of the accuracy of upward communication in relation to the following suggestions:

Usually Inaccurate	Often Inaccurate	Often Accurate	Almost Always Accurate
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The scale ranged from 0 to 40.

A template was fabricated and divided into four equal segments along the continuum. The scale was further divided so that each of the four segments had ten equal increments . . . .



The zero point on the template was then aligned with the left side of the continuum on the questionnaire so the scale was directly below the line and mark. The scale was treated as an equal interval measurement scale [19:30].

Scoring the questionnaire was simply a matter of assigning a numerical value to each of the marks placed on the scale by the respondents (19:31).

The interval scale is applicable according to the instrument's author (19:30). Further, in discussion on scale construction, Helmstadter referenced the Likert scale as an interval scale (12:370).

In a discussion of the relative merits of median dichotomization versus Pearson product-moment for Likert scales data, Keown and Hakstian have indicated that the Pearson product-moment correlation coefficient was more appropriate (18:27).

The Job Diagnostic Survey (JDS) is an instrument designed to measure three classes of variables: (1) the objective characteristics of jobs, (2) the personal affective reactions of individuals to their jobs, and (3) the readiness of individuals to respond to jobs which have a high degree of internal work motivation (11:1). Although the JDS measures seven job dimensions and three psychological states, this research effort will be primarily directed toward affective reactions to the job. As measured by the JDS, these reactions are (11:4-6):

1. General Satisfaction
2. Internal Work Motivation
3. Specific Satisfactions
  - a. Job Security
  - b. Pay and Compensation
  - c. Social
  - d. Supervision
  - e. Growth

In addition, the JDS measures several factors including Motivating Potential Score (MPS) which reflects the overall potential of a job to motivate an individual. The MPS is computed based on the job dimensions of Skill Variety, Task Identity, Task Significance, Autonomy and Feedback (11:4).

As measured by the JDS short form, the scores of all the items (except MPS) range from 1 to 7, with 1 denoting the lowest value of the dimension, and 7 the highest (11:10).

The 1-7 scales of the JDS are also Likert-type scales. There has been sufficient justification above for assuming interval level data with Likert scales. In addition, Hackman and Oldham reported in 1974 that the JDS "has been taken by over 1500 individuals working in more than 100 different jobs in about 15 different organizations [11:18]." There has, then, been a broad data base established for the JDS, such that the parametric characteristics of interval level data have taken on substantive meaning. Hackman and Oldham have calculated several of the parameters from the data, including mean, variance, intercorrelation and F-ratio (11:22,24,25,29,30).

Information on the demographic variables were obtained by the use of a written survey. These variables include civilian versus military status, length of time assigned to the SPO, assignment status (assigned or collocated), hierarchical level, leader grade and organizational size (2:19).

From the above discussion, it appears that the LOQ, POOC, and the JDS may be used at interval data level with reliable results. Consequently, this research effort will attempt to statistically analyze the data obtained from these instruments using the Pearson product-moment coefficient of correlation, and using the one-way analysis of variance (ANOVA) in those cases where correlation is inappropriate.

Operational Definitions. The leadership dimensions of Consideration and Initiating Structure were measured using the LOQ. The questions are scaled from zero to four. In response to a question, a zero-scored answer corresponds to "never . . . , not at all . . . , (or) very seldom [2:78]" and is equated with low Consideration and Initiating Structure. An answer of four, on the other hand, corresponds to "always . . . , often . . . , a great deal [2:78]," and is equated with a high Consideration or Initiating Structure score. The sum of all 20 questions for each dimension is used as an overall score.

The phase of weapon system acquisition was measured by categorizing the weapon acquisition life cycle into three phases (1) conceptual/validation, (2) full scale development, and (3) production/deployment. Numerals were then assigned to each phase: Conceptual/validation - Phase I; Full Scale Development - Phase II; Production/deployment - Phase III.

Organizational climate was measured using the Profile of Organizational Characteristics, Form S. The scales range from 0-40. A zero corresponds to negative aspects of climate while a 40 relates to positive aspects of climate (19:71).

Although there is no overall indication of job satisfaction, for the purposes of this research effort job satisfaction will be considered to be composed of 7 variables. They are all measured by the JDS and consist of the 7 affective reactions to the job. The affective reactions (general satisfaction, internal work motivation, job security, pay and compensation, social, supervision, and growth) are scored from the JDS on a scale of 1 to 7. A score of 1 represents low satisfaction (or poor motivation, low security, etc.), and 7 represents great satisfaction (or great motivation, high security, etc.).

Following are definitions of the affective reactions to the job (11:6,12-13):

1. General satisfaction: an overall measure of the degree to which the employee is satisfied and happy with the job.
2. Internal work motivation: the degree to which an employee is self-motivated to do the job.
3. Job security: how secure the future is for the employee in the organization.
4. Pay and compensation: the amount of pay and fringe benefits the employee receives.

5. Social: the chance to get to know peers and coworkers on the job.

6. Supervision: the amount of support and guidance received from the supervisor.

7. Growth: the opportunities for personal growth and development in the job.

Hierarchical level is defined on a scale of 1 to 5. A rating of 1 represents the highest level of hierarchy (overall SPO Directorate), and levels 2, 3, 4 and 5 represent subordinate Directorate, Division, Branch and Section levels, respectively.

Tenure is the time in the job currently held by the individual. It is defined in terms of quarters of a year (3 month periods). The values assigned to tenure range from 1 (less than or equal to three months) to 50 as depicted in Table 2.

TABLE 2  
MEASUREMENT OF TENURE

Months Assigned to SPO	Assigned Value
1-3	1
4-6	2
7-9	3
10-12	4
13-15	5
.	.
.	.
.	.
148-150	50

Assigned/collocated is defined as a dummy variable. That is, an individual is either assigned to his job as part of the SPO, or is collocated on the SPO job but reports administratively to some other organization. The values represented here are 1 (assigned) and 0 (collocated).

Military/civilian is also a dummy variable, defined as 1 (military) or 0 (civilian).

Grade is defined on a scale of 1-5 and will be considered ordinal level data. The scale is defined as shown in Table 3.

TABLE 3  
MEASUREMENT OF GRADE

Grade	Assigned Value
0-2 or GS-11 and below	1
0-3 or GS-12	2
0-4 or GS-13	3
0-5 or GS-14	4
0-6 or GS-15 and above	5

Organizational size was measured on a scale of 1 to 4. SPOs consisting of 30 members or less were categorized into Group 1; 31-60, Group 2; 61-105, Group 3; and greater than 105, Group 4. Table 4 shows the size measurement of the SPOs.

TABLE 4  
MEASUREMENT OF ORGANIZATIONAL (SPO) SIZE

Group	SPO SIZE	SPO PHASE
1 ≤30	11	C/V
	18	C/V
	30	P/D
2 31-60	42	P/D
	46	P/D
	49	FSD
3 61-105	68	P/D
	70	FSD
	87	P/D
	105	P/D
4 >105	168	FSD
	169	FSD
	207	P/D

Evidence of Data Validity. To show that the data were valid, it must be shown that the measuring instruments were valid, and that the responses by the respondents were accurate. The instruments used to gather data were the LOQ, the POOC, the JDS, and the demographic survey.

The responses to the demographic survey consisted of straightforward answers to unambiguous questions regarding length of time in the job, grade, hierarchical level, SPO

phase, assigned/collocated status, military/civilian status, and organizational size. The demographic survey can then be assumed to be valid, based on the assumption that the respondents were honest in their answers to the survey questions.

As discussed previously (pp 23-26), the LOQ has been used by numerous researchers as a measuring instrument for leader behavior. This general use reflects an acceptance of the validity of the instrument. Furthermore, as noted in the Coggeshall and Jasso thesis, Fleishman found the LOQ scales to be independent and valid (2:24). Validity of the LOQ also rests on assumptions regarding respondent reaction to the questionnaire. Fleishman indicated that response to the LOQ did not correlate significantly with respondent intelligence nor respondent personality (8:1-2). The fact that the LOQ was found to be independent of these two variables was used as further evidence of the validity of the LOQ as a measuring instrument (8:2).

The POOC, developed by Likert, has been widely applied with demonstrated validity (21:40). Studies by Likert (21:38), Marrow, Bowers, and Seashore (22:32-80), and Golembiewski (10:13-31) have used the POOC as a valid measure of organizational climate. Golembiewski concludes that

the Profile [of Organizational Characteristics] items seem to reliably measure some phenomena that are relevant in organizations, even though many of the rank-order correlations are low [10:2].

Hackman and Oldham's JDS has also been shown to be a valid measuring instrument. An assessment of the wide use of the JDS by researchers was previously made (pp 28-29). In addition, Hackman and Oldham found that "the variables measured by the JDS relate to one another (and to external criterion variables) generally as predicted by the theory on which the instrument is based [11:26]." Conditions suggested by Hackman and Oldham for assuring the validity of the data include:

1. Respondents are "moderately" literate
2. Respondents answer questions honestly
3. Respondents are assured of anonymity
4. The instrument is not used to diagnose jobs of single individuals
5. The researcher realizes that normative data are still being accumulated on the JDS scales (11:36-38).

One additional question should be addressed regarding data validity: the problem of non-respondent bias. As previously discussed, the possible problem of bias of the data due to non-respondents was investigated by comparing early and late questionnaire returns. The conclusion was that since there was no significant difference between early and late responses, the non-respondents did not significantly bias the data.

In order to assure the validity of the data, each SPO manager selected was provided exact instructions on how to complete each questionnaire in the questionnaire package

(2:24). No questions were deleted or changed. In addition, in an attempt to reduce respondent bias caused by the respondent's reluctance to reveal personal information, "each respondent was assured that his response would be kept confidential [2:24]."

### Test Design for Research Hypotheses

Statistical Tests. The research hypotheses state that there is a relationship between Consideration and Initiating Structure and each situational variable. These hypotheses were tested by analyzing the interaction of each variable with Consideration and with Initiating Structure in each phase of the weapon acquisition life cycle. Additionally, an overall test was conducted. This overall test used the Consideration and Initiating Structure scores of all respondents, without regard to phase, and tested these scores for significant relationships with the situational variables.

Hence, there were 114 hypotheses of no difference ( $H_0$ ), and 114 corresponding hypotheses of significant difference ( $H_1$ )<sup>5</sup>. These hypotheses were distributed as follows:

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<sup>5</sup> Although 114 hypotheses were intended for testing, only 112 were actually tested because of insufficient data in the organizational size variable in the C/V phase.

VARIABLE	NUMBER OF HYPOTHESES SETS ( $H_0$ AND $H_1$ )	
	CONSIDERATION	INITIATING STRUCTURE
Phase <sup>6</sup>	1	1
Job Satisfaction <sup>7</sup>	28	28
Organizational Climate	4	4
Tenure	4	4
Assigned/Collocated	4	4
Military/Civilian	4	4
Grade	4	4
Hierarchical Level	4	4
Organizational Size	<u>4</u>	<u>4</u>
TOTAL	57	57
GRAND TOTAL	114	

Each  $H_0$  asserts that there is no statistically significant relationship between Consideration (or Structure) and the appropriate variable, and the corresponding  $H_1$  asserts that there is such a statistically significant relationship.

Two statistical techniques were used to test the hypotheses. The Pearson product-moment correlation coefficient was calculated for those interactions between Consideration (and Structure) for those variables that were at the interval data level (the seven job satisfaction

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<sup>6</sup>Only the overall test could be conducted for phase.

<sup>7</sup>Job satisfaction consists of seven variables, each of which was tested four times--once for each phase and once overall.

variables, organizational climate, and tenure). A one-way analysis of variance (ANOVA) was conducted on the remaining variables to test for significant differences in mean Consideration and Initiating Structure scores as they occurred within each variable.

Although the correlation coefficient allows greater confidence in inferring a relationship between variables than the ANOVA test, it was necessary to perform the ANOVA test because of the lack of interval level data for assigned/collocated, military/civilian, grade, hierarchical level, organizational size, and phase variables. These variables were not defined in terms of interval level data, thus prohibiting the direct calculation of a correlation between the variable and Consideration or Initiating Structure. However, the Consideration and Structure scores within each variable could be compared with each other by using the ANOVA. In this manner, a relationship between the variable and either of the two leader dimensions could be inferred.

The Pearson product-moment correlation coefficient was selected for performing the relationship tests (where possible) primarily for two reasons: (1) the variables to be tested (job satisfaction, organizational climate, and tenure) were considered random variables, and (2) no direction or causality of any relationship could be inferred. That is, if a significant relationship were

found between Consideration and organizational climate (for example) no inference could be drawn regarding which one (if either) caused the other.

The correlation coefficient<sup>8</sup>,  $r$ , is computed by the following formulae:

$$r = \frac{SP}{\sqrt{(SS_x)(SS_y)}}$$

$$SP = \sum XY - \frac{\sum X \sum Y}{N}$$

$$SS_x = \sum X^2 - \frac{(\sum X)^2}{N}$$

$$SS_y = \sum Y^2 - \frac{(\sum Y)^2}{N}$$

where

X = random variable, Consideration or Initiating Structure

Y = random variable, situational variables

N = number of observations

If perfect correlation exists between two variables,  $r = +1$ . If the relationship is perfectly inverse, then  $r = -1$ . If no linear relationship exists,  $r = 0$ .

The Pearson product-moment correlation coefficient is an appropriate measure of the degree of the relationship if:

1. Two characteristics are involved
2. Both variables are continuous

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<sup>8</sup> The Pearson product-moment correlation coefficient,  $r$ , is an estimate of the population parameter,  $\rho$ .

3. Both variables are measured at least at interval level

4. The relationship between the two variables is assumed to be linear (12:221).

If one or more of these assumptions are invalid, the Pearson product-moment correlation coefficient will not accurately measure the association between the two variables.

The value of the correlation coefficient,  $r$ , should not be interpreted as a percent or a proportion of correlation, nor should it be interpreted in terms of original raw data units, since the value of  $r$  is independent of the unit and magnitude of the input scores (27:78). The relationship identified by  $r$  may be said to be relatively "strong" or relatively "weak".

The prob-value<sup>9</sup> was also calculated to test for the level of statistical significance. The correlation was considered statistically significant for prob-values less than or equal to .05.

The use of the ANOVA difference of means test requires two simple assumptions:

1. The samples are drawn from a normal population
2. The populations have equal variances ( $\sigma^2$ )

(32:220).

The comparison is accomplished by calculating the following formula:

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<sup>9</sup>For a detailed explanation of prob-value, see ref. 32:189.

$$\frac{MSS_r}{MSS_u} = \frac{SS_r / (r-1)}{SS_u / \sum(n_i - 1)}$$

where  $MSS_r$  is the mean sum of squares (explained),  $MSS_u$  is the mean sum of squares (unexplained),  $r-1$  is the degree of freedom in the numerator, and  $\sum(n_i - 1)$  is the degree of freedom in the denominator.

The ratio of  $MSS_r$  to  $MSS_u$  is the F value of the groups being evaluated. By comparing this F value with a table of standard F values, it can be ascertained at what level the difference of means is significant.

For those relationships that were found to be significant at the .05 level, Scheffe's interval technique was used to test which groups caused the significance<sup>10</sup>.

Criteria Test. It was difficult to define a level of operational significance for this research effort. An overall criteria test was not attempted; in its place there was a case-by-case analysis of each of the several hypotheses. At the conclusion of the statistical calculations, each relationship and its level of significance were studied on an individual basis. Relationships which appeared strong enough to warrant additional study were examined for possible operational significance.

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<sup>10</sup>For a detailed explanation of Scheffe's intervals, see ref. 32:224.

The many tests for relationship between the variables of interest can be considered conceptually to form a three-dimensional matrix as depicted in Figure 1.

### Assumptions and Limitations

#### Assumptions.

1. The sample population followed a normal distribution.
2. The JDS, LOQ and Profile of Organizational Characteristics were accurate measuring instruments.
3. Respondents to the questionnaires responded honestly and accurately to the questions.
4. The managers surveyed were representative of the total population.
5. A SPO identified as being predominantly in a particular phase of the weapons acquisition cycle was in fact in that phase.

#### Limitations.

1. Due to the nature of the population, sampling was used instead of census to determine appropriate data.
2. Some of the variables were restricted to nominal and ordinal level data, thereby necessitating use of the ANOVA test for difference of means instead of the correlation coefficient.

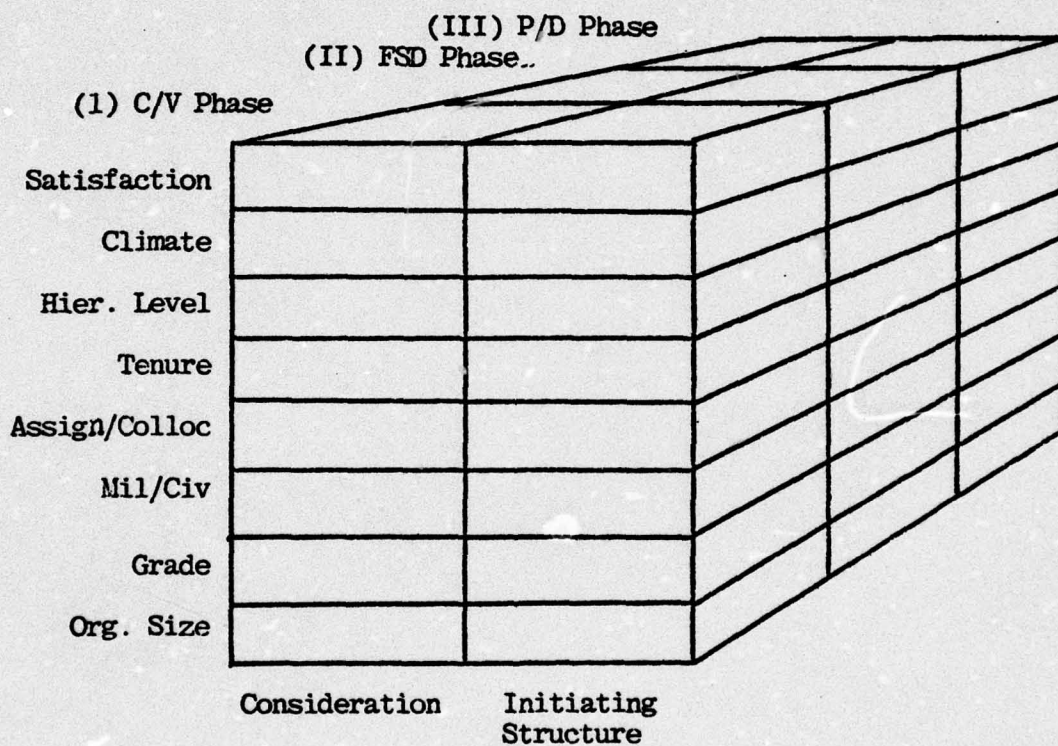


Figure 1

Conceptual Representation of Variable Interaction

## CHAPTER III

### RESULTS

#### Statistical Techniques

A Pearson product-moment correlation coefficient and its associated prob-value were calculated for 72 different sets of data. The correlations were used for the situational variables of general satisfaction, internal work motivation, job security, pay and compensation, social, supervision, growth, organizational climate and tenure for each of the three phases and for the overall scores (i.e., without respect to phase).

A one-way ANOVA and associated F values were calculated for 40 different sets of data. The ANOVA test was used for the situational variables of grade, hierarchical level, assigned/collocated, military/civilian, and organizational size for each of the three phases<sup>11</sup>. An overall test, i.e., without regard to phase, was also conducted for all these variables, as well as for a test of significant difference in mean scores between the phases themselves.

#### Recapitulation of Hypotheses

Tables 5 and 6 provide an overall picture of the hypotheses tested. Each hypothesis can be considered as

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<sup>11</sup>Organizational size was analyzed for only 2 phases.

TABLE 5  
HYPOTHESES SUMMARY (CORRELATION)

Phase	VARIABLES									
	Hypothesis <sup>1</sup>	General <sup>2</sup> Satisfaction	Internal <sup>2</sup> Work Motiv.	Job <sup>2</sup> Security	Pay and <sup>2</sup> Compensation	Social <sup>2</sup>	Super- <sup>2</sup> vision	Growth <sup>2</sup>	Organi- <sup>2</sup> zational Climate	Temure <sup>2</sup>
C/V	H <sub>0</sub>	p=0	p=0	p=0	p=0	p=0	p=0	p=0	p=0	p=0
	H <sub>1</sub>	p≠0	p≠0	p≠0	p≠0	p≠0	p≠0	p≠0	p≠0	p≠0
FSD	H <sub>0</sub>	p=0	p=0	p=0	p=0	p=0	p=0	p=0	p=0	p=0
	H <sub>1</sub>	p≠0	p≠0	p≠0	p≠0	p≠0	p≠0	p≠0	p≠0	p≠0
P/D	H <sub>0</sub>	p=0	p=0	p=0	p=0	p=0	p=0	p=0	p=0	p=0
	H <sub>1</sub>	p≠0	p≠0	p≠0	p≠0	p≠0	p≠0	p≠0	p≠0	p≠0
Over- all	H <sub>0</sub>	p=0	p=0	p=0	p=0	p=0	p=0	p=0	p=0	p=0
	H <sub>1</sub>	p≠0	p≠0	p≠0	p≠0	p≠0	p≠0	p≠0	p≠0	p≠0

<sup>1</sup> Each hypothesis represents two hypotheses: one for Consideration and one for Initiating Structure

<sup>2</sup> These variables are job satisfaction variables.

TABLE 6  
HYPOTHESES SUMMARY (ANOVA)

Phase	Hypotheses <sup>1</sup>	VARIABLE							
		Phase	Assigned/ Collocated	Military/ Civilian	Grade	Hierarchical Level	Organizational Level		
C/V	H <sub>0</sub>	N/A	$\mu_1 = \mu_2$	$\mu_1 = \mu_2$	$\mu_1 = \mu_2 = \dots = \mu_5$	$\mu_1 = \mu_2 = \dots = \mu_5$	N/A		
	H <sub>1</sub>	N/A	$\mu_1 \neq \mu_2$	$\mu_1 \neq \mu_2$	$\mu_1 \neq \mu_2 \neq \dots \neq \mu_5$	$\mu_1 \neq \mu_2 \neq \dots \neq \mu_5$	N/A		
FSD	H <sub>0</sub>	N/A	$\mu_1 = \mu_2$	$\mu_1 = \mu_2$	$\mu_1 = \mu_2 = \dots = \mu_5$	$\mu_1 = \mu_2 = \dots = \mu_5$	$\mu_1 = \mu_2 = \mu_3 = \mu_4$		
	H <sub>1</sub>	N/A	$\mu_1 \neq \mu_2$	$\mu_1 \neq \mu_2$	$\mu_1 \neq \mu_2 \neq \dots \neq \mu_5$	$\mu_1 \neq \mu_2 \neq \dots \neq \mu_5$	$\mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4$		
P/D	H <sub>0</sub>	N/A	$\mu_1 = \mu_2$	$\mu_1 = \mu_2$	$\mu_1 = \mu_2 = \dots = \mu_5$	$\mu_1 = \mu_2 = \dots = \mu_5$	$\mu_1 = \mu_2 = \mu_3 = \mu_4$		
	H <sub>1</sub>	N/A	$\mu_1 \neq \mu_2$	$\mu_1 \neq \mu_2$	$\mu_1 \neq \mu_2 \neq \dots \neq \mu_5$	$\mu_1 \neq \mu_2 \neq \dots \neq \mu_5$	$\mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4$		
Over-all	H <sub>0</sub>	$\mu_1 = \mu_2 = \mu_3$	$\mu_1 = \mu_2$	$\mu_1 = \mu_2$	$\mu_1 = \mu_2 = \dots = \mu_5$	$\mu_1 = \mu_2 = \dots = \mu_5$	$\mu_1 = \mu_2 = \mu_3 = \mu_4$		
	H <sub>1</sub>	$\mu_1 \neq \mu_2 \neq \mu_3$	$\mu_1 \neq \mu_2$	$\mu_1 \neq \mu_2$	$\mu_1 \neq \mu_2 \neq \dots \neq \mu_5$	$\mu_1 \neq \mu_2 \neq \dots \neq \mu_5$	$\mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4$		

<sup>1</sup>Each hypothesis represents two hypotheses: one for Consideration and one for Initiating Structure.

having two formulations. One hypothesis tests with the dimension of Consideration; the other hypothesis tests with Initiating Structure.

### Results of Analysis

Phase. Table 7 summarizes the results of the phase analysis. The Consideration and Initiating Structure scores of the respondents from each phase were tested for significant difference in mean from the respondents' scores in other phases. No significant difference was found at the .05 level. The calculated F value of 2.70 for Initiating Structure was significant, however, at the .10 level.

TABLE 7  
RESULTS OF OVERALL PHASE ANOVA

	Consideration	Initiating Structure
Calculated F	.15	2.70
Critical F	3.00	3.00

Job Satisfaction. Total results from Job Satisfaction are presented in Table 8. Of the 56 correlation values calculated for the seven subcategories within job satisfaction, only six were found to be statistically significant at the .05 level. These six are:

TABLE 8  
RESULTS OF JOB SATISFACTION ANALYSIS

Variable	Parameter	Phase												Overall		
		C/V				FSD				P/D				C	IS	
		C	IS	C	IS	C	IS	C	IS	C	IS					
General Satisfaction	r	.00	.05	-.07	.02	.09	.03	-.00								
	Prob-value	87.5	79.1	65.1	96.4	51.0	88.1	99.9								
Internal Work Motivation	r	.48*	.06	.09	.15	.20	.12	.20*								
	Prob-value	47.7	73.4	52.9	23.1	10.3	15.2	1.2								
Job Security	r	.30	.23*	-.13	-.06	-.03	.08	-.05								
	Prob-value	73.9	4.9	32.7	73.2	93.4	39.2	67.2								
Pay and Compensation	r	.12	.19	-.06	-.03	.04	.07	.01								
	Prob-value	65.6	12.4	75.3	90.7	85.0	44.8	99.4								
Social	r	.46*	.16	-.13	.15	.11	.17*	.01								
	Prob-value	3.5	20.8	29.5	25.6	42.1	2.9	96.4								
Supervision	r	-.03	.26	.17	-.02	.09	.10	.11								
	Prob-value	96.5	28.7	16.7	97.7	55.2	28.3	22.3								
Growth	r	.48*	.11	-.14	.11	.12	.15	.03								
	Prob-value	2.7	38.9	29.2	40.8	35.4	6.7	89.2								

\* Significant at the .05 level

NOTE: In the table above "C" represents Consideration and "IS" represents Initiating Structure

<u>Variable</u>	<u>Related Dimension</u>	<u>Phase</u>
Internal Work Motivation	Initiating Structure	C/V
Internal Work Motivation	Initiating Structure	Overall
Job Security	Consideration	FSD
Social	Consideration	C/V
Social	Consideration	Overall
Growth	Consideration	C/V

Organizational Climate. Table 9 summarizes the results from investigation of the organizational climate variable. Significance was found in the C/V phase versus Initiating Structure and overall versus Consideration.

TABLE 9  
RESULTS OF ORGANIZATIONAL CLIMATE ANALYSIS

Parameter	Phase						Overall	
	C/V		FSD		P/D		C	IS
	C	IS	C	IS	C	IS		
r	.35	.50*	.23	-.09	.21	.05	.21*	-.02
Prob-value	12.8	2.0	5.2	55.0	7.8	80.2	0.6	94.4

\*Significant at the .05 level

Tenure. In the analysis of tenure, only Initiating Structure in the C/V phase was found to have a significant correlation. Results are shown in Table 10.

TABLE 10  
RESULTS OF TENURE ANALYSIS

Parameter	Phase						Overall	
	C/V		FSD		P/D		C	IS
	C	IS	C	IS	C	IS		
r	-.01	-.60*	-.08	.00	-.01	-.17	-.04	-.10
Prob-value	99.7	.3	61.9	99.9	98.7	18.4	80.2	24.1

\* Significant at the .05 level

Assigned/Collocated. The ANOVA conducted for this variable showed a significant difference of means only in the FSD phase versus Initiating Structure. Results of the ANOVA calculations are tabulated in Table 11.

TABLE 11  
RESULTS OF ASSIGNED/COLLOCATED ANALYSIS

Parameter	Phase						Overall	
	C/V		FSD		P/D		C	IS
	C	IS	C	IS	C	IS		
Calculated F	1.13	.43	.02	4.81*	1.33	.02	.23	1.93
Critical F	4.35	4.35	3.98	3.98	3.98	3.98	3.84	3.84

\* Significant at the .05 level

The assigned personnel in FSD had a mean Initiating Structure score of 45.6, compared to 42.5 for collocated personnel.

Military/Civilian. The results of the ANOVA for military/civilian respondents are shown in Table 12. Significance was found for Initiating Structure scores both in FSD and overall.

TABLE 12  
RESULTS OF MILITARY/CIVILIAN ANALYSIS

Parameter	Phase						Overall	
	C/V		FSD		P/D		C	IS
	C	IS	C	IS	C	IS		
Calculated F	.26	1.33	.83	9.83*	1.55	.33	1.56	6.58*
Critical F	4.35	4.35	3.98	3.98	3.98	3.98	3.84	3.84

\* Significant at the .05 level.

The significant Initiating Structure mean scores for military and civilian personnel were as follows:

	<u>Military</u>	<u>Civilian</u>
FSD	46.5	42.4
Overall	45.1	42.4

Grade. Significant differences were found in the grade variable for Initiating Structure scores in P/D and overall. However, as shown in Table 13, this significance disappeared if the enlisted grades were not included in the analysis. However, the differences were again significant if the enlisted grades were considered as a separate group. Implications of these results will be discussed in the following chapter.

TABLE 13

RESULTS OF GRADE ANALYSIS

Parameter	Phase								Overall			
	C/V		FSD		P/D		Enlisted Incl. Gp 1		Enlisted Excluded		Enlisted Sep Gp	
	C	IS	C	IS	C	IS	C	IS	C	IS	C	IS
Calculated F	.82	.78	1.13	1.01	.82	3.05*	.97	2.71* <sup>1</sup>	2	1.76	2	2.49* <sup>3</sup>
Critical F	3.16	3.16	2.51	2.51	2.52	2.52	2.37	2.37		2.37		2.37

\* Significant at the .05 level

<sup>1</sup>Groups were: 0-2, GS-11 and below -- 1  
 0-3, GS-12 -- 2  
 0-4, GS-13 -- 3  
 0-5, GS-14 -- 4  
 0-6, GS-15 and above -- 5

Significant differences were found between groups 1 and 3, and groups 1 and 4.

<sup>2</sup>The low value of .97 for the Consideration F (groups as shown in footnote 1) indicated that further calculations with Consideration scores were not necessary.

<sup>3</sup>Groups were: E-9 and below -- 1  
 0-1, 0-2, GS-7 to GS-11 -- 2  
 0-3, GS-12 -- 3  
 0-4, GS-13 -- 4  
 0-5, GS-14 -- 5  
 0-6, GS-15, and above -- 6

Significant differences were found between groups 1 and 4, and groups 1 and 5.

In the P/D phase, the significant grade groups, their Initiating Structure mean scores, and associated Scheffe intervals were:

<u>Groups</u>	<u>Means</u>	<u>Scheffe Interval</u>
1,3	48.5, 40.6	7.9 $\pm$ 5.5
1,4	48.5, 41.5	7.0 $\pm$ 5.6
2,3	45.7, 40.6	5.1 $\pm$ 4.5

Group 1 was 0-2/GS-11 and below, Group 2 was 0-3/GS-12, Group 3 was 0-4/GS-13, Group 4 was 0-5/GS-14 and Group 5 was 0-6/GS-15 and above.

In the overall analysis, the significant grade groups and their numerical values were:

<u>Groups</u>	<u>Means</u>	<u>Scheffe Interval</u>
1,3	47.5, 42.4	5.1 $\pm$ 3.9
1,4	47.5, 41.9	5.5 $\pm$ 4.1

With the enlisted grades excluded, there were no significant differences in group means, as mentioned earlier. However, when enlisted personnel were grouped separately (new Group 1), and the other groups were renumbered 2 through 6, as appropriate, the significant groups and their Initiating Structure means were:

<u>Groups</u>	<u>Means</u>	<u>Scheffe Interval</u>
1,4	50.3, 42.4	8.0 $\pm$ 5.9
1,5	50.3, 41.9	8.4 $\pm$ 6.0

In this context, Group 1 was comprised of the enlisted grades, Group 4 was 0-4 and GS-13, and Group 5 was 0-5 and GS-14.

Hierarchical Level. As depicted in Table 14, a significant difference in means was found in Initiating Structure scores in P/D. However, the overall difference for Initiating Structure was found to be significant at the .10 level. In the P/D phase, a significant difference was found to exist only between the subordinate directorates (level 2) and the divisions (level 3).

TABLE 14  
RESULTS OF HIERARCHICAL LEVEL ANALYSIS

Parameter	Phase						Overall	
	C/V		FSD		P/D		C	IS
	C	IS	C	IS	C	IS		
Calculated F	.28 <sup>1</sup>	1.29 <sup>1</sup>	.84 <sup>1</sup>	.97 <sup>1</sup>	.83 <sup>1</sup>	2.93 <sup>*1,2</sup>	2.16 <sup>3</sup>	2.30 <sup>3</sup>
Critical F	3.59	3.59	2.74	2.74	2.75	2.75	2.60	2.60

\* Significant at .05 level .

<sup>1</sup> Does not include hierarchical level 1.

<sup>2</sup> Significant differences were found between levels 2 and 3.

<sup>3</sup> Includes hierarchical level 1.

The mean Initiating Structure scores were 47.5 for level 2 and 40.5 for level 3 (Scheffe interval of 7.0 ± 4.8).

Organizational Size. The only significant result found for organizational size was in the Initiating Structure scores, overall. The Scheffe interval showed that the groups with significant differences were groups 1 and 3, 1 and 4,

and 2 and 4. Size group varied from small (Group 1) to large (Group 4). Table 15 summarizes results for the organizational size variable.

TABLE 15  
RESULTS OF ORGANIZATIONAL SIZE ANALYSIS

Parameter	Phase						Overall	
	C/V		FSD		P/D		C	IS
	C	IS	C	IS	C	IS		
Calculated F	1	1	.13 <sup>2</sup>	1.25 <sup>2</sup>	.49 <sup>3</sup>	.96 <sup>3</sup>	.13 <sup>3</sup>	3.5 <sup>*3,4</sup>
Critical F			3.13	3.13	2.75	2.75	2.60	2.6

\* Significant at .05 level.

<sup>1</sup> Only 1 organizational size.

<sup>2</sup> Groups 2, 3, 4.

<sup>3</sup> Groups 1, 2, 3, 4.

<sup>4</sup> Significant differences were between Groups 1 and 3, 1 and 4, 2 and 4.

The groups which had significantly different means, their initiating Structure mean scores and intervals were:

<u>Groups</u>	<u>Means</u>	<u>Scheefe Interval</u>
1,3	41.0, 44.6	3.6 + 3.3
1,4	41.0, 44.9	4.0 + 3.1
2,4	41.0, 44.9.	3.9 + 3.3

### Results Summary

A limited number of data points were found to be statistically significant. Specifically, 16 of the 112 relationships investigated indicated a correlation or difference of means significant at the .05 level. Of these

16 significant relationships, 5 were found in the Consideration dimension, and 11 in the Initiating Structure dimension. The results break down as follows:

<u>Where Significant</u>	<u>Number of Cases</u>	
	<u>Consider.</u>	<u>Init. Str.</u>
Within phase and overall	1*	3*
Within phase but not overall	2	4
Overall but not within phase	1	1

\*Two relationships for each case

There were then only 16 of the hypotheses of no difference rejected. The other 96 hypotheses were shown to result in no statistical significance and could not be rejected.

These results are shown in Table 16.

TABLE 16

REJECTION OF HYPOTHESES OF NO DIFFERENCE<sup>1</sup>

Variable	Phase and Leadership Dimension Variables									
	C/V		FSD		P/D		Overall			
	C	IS	C	IS	C	IS	C	IS		
Phase	N/A	N/A	N/A	N/A	N/A	N/A				
General Satisfaction										
Interval Work Motivation		Reject							Reject	
Job Security			Reject							
Pay and Compensation										
Social	Reject								Reject	
Supervision										
Growth	Reject									
Organizational Climate		Reject							Reject	
Tenure		Reject								
Assigned/Collocated				Reject						
Military/Civilian				Reject					Reject	
Grade									Reject	
Hierarchical Level									Reject	
Organizational Size	N/A	N/A							Reject	

<sup>1</sup> Cells with no entry indicate that the hypothesis of no difference could not be rejected.  
 Note: In the table above N/A represents Not Applicable.

## CHAPTER IV

### CONCLUSIONS

#### Purpose of Study

This study was conducted to assess possible relationships between the leader dimensions of Consideration and Initiating Structure and a number of situational variables in Air Force System Program Offices. The hypotheses concerning the existence of such a relationship were summarized in Chapter III, Tables 5 and 6. In general, each hypothesis postulated that a relationship did exist between Consideration and Initiating Structure and each of the situational variables.

#### Leader Dimensions

Consideration and Initiating Structure are two dimensions of leader behavior which were identified by the Ohio State studies (3:8). Consideration is that dimension of leader behavior which indicates the degree to which a leader is concerned for his subordinates in terms of warmth, considerate acts, and human relations. Initiating Structure is the dimension which indicates how oriented the leader is toward getting the job done by establishing deadlines, initiating routines, and formalizing the organizational functions (1:485).

These two dimensions were measured for this study by the Leadership Opinion Questionnaire (LOQ), developed by Fleishman (8:1). This instrument is completed by the leader himself, and measures his behavior as he perceives it.

### Situational Variables

Air Force System Program Offices (SPOs) are responsible for procurement of major Air Force weapon systems. The entire weapon acquisition cycle, from genesis of the weapon concept to operational deployment of the system is conducted by the SPO. Conceptually, and for the purposes of this study, the SPO functions were divided into three phases: Conceptual/Validation (C/V), Full Scale Development (FSD), and Production/Deployment (P/D). The C/V phase encompasses definition of the weapon system, preliminary design, and manufacture of working prototypes. In FSD, following contractor selection, the system is designed and fabricated, and a production baseline established. The P/D phase includes weapon system production, a comprehensive quality assurance effort, and actual deployment to the using organizations.

The remaining situational variables analyzed were job satisfaction, organizational climate, tenure, assigned/collocated, military/civilian, grade, hierarchical level, and organizational size.

Job satisfaction was measured by the Job Diagnostic Survey (JDS) developed by Hackman and Oldham (11). For this study, job satisfaction was defined in terms of seven affective reactions to the job. These seven variables are general satisfaction, internal work motivation, job security, pay and compensation, social, supervision, and growth (11).

Organizational climate was measured with Likert's Profile of Organizational Characteristics (19:28). Climate can be defined as the overall atmosphere existing in the work group.

Tenure was a demographic variable measured by questionnaire response. It is defined as the length of time the leader has held his current position in the SPO.

Assigned personnel were those actually assigned to the office in which they worked; collocated personnel were assigned administratively to an office other than the one in which they actually worked.

Military and civilian respondents were identified from questionnaire returns.

Leader grade was defined as currently held military or civilian grade.

Hierarchical level was determined by the leader's location within the SPO structure, varying from SPO Director to section chief.

Organizational size varied from small SPOs (less than 30 personnel) to very large SPOs (greater than 105 personnel).

#### Data Source

Data for the study were obtained by an amalgamation of data from three previous thesis efforts (2; 19; 26). The population consisted of SPO managers in the Aeronautical Systems Division (ASD) located at Wright-Patterson AFB, Ohio, that could be readily identified with a particular phase of the weapons acquisition life cycle. The populations were 29, 456, and 585 for C/V, FSD, and P/D respectively. In analyzing the previous thesis efforts, it was determined that the following sample sizes were usable for this study: 22 from C/V, 78 from FSD, and 75 from P/D.

#### Statistical Techniques

Two techniques were used in analyzing the data. The Pearson product-moment correlation coefficient and associated prob-value were calculated for nine situational variables as they related to Consideration and Initiating Structure. These nine were general satisfaction, internal work motivation, job security, pay and compensation, social supervision, growth, organizational climate, and tenure. The other six variables (phase, assigned/collocated, military/civilian, grade, hierarchical level, and organizational size) did not lend themselves to correlation techniques because not all the variables were definable in

terms of interval level data. Hence, a one-way analysis of variance (ANOVA) was performed on all the Consideration and Initiating Structure scores as they interacted with the ordinal level variables.

### Results

No evidence was found to support the hypothesis that a general relationship existed between Consideration or Initiating Structure and any of the situational variables. However, a few significant relationships were found at apparently unrelated points in the analysis. This limited number of significant relationships (16 of 112 analyzed) can be discussed in terms of their meaningfulness to the study of leadership.

### Analysis

Phase. No significant relationship was found to exist between phase of weapon acquisition life cycle and the two leader dimensions at the .05 level. There was, however, a trend toward higher Initiating Structure scores in the FSD and P/D phases. This result is evidenced by the overall calculated F value of 2.70, which is significant at the .07 level. Hence, even though the difference in Initiating Structure scores was not significant at the .05 level, the difference did approach that level of statistical significance. This is understandable, in that the C/V phase has a basically unstructured task environment, when

compared to the well-defined tasks of the succeeding two phases.

There was essentially no variation in Consideration scores among the phases, indicating that leader behavior in that dimension did not vary with the phase.

Job Satisfaction. Each of the seven affective reactions was analyzed for significance, and the lack of any overall pattern indicated that no correlation could be inferred between job satisfaction and the leader dimensions. There were, however, scattered points of statistical significance found among four of the seven affective reactions.

1. General Satisfaction. There was no correlation found between general satisfaction and the two leader dimensions. This means that a more considerate leader was no more satisfied than a less considerate leader, and a more highly structured leader was no more satisfied than a leader with less structure. A result such as this could be anticipated, in that each leader would appear to be most satisfied while exercising that dimension which is strongest in him. Thus a high Consideration leader would not necessarily derive more general satisfaction than a low Consideration leader. The same logic would hold for Initiating Structure.

2. Internal Work Motivation. In general, no significant correlations appeared between the leader

dimensions and internal work motivation, with the exception of Initiating Structure in the C/V phase and overall. The correlation in the C/V phase was reasonably strong ( $r=.48$ ), and statistically significant at less than the .05 level. This result may be due to the basically unstructured task in the C/V phase. Thus, for the leader to be internally motivated, he must create the structure that is absent from his job environment. Overall, there was a small but significant correlation ( $r=.20$ ) between internal work motivation and Initiating Structure. The most likely explanation for this small correlation is the effect of the strong correlation in the C/V phase as it influences the overall calculation of  $r$ . Thus, one would expect a more highly structured manager to be more internally motivated, but only slightly. The lack of significant correlations in the remaining interactions between the leader dimensions and internal work motivation would seem to indicate that, in general, a more considerate (or more structured) leader is no more internally motivated than a less considerate (or less structured) leader.

3. Job Security. There were no significant correlations between job security and the leader dimensions, except for a small positive correlation ( $r=.23$ ) in the FSD phase with Consideration. The cause of this correlation is not easily discernible, but may be due to factors unique to FSD that were not considered in this study. It

can be said, however, that no general relationship exists between job security and the leader dimensions.

4. Pay and Compensation. There were no significant correlations between pay and compensation and the two leader behavior dimensions. This lack of correlation may be due to the adequate pay/compensation afforded by both the military and civilian structures in the SPO, and the inherent stability found in government jobs. Hence, it would be expected that pay and compensation would not be regarded as strong factors influencing the leader's behavior in his task environment. Another possible explanation for the lack of correlation may be that the nature of SPO work is inherently satisfying to the leader. That is, it may be that the challenge of introducing a new weapon system to the Air Force is large enough that pay and compensation become relatively minor factors in affecting the behavior of the leader.

5. Social. There were two significant correlations between the social variable and Consideration. One of these correlations was relatively strong (in C/V with  $r=.46$ ) and the other was weak (overall with  $r=.17$ ). The strong correlation in the C/V phase may be due to the fact that the SPO is a new organization at this time. Consequently, no firm social relationships have been established. As a result, a more considerate leader may find that he can establish a better social environment than a less considerate leader merely because of the newness of the

situation. Using this reasoning it would be expected that the correlation between Consideration and the social variable would be less significant as the SPO matured. The lack of significant correlations in the FSD and P/D phases supports this argument. The weak correlation ( $r=.17$ ) overall is probably the reflection of the relatively strong correlation in C/V as it influenced the calculation of  $r$ . The lack of any significant correlation in the Structure dimension indicates that the social environment had no relationship to the amount of Structure exhibited by the leaders considered in this study.

6. Supervision. The supervision variable is a measure of how satisfied the leader is with the supervision he receives. There was no significant correlation between the leader dimensions and supervision. This finding may be expected, in that how satisfied a leader is with the supervision he himself receives would not seem to influence whether he is more or less considerate or structured.

7. Growth. The growth variable measures the leader's satisfaction with his opportunities for personal growth and development (11:6). The results of the study indicated that there was a correlation of .48 between Consideration and growth in the C/V phase and a correlation of .33 with Initiating Structure in the same phase. However, only the Consideration correlation was significant; the Initiating Structure correlation was in the right direction, but significance was less than .15.

In the other phases, and overall, no other significant correlations existed for either leader behavior dimension. It would appear that in the C/V phase, the opportunities for growth and development are larger than in the subsequent phases. In the C/V phase the individual may feel that his opportunities for growth are nearly unlimited, whereas, in the follow-on phases, system definition has advanced to such an extent that the opportunities for growth may appear to be limited. Hence, it can be expected that, regardless of leader behavior, a leader's expectations for growth may be higher in the C/V phase. This reasoning is only partially supported by the results of this study.

Organizational Climate. It would be expected, in general, that more considerate leadership would be positively correlated with a more favorable climate. It might also be anticipated that a more structured leader would have no correlation, or perhaps a negative correlation, with climate. The results of the analysis indicate that the eight correlations were approximately as expected, with one exception. Looking first at the overall Consideration correlation, it is noted that only one value was significant ( $r=.21$ , prob-value less than .01). However, the other Consideration correlations were also positive ( $r=.35, .23, .21$ ) and nearly significant (prob-value less than .13, .052, .08). The overall trend, then, seems to bear out the theoretical relationship.

However, one of the Initiating Structure correlations was significant, strong, and positive ( $r=.50$ , prob-value less than .02). This correlation occurred in the C/V phase, and may be explained, again, by the basically unstructured nature of the C/V task. That is, the leader who contributes more structure in the C/V phase, actually may create a better climate because he has more adequately defined the work at hand. As expected, in the other phases no correlations existed between organizational climate and Structure.

Tenure. No significant correlations were found between the leader dimensions and tenure, except for a strong negative correlation with Initiating Structure in the C/V phase. This correlation at first appears anomalous. However, upon further examination of the nature of the task, a possible explanation becomes evident. Bearing in mind that the C/V phase is the very beginning of the SPO, and that the C/V task is highly unstructured, it may be true that a leader performing in his first few months within the C/V phase must be highly structured. Later in the C/V phase, when task definition is somewhat clearer, and functional relationships are more clearly defined, the leader may have less need to contribute Structure to the task. This reasoning may explain the strong negative correlation between tenure and Initiating Structure in the C/V phase.

Assigned/Collocated. Overall, there was no difference found between assigned and collocated personnel in terms of their leader behavior dimensions. There was, however, one significant difference between the Structure scores of assigned and collocated personnel in FSD. The assigned personnel had significantly higher Structure scores than their collocated counterparts. Although no obvious explanation is forthcoming, there may be factors in FSD which cause collocated personnel to perceive themselves as being less constrained by the existing structure. This explanation does not shed any light on the lack of meaningful structure differences between assigned and collocated personnel in the other two phases.

Military/Civilian. In every phase, and overall, the military mean Initiating Structure scores were higher than the civilian scores. However, this difference was significant only in the FSD phase and overall. That military Structure scores were higher than civilian scores might have been anticipated, and is most likely explained by the nature of military training and the emphasis in the military structure on maintaining the established order. Hence, military leaders were always more structured than civilian leaders, and significantly so in two areas.

The results of the military/civilian variable as it interacted with Consideration showed no difference in scores between military and civilian leaders. Accordingly,

no significant variation in the considerate behavior of military and civilian leaders can be deduced from this study.

Grade. In analyzing the Consideration dimension, no significant difference was found among any of the grades. This appears to indicate that how considerate a leader is bears no relationship to the grade he holds.

However, significant differences were found in the Initiating Structure mean scores, both for the P/D phase and overall. Since these significant differences involved primarily group 1, an analysis was performed of the composition of this group. Six enlisted personnel had been included in group 1, along with O-2s and GS-11s and below. But because of their experience level and background, it was felt that these enlisted members may have been wrongly included in group 1. Consequently, an additional study was conducted with the enlisted members excluded from the analysis. The results in this case indicated no significant difference in means among the Structure scores. That is, the leaders holding officer and GS grades were about equally structured. To further examine the relationship, a third study was performed with the enlisted grades treated as a separate group. Predictably, significant differences appeared between the Initiating Structure means of the enlisted group and two officer groups (groups 4 and 5).

The remaining question was why this significance had not appeared in the C/V and FSD phases. Upon examination it was found that no enlisted respondents existed in the C/V phase, and only two existed in the FSD phase. The remaining four enlisted members were included in the P/D phase. Therefore, the lack of significant differences within the first two phases may be attributable to the small number of enlisted members (bearing in mind that the enlisted members were the determining factor in pinpointing the overall significant differences).

An obvious factor which may explain the higher structure behavior of the enlisted members is the difference in their training and background, and that of the officers/GS employees. In general, officers and GS employees of the level studied have college training, whereas, in general, enlisted members do not. Furthermore, the enlisted experience is generally more technically oriented than that of the other groups.

A second factor that may help explain the higher structure scores of the enlisted members is the age differential. Since it was noted that the enlisted Structure means were significantly higher than the O-4/GS-13 and O-5/GS-14 groups, but not significantly higher than the O-6/GS-15 and above group, it is apparent that some factor related to age may be at work.

Overall, then, there was a significant difference in Structure scores according to grade, and this difference

appears related to the difference between officer/GS and enlisted grades. The reasons for the difference, however, may be due to variables not measured in this study.

Hierarchical Level. Only one significant difference appeared in the interaction of hierarchical level with the leader dimensions. This difference occurred in the Initiating Structure scores in the P/D phase, and was between the subordinate directorate and division levels (hierarchical levels 2 and 3). Figure 2 illustrates the relationship between Initiating Structure scores for level 2 and level 3 through the phases. As can be seen, their scores are roughly parallel until the P/D phase. In this phase the level 3 scores drop, and the level 2 scores continue to rise such that the difference from level 3 is significant. An explanation may be found in the differing nature of the tasks for the level 2 and 3 hierarchies between FSD and P/D. Level 2, subordinate only to the SPO Directorate level, is still concerned in the P/D phase with full completion of the task, including program control and integrated support activities. Hence, level 2 could be envisioned as more structured as the task nears completion. Level 3, however, is concerned primarily with subsystem completion (such as avionics, armament and propulsion). These subsystems have generally been well-defined by the end of the FSD phase and the tasks remaining in P/D consist primarily of quality assurance monitoring and refinements of the existing subsystems. It can be said that level 3

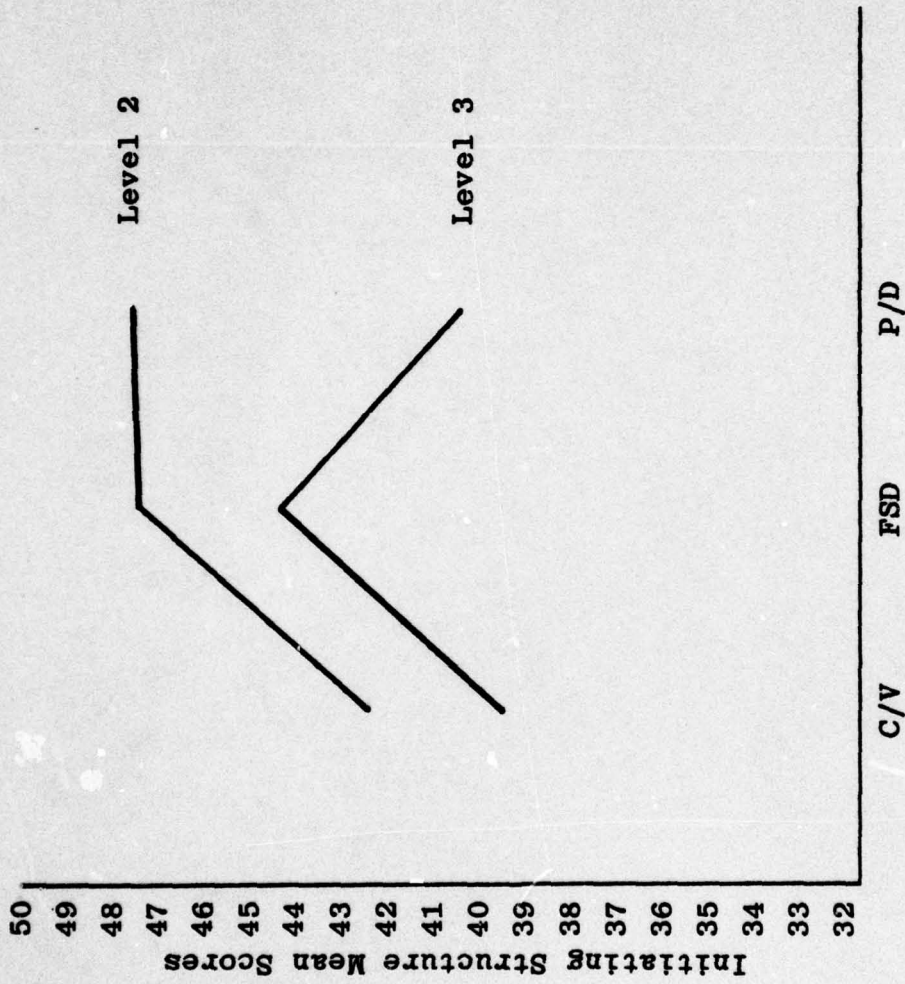


Figure 2

Initiating Structure Scores of Hierarchical Levels 2 and 3

managers may be more structured only through the FSD phase. By the P/D phase their major tasks have been accomplished and exhibit less structure.

No significant differences appeared between Consideration and the hierarchical levels. This result indicates that the considerate behavior of the leader does not change with the hierarchical level of the SPO organization.

Organizational Size. It may be anticipated that a larger organization would require a leader to exhibit more Structure to effectively control a more complicated organizational environment. This expectation was found to be true in this study, since a significant difference existed between the Initiating Structure scores of the small (group 1) and large (group 4) group leaders. Specifically, differences existed overall between groups 1 and 3, 1 and 4, and 2 and 4. Although no significant differences were noted in the FSD and P/D phases, this may be due to the small number of respondents from group 1 in these phases (0 for FSD, and 4 for P/D).

No significant difference in Consideration mean scores was found to exist for any phase or overall.

#### General Conclusions

Within the phase categories themselves, more significant relationships appeared in the C/V phase than in the two subsequent phases (C/V - 5; FSD - 3; P/D - 2). Perhaps this is attributable to the different nature of

the C/V task, in that the C/V phase is primarily concerned with SPO initiation and system definition.

Nonetheless, from the overall scarcity of significant data points in the analysis, it was evident that no general pattern existed relating Consideration and Initiating Structure to the situational variables. This would indicate that leadership behavior in Air Force SPOs is not related to the phase in which the work is currently being performed, nor to any of the organizational or individual variables considered in this study. Significant correlations and differences of means that did occur were generally explainable but were, again, not indicative of any overall relationship between the leader dimensions and the situational variables.

There were a greater number of significant relationships between Initiating Structure and the situational variables than between Consideration and situational variables (11 and 5, respectively). The appearance of more significant relationships in the Initiating Structure dimension may indicate that this dimension is better defined than Consideration in terms of its measurement by the LOQ.

#### Limitations of the Study

One of the inherent limitations found in this study may be the self-rating of leader behavior as accomplished by the LOQ. In other words, it may be that the leader assessing his own behavior is not an accurate enough

indication of his behavior as perceived by others. In this regard, perhaps the Leader Behavior Description Questionnaire (LBDQ) developed for the Ohio State studies may have been a better instrument for measuring Consideration and Initiating Structure for this study.

Another possible limitation of this study may have been the assumption of linearity necessary for the use of the correlation coefficient. Hence, if a curvilinear relationship existed, the correlation would not accurately reflect the full relationship. In this regard, perhaps some regression technique could have been useful.

In addition, at several points in the analysis, it was suggested that unmeasured factors could have influenced the results. Such variables as age, background, training, social experience, and task variables unknown or unmeasured may have biased the results of the study enough to mask significant relationships.

#### Suggestions for Additional Research

It is suggested that a similar study be conducted using the LBDQ rather than the LOQ as an instrument of measuring leader behavior. By this means the subordinate perceptions of leader behavior rather than his own perceptions would define the Consideration and Initiating Structure of the leader.

It is also suggested that regression analysis be attempted for at least some of the variables to investigate the possibility of curvilinear (as opposed to strictly linear) relationships.

As an additional improvement on this study, perhaps an attempt should be made to measure and control variables such as age, training, or background. In this way contributions to leader behavior from these variables could be isolated.

**APPENDIX A**  
**ANOVA RESULTS**

TABLE 17  
ANOVA Results in the C/V Phase (Consideration)

Situational Variable	Degrees of Freedom		Explained MSS	Unexplained MSS	F-ratio <sup>2</sup>
	$V_1$	$V_2$			
Assigned/Collocated	1	20	52.61	46.52	1.13
Military/Civilian	1	20	12.82	48.51	.26
Hierarchical Level	2	17	14.86	52.43	.28
Grade	3	18	39.37	48.05	.82
Organizational Size	-	-	N/A	N/A	-

<sup>1</sup>  $V_1$  represents degrees of freedom in the numerator;  $V_2$  represents degrees of freedom in the denominator.

<sup>2</sup> \* Indicates significance at .05 level.

TABLE 18  
ANOVA Results in the C/V Phase (Initiating Structure)

Situational Variable	Degrees of Freedom		Explained MSS	Unexplained MSS	F-ratio <sup>2</sup>
	$V_1$	$V_2$			
Assigned/Collocated	1	20	25.86	59.86	.43
Military/Civilian	1	20	76.02	57.35	1.33
Hierarchical Level	2	17	60.23	46.38	1.30
Grade	3	18	46.70	60.17	.78
Organizational Size	-	-	N/A	N/A	-

<sup>1</sup>  $V_1$  represents degrees of freedom in the numerator;  $V_2$  represents degrees of freedom in the denominator.

<sup>2</sup> \* Indicates significance at .05 level.

TABLE 19  
ANOVA Results in the FSD Phase (Consideration)

Situational Variable	Degrees of Freedom		Explained MSS	Unexplained MSS	F-ratio <sup>2</sup>
	$V_1$	$V_2$			
Assigned/Collocated	1	76	.82	36.06	.02
Military/Civilian	1	76	31.25	37.66	.83
Hierarchical Level	3	73	30.81	36.81	.84
Grade	4	73	43.86	38.86	1.13
Organizational Size	2	75	4.98	38.44	.13

<sup>1</sup>  $V_1$  represents degrees of freedom in the numerator;  $V_2$  represents degrees of freedom in denominator.

<sup>2</sup> \* Indicates significance at .05 level.

TABLE 20  
ANOVA Results in the FSD Phase (Initiating Structure)

Situational Variable	Degrees of Freedom		Explained MSS	Unexplained MSS	F-ratio <sup>2</sup>
	$V_1$	$V_2$			
Assigned/Collocated	1	76	172.96	35.95	4.81*
Military/Civilian	1	76	332.77	33.85	9.83*
Hierarchical Level	3	73	37.14	38.24	.97
Grade	4	73	38.13	37.71	1.01
Organizational Size	2	75	46.71	37.49	1.25

<sup>1</sup>  $V_1$  represents degrees of freedom in the numerator;  $V_2$  represents degrees of freedom in the denominator.

<sup>2</sup> \* Indicates significance at .05 level.

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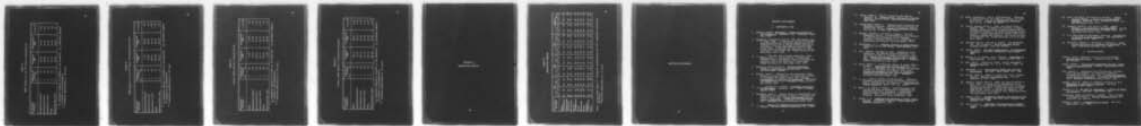
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TABLE 21  
ANOVA Results in the P/D Phase (Consideration)

Situational Variable	Degrees of Freedom		Explained MSS	Unexplained MSS	F-ratio <sup>2</sup>
	$V_1$	$V_2$			
Assigned/Collocated	1	73	59.40	44.70	1.33
Military/Civilian	1	73	68.88	44.57	1.55
Hierarchical Level	3	69	37.71	45.29	.83
Grade	4	70	37.37	45.33	.82
Organizational Size	3	71	22.32	45.85	.49

<sup>1</sup>  $V_1$  represents degrees of freedom in the numerator;  $V_2$  represents degrees of freedom in the denominator.

<sup>2</sup> \* Indicates significance at .05 level.

TABLE 22  
ANOVA Results in the P/D Phase (Initiating Structure)

Situational Variable	Degrees of Freedom		Explained MSS	Unexplained MSS	F-ratio <sup>2</sup>
	$V_1$	$V_2$			
Assigned/Collocated	1	73	1.37	58.86	.02
Military/Civilian	1	73	19.26	58.61	.33
Hierarchical Level	3	69	160.30	54.78	2.93*
Grade	4	70	159.56	52.28	3.05*
Organizational Size	3	71	55.77	58.18	.96

<sup>1</sup>  $V_1$  represents degrees of freedom in the numerator;  $V_2$  represents degrees of freedom in the denominator.

<sup>2</sup> \* Indicates significance at .05 level.

TABLE 23  
Overall ANOVA Results (Consideration)

Situational Variable	Degrees of Freedom		Explained MSS	Unexplained MSS	F-ratio <sup>2</sup>
	$V_1$	$V_2$			
Phase	2	172	6.36	41.85	.15
Assigned/Collocated	1	173	9.51	40.50	.23
Military/Civilian	1	173	64.40	41.31	1.56
Hierarchical Level	4	170	87.17	40.37	2.16
Grade	4	170	40.84	42.15	.97
Organizational Size	3	171	5.46	42.08	.13

<sup>1</sup>  $V_1$  represents degrees of freedom in the numerator;  $V_2$  represents degrees of freedom in the denominator.

<sup>2</sup> \* Indicates significance at .05 level.

TABLE 24  
Overall ANOVA Results (Initiating Structure)

Situational Variable	Degrees of Freedom		Explained MSS	Unexplained MSS	F-ratio <sup>2</sup>
	$\nu_1$	$\nu_2$			
Phase	2	172	132.11	48.99	2.70
Assigned/Collocated	1	173	94.99	49.16	1.93
Military/Civilian	1	173	318.37	48.40	6.58*
Hierarchical Level	4	170	111.41	48.46	2.30
Grade	4	170	130.17	48.06	2.71*
Organizational Size	3	171	167.35	47.85	3.50*

<sup>1</sup>  $\nu_1$  represents degrees of freedom in the numerator;  $\nu_2$  represents degrees of freedom in the denominator.

<sup>2</sup> \* Indicates significance at .05 level.

APPENDIX B  
CORRELATION RESULTS

TABLE 25

CORRELATION RESULTS

Situational Variable	C/V						FSD						P/D						Overall					
	C			IS			C			IS			C			IS			C			IS		
	n	r	n	n	r	n	n	r	n	n	r	n	r	n	n	r	n	r	n	n	r	n	r	
General Satisfaction	22	-.06	22	22	.00	78	.05	78	-.07	75	.02	75	.09	175	.03	175	-.00							
Internal Work Motivation	22	.18	22	22	.48*	78	.06	78	.09	75	.15	75	.20	175	.12	175	.20*							
Job Security	22	.10	22	22	.30	78	.23*	78	-.13	75	-.06	75	-.03	175	.08	175	-.05							
Pay and Compensation	22	.12	22	22	.29	78	.19	18	-.06	75	-.03	75	.04	175	.07	175	.01							
Social Supervision	22	.46*	22	22	.40	78	.16	78	-.13	75	.15	75	.11	175	.17*	175	.01							
Growth	22	-.03	22	22	.06	78	.26	78	.17	75	-.02	75	.09	175	.10	175	.11							
Organizational Clim.	22	.48*	22	22	.33	78	.11	78	-.14	75	.11	75	.12	175	.15	175	.03							
Temure	22	.35	22	22	.50*	78	.23	78	-.09	75	.21	75	.05	175	.21*	175	-.02							
	22	-.01	22	22	-.60*	78	-.08	78	-.00	75	-.01	75	-.17	175	-.04	175	-.10							

Notes: In the table above "C" represents Consideration and "IS" represents Initiating Structure.

\* Indicates significance at .05 level.

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