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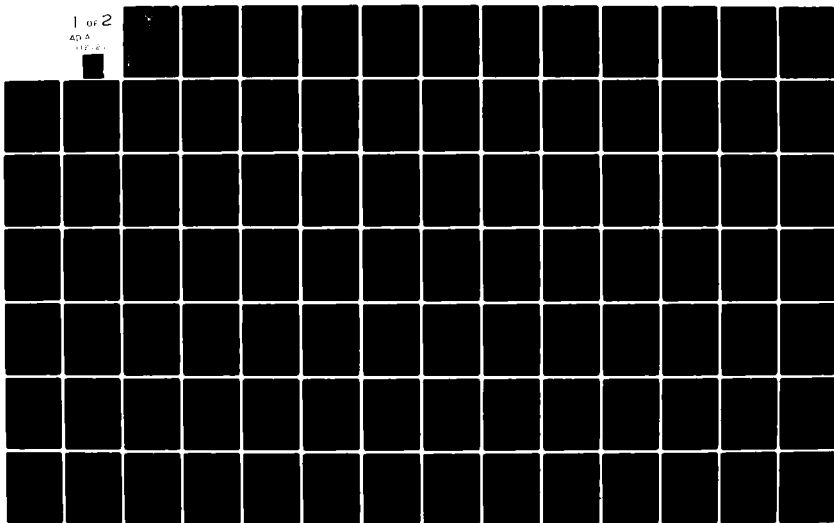
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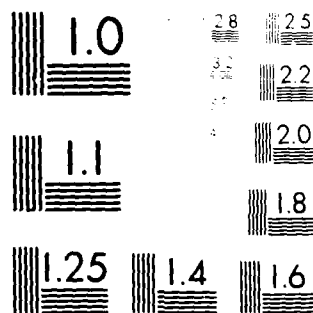
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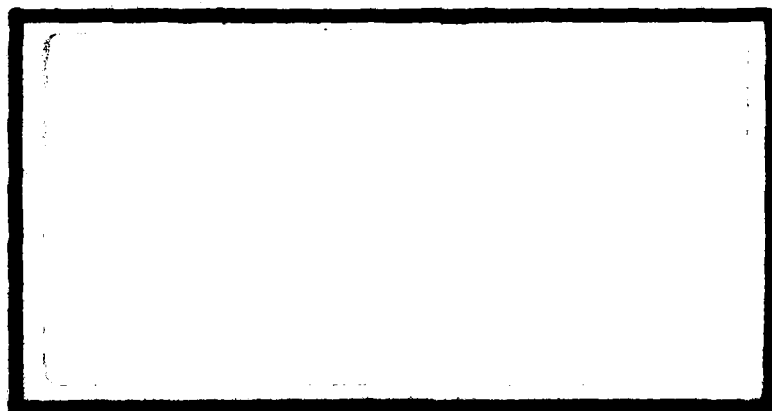




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A PREDICTIVE VALIDITY STUDY
OF AN ASSESSMENT CENTER FOR
RESEARCH AND DEVELOPMENT SUPERVISORS

Kevin K. Rankin, First Lieutenant, USAF

LSSR 100-81

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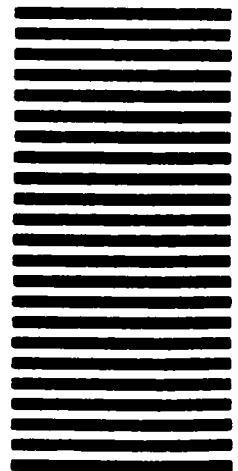
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The purpose of this thesis is to investigate the predictive validity of the 1974-1975 Aeronautical Systems Division (ASD) Management Assessment Center conducted at Wright-Patterson AFB OH. The assessment center method is reviewed with an emphasis on the 1974-1975 ASD assessment center background, construction, and usage. As an adjunct to the understanding of assessment centers, predictors, criteria, and the predictive validity concept are reviewed. A previous study of the predictive validity conducted in 1980 concluded that the ASD assessment center is a valid predictor of managerial effectiveness. Although the results of the 1980 study were statistically significant, they did not achieve expected validity levels. Based on those results and a review of criteria, alternate criteria were developed for the measurement of managerial effectiveness. These criteria were incorporated into an interview and questionnaire which were given to the supervisors of a sample group of individuals who participated in the ASD assessment center. Using the information from these interview/questionnaires, a predictive validity study was conducted. Results of this study do not support the 1980 study nor do they confirm the predictive validity of the assessment center. Based on these results, additional research on this subject is recommended.

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A PREDICTIVE VALIDITY STUDY
OF AN ASSESSMENT CENTER FOR
RESEARCH AND DEVELOPMENT SUPERVISORS

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 Requirement for the
Degree of Master of Science in Systems Management

By

Kevin K. Rankin, BA
First Lieutenant, USAF

September 1981

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This thesis, written by

First Lieutenant Kevin K. Rankin

and approved in an oral examination, 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 SYSTEMS MANAGEMENT

DATE: 30 September 1981

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CHAPTER 1

INTRODUCTION

Background

The key occupational group in an industrial society is embodied in that of management and managers (Campbell et al, 1970). Management has been defined as the creation and maintenance of an environment in which people can accomplish goals efficiently and effectively. These organizational environments are directed towards the achievement of organization goals, integrating human, financial, and natural resources. The person responsible for the efficient and effective use of a given set of resources is the manager (Albanese, 1978).

In today's environment of high inflation rates and cutbacks in federal spending the Department of Defense (DOD) is pressed to maintain the efficient, effective organization necessary to achieve its goal of national defense with limited resources. In order to insure the proper use of these resources, good managers must be obtained, trained, and retained. The selection of good managers is greatly enhanced by insuring that the selection process for these managers is also efficient and, especially, effective.

There are numerous methods of manager selection available. Included are personal data sheets, tests, interviews, supervisory ratings, assessment centers, and variants or combinations of these methods. One method of particular interest

is the assessment center. Since its first practical industrial use in 1956 at the American Telephone and Telegraph company (AT&T) (Bray and Grant, 1966), the assessment center has achieved general acceptance and success. The average validity of the assessment center in the prediction of managerial success is about as high as the maximum achieved by other traditional methods (Norton and Edinger, 1978).

As with any selection method, it must be insured that the assessment center accurately reflects the target job being measured. This is content validity. In addition, the assessment center must be consistent or reliable in the ratings which are given to assessees, or internal validity. Finally, it must be able to show a relationship between the rating and the success criteria used, external or predictive validity.

Statement of the Problem

The Aeronautical Systems Division (ASD) at Wright-Patterson AFB, Ohio conducted an assessment center in 1974 and 1975. This assessment center was designed to augment the existing Merit Promotion Plan. Specifically, it would be used to aid in the evaluation of employees, in the grades of GS-9 and above, for selection to first level supervisory positions (ASDRP 30-1, 1974).

A predictive validity study of this assessment center was accomplished in 1980 in a master's thesis effort (Komar and Wise, 1980). Using a sample of size $N=143$ of those

personnel who attended the assessment center, four criteria variables were compared against the assessment center overall rating, the predictor variable. Correlation coefficients resulting from this study were (1) $r=.27$ with the number of promotions received since the assessment center, (2) $r=.15$ with salary, (3) $r=.24$ with grade (rank), and (4) $r=.28$ with the most recent merit appraisal ratings for those sampled personnel. Although these values were statistically significant at less than the .05 level, they are not as strong as the median correlation coefficient, $r=.37$, found in other studies (Cohen et al, 1974) (Byham and Wettengel, 1974). A need to investigate an alternative method of confirming the predictive validity of the 1974-1975 ASD assessment center is indicated.

Objectives of the Research

The overall objective of this thesis is to further investigate the predictive validity of the 1974-1975 ASD assessment center. Specifically the objectives are:

1. Develop a technique for testing the predictive validity of assessment centers.
2. Implement the technique for the ASD assessment center subjects.
3. Ascertain application value of the technique to future assessment centers.

Scope and Limitations

This thesis is limited to an investigation and

development of a validation technique for the 1974-1975 ASD assessment center. Only those personnel who attended this assessment center and subsequently achieved supervisory status are utilized in this study.

Approach to the Problem

The generation of alternative criteria was aided by the examination of the history of the assessment center in general, the history of the 1974-1975 ASD assessment center specifically, assessment center predictive validity, and a comparison of various predictors and criteria.

The criteria used are a combination of interview techniques and questionnaire techniques to ascertain various ratings of the assessment center subject's current managerial performance. Information on the subjects was obtained from their respective supervisors.

The content of the questionnaire consists of a rating of the subject on the same 14 managerial dimensions measured in the assessment center. In addition, a measure of importance, or criticalness, of those 14 dimensions to the effective completion of managerial jobs is included.

The content of the interview was twofold. First, the raters were questioned to obtain general reactions to the assessment center and to obtain a measure of the subject's perceived overall performance effectiveness in the current job. Second, the interview was used as a vehicle to insure the rater that this study is to be used only as research and

will have no impact on the career, salary, or personnel records of the subject assessee. This is accomplished because it is felt that the supervisor would tend to be more unbiased and honest in his rating than if it were to be used operationally (e.g., as a decision input of the promotion process) (Norton, 1980c).

Summary

This chapter has provided an introduction to the research subject, identified the problem, and outlined the objectives and limitations of the study. The remaining chapters will cover a more complete background of the subject, the methodology for achieving the stated objectives, the results and analysis of the study, and conclusions and recommendations. The next chapter will include a background study of the assessment center concept, a discussion of the measurement of managerial effectiveness, and a review of assessment center validation.

CHAPTER 2

ASSESSMENT CENTERS AND VALIDITY

History of the Assessment Center

The assessment center concept originated in Germany in World War One as an officer selection procedure. Consequently, early usage of assessment centers was limited to military uses. In World War Two, the British used it for officer selection (Huck, 1977) and the United States used it for the selection of intelligence agents (MacKinnon, 1977).

Application in the American business environment commenced in 1956 with a Management Progress Study conducted at AT&T (Bray and Grant, 1966). Results of this study were used, not for management application (e.g., promotion or salary decisions), but for research. Continued development and application of the assessment center spread from use in AT&T to other business firms. A summary of some of these studies is shown in Tables 2-1.

The first operational use of assessment centers in government since the World War Two study for intelligence agent selection occurred in the Internal Revenue Service (IRS) in 1969 (Byham and Wettengel, 1974). (There were some research efforts performed in the government in the interim, re: MacKinnon et al, 1958.) Since the IRS usage, the assessment center has been used by the U.S. Forest Service, the Federal Aviation Agency, the Tennessee Valley Authority, and the U.S. Postal Service to name but a few (Cohen and Jaffee, 1973).

TABLE 2-1
A SUMMARY OF RESEARCH STUDIES

Study & Location	Main Objective	Assessors	Groups Studied	Criteria
Bray & Grant, 1966/AT&T	research program, Mgmt Progress Study	psychologists & a few managers	young managers	progress in management
Bray, 1964a AT&T	operational program	managers	recently promoted, assessed and non-assessed managers	job performance; potential for advancement
Mather, 1964 AT&T	operational program	managers	recently promoted, assessed managers	job performance
Campbell & Bray, 1967 AT&T	operational program	managers	recently promoted, assessed and non-assessed managers	job performance; potential for advancement
Bray & Campbell, 1968 AT&T	research program	sales managers	recently employed salesmen	field review of performance
Wollowick & McNamara, 1969 IBM	operational program	managers	managerial candidates	increase in managerial responsibility after 3 years
Hinrichs, 1969 IBM	operational program	managers	managerial candidates	salary

Source: Cohen et al, 1974

TABLE 2-1
A SUMMARY OF RESEARCH STUDIES

Study & Location	Main Objective	Assessors	Groups Studied	Criteria
Carleton, 1970 Standard Oil (Ohio)	operational program	psychologists & managers	managerial candidates	ratings: a. 12 traits b. job potential c. salary & pro- motion progress
Finley, 1970 Standard Oil (Ohio)	operational program	psychologists & managers	managerial candidates	ratings: a. 12 traits b. job potential
Ginsburg & Silverman, 1972 hospital organization	operational program	managers	hospital administrators	ratings of present job performance
Jaffee, et al., 1970/ORNL, Nuclear Div.	operational program	managers	recently pro- moted managers	feelings of supervisors and subordinates
Thomson, 1970 Standard Oil (Ohio)	operational program	psychologists & managers	management candidates	supervisory ratings
Dodd, 1971 IBM	operational program	managers	management candidates	change in man- agement level; change in salary
Bentz, 1971 Sears	operational program	psychologists & managers	managerial trainees	job performance ratings & progress in management

Source: Cohen et al, 1974

Additionally, assessment centers have been used in several other countries such as Canada, Australia, Japan, Brazil, and South Africa (Huck and Bray, 1976).

Uses of assessment centers in DOD include the U.S. Army and the U.S. Air Force. The U.S. Army used the center as a method of prediction of performance of junior officers as well as the identification of personal and career development areas which are in need of further training. In the U.S. Air Force, uses have been primarily restricted to Wright-Patterson AFB activities although it is used at Squadron Officer's School at Maxwell AFB, AL as a training aid. Wright-Patterson assessment centers have been oriented to the selection of civilian personnel for position promotions or identification of training needs. The 1974-1975 assessment center was directed towards selection of civilian scientific and engineering personnel to first level supervisory positions. The assessment center concept was used again in 1979 in the Upward Mobility Program (Norton et al, 1980a). Assessment centers are still considered as possible methods for the identification of training needs of civilian personnel (Wissman, 1981).

Due to its success and value (as determined by the using organization or agency), it appears to be certain that the assessment center will continue to be a desirable instrument for management selection and development.

The 1974-1975 ASD Assessment Center

The first major U.S. Air Force application of the assessment center was accomplished in early 1974. The Air Force Systems Command (AFSC) sponsored a test center in an effort to determine the feasibility of using the assessment center concept for the selection of USAF civilian personnel for first level supervisory positions (ASD/DPCU, 1973). Two research and development organizations at Wright-Patterson AFB, Ohio were chosen as the subject organizations, the ASD Engineering Directorate and the USAF Avionics Laboratory (AFAL) (Bryant, 1975c). These organizations are representative of the Research and Development (R&D) activities conducted in the USAF in general and AFSC in particular.

A number of alternatives were examined by AFSC in the determination of the design and content of the USAF assessment center. Existing assessment centers, such as the American Management Association center (Bryant, 1975c), were considered for direct application. In addition, management consultation firms specializing in the design of assessment centers were examined to determine the best alternative for USAF use. Due to the "... unique and specialized work force involved" and unique systems with which they worked (Bryant, 1975c), it was decided to design an assessment center unique to the USAF environment.

The firm chosen for this task was Assessment Associates, Inc. of Emerson N.J., headed by Dr. J.L. Moses. Dr. Moses is a noted authority on assessment centers having been involved

in the design and implementation of the 1967-1968 AT&T assessment center and reviewing applications and validities of assessment centers (Moses with Cohen et al, 1974) (Moses and Byham, 1977).

The objectives of the Air Force assessment center were listed as follows [Moses, 1973]:

1. Evaluate supervisory skills needed to succeed as a first level supervisor in ASD or AL [Avionics Laboratory].
2. Provide both management and each participant with a profile of individual strengths and weaknesses.
3. Stimulate, where applicable, appropriate self developmental activities that might be warranted.

These objectives were used as guidelines in the design of the assessment center.

Dr. Moses identified 14 dimensions to be used in the assessment center. These dimensions are measures of managerial success and were determined through a survey of supervisors in those organizations to be involved in the assessment center. The dimensions identified for use and their definitions are listed in Figure 2-1.

The assessment center was designed to observe, measure, and evaluate the 14 dimensions (Moses, 1973). The assessment process included three phases, (1) the Assessment Phase, assessees participate in exercises and interviews (see Figure 2-2) (for a breakout of the dimensions observed in each exercise, see Table 2-2), (2) the Evaluation Phase, assessors prepare

1. Oral Communications Skills (OC): To what extent can this individual effectively express his ideas orally?
2. Leadership (L): To what extent is this individual able to get others to work together effectively in a group?
3. Energy (EN): To what extent does this individual maintain a high level of activity?
4. Empathy (EM): To what extent does this individual exhibit a concern for others?
5. Forcefulness (FO): To what extent is this individual able to command attention from others?
6. Persuasiveness (PE): To what extent is this individual able to sell his point of view to others?
7. Flexibility (FL): To what extent can this individual adjust to new situations easily?
8. Stress Tolerance (ST): To what extent is this individual able to respond appropriately to stressful conditions?
9. Risk Taking (RT): To what extent is this individual willing to take either risk or responsibility to achieve objectives?
10. Acquiring Information (AI): To what extent is this individual able to obtain information?
11. Organizing Skills (OS): To what extent can this individual plan and organize the work of himself and others?
12. Problem Solving (PS): To what extent can this individual easily find the best solution to a problem?
13. Decision Making (DM): To what extent can this individual make decisions of high quality?
14. Written Communications Skills (WCS): To what extent can this individual effectively express his ideas in writing?

Figure 2-1

ASD ASSESSMENT CENTER DIMENSIONS

Source: Komar and Wise, 1980

1. Interview: This exercise provides an opportunity for the assessor to gather inputs directly from the candidate in a one-on-one situation. It addresses such areas as job likes and dislikes, career planning, interests, and any other areas the candidate wishes to discuss. Prior to the interview, each candidate is asked to complete a questionnaire which asks for information regarding background, interests, likes and dislikes.
2. City Council: This simulation "is an assigned role, leaderless group discussion. Six participants roleplay City Council members, who have been called together to determine the best use to be made of a Federal financial grant of \$1,000,000 to their city. Each 'council member' has information on the needs of one City Department. Each participant is to try to get the largest appropriation possible for his department while still helping the group swiftly and fairly accomplish its task" (Development Dimensions, 1973).
3. Management Problems: This simulation is a leaderless group discussion with no assigned roles. The six candidates are to act as a group of consultants asked to give recommendations concerning an organization's problems. The group must come up with a written recommendation of a suggested course of action for each of four problems. All group members must agree on and initial the recommendation.
4. Supervisory Task Force: This simulation is a leaderless group discussion with no assigned roles. The six candidates are to act as a special task force assigned to decide upon the attributes needed to successfully perform a first level supervisory job. Each candidate is given a period to study the list and rank the attributes (plus any they want to add) in their order of importance to a first level supervisor. The candidates must then meet together and prepare a written report listing the agreed-upon attributes.
5. Research Budget: This is an individual exercise in which the candidate is given a short description of a situation demanding an immediate decision. The candidate is asked to play the role of a newly appointed personnel director who must make an immediate decision and present the reasoning behind it. A staff member is assigned to play the role of a resource person who will answer any questions the candidate wishes to ask.

Figure 2-2
ADD ASSESSMENT CENTER EXERCISES

Source: Komar and Wise, 1980

6. Organizational Problem: This is an individual exercise in which the candidate is asked to play the role of a special task force member. The task force is concerned with improving organizational effectiveness. The candidate is told of a number of concerns being raised which suggest that the present form of the organization is outmoded. The candidates must prepare a written proposal outlining their thoughts, ideas, and suggestions in this matter.

Figure 2-2

ADD ASSESSMENT CENTER EXERCISES

Source: Komar and Wise, 1980

TABLE 2-2
DIMENSION-EXERCISE MATRIX

Dimensions \ Exercise*	INT	CIC	MGP	STF	REB	ORP
Oral Comm Skills (OCS)	X	X			X	
Leadership (L)		X	X	X		
Energy (EN)		X	X	X		
Empathy (EM)	X		X	X		
Forcefulness (FO)	X	X	X	X		
Persuasiveness (PE)		X	X		X	
Flexibility (FL)		X	X	X	X	
Stress Tolerance (ST)		X	X		X	
Risk Taking (RT)	X	X	X		X	
Acquiring Information (AI)	X	X			X	
Organizing Skills (OS)		X	X		X	X
Problem Solving (PS)			X	X	X	X
Decision Making (DM)		X	X		X	X
Written Comm Skills (WCS)					X	X

*See Figure 2-2 for explanation of the exercises.

Source: Komar and Wise, 1980

reports and reach a group decision on the evaluation of each assessee, and (3) the Feedback Phase, the assessee receives a personal interview on center performance and both the assessee and management receive a profile of the assessee's strengths and weaknesses.

A trial run of the ASD assessment center was conducted from January to June of 1974 involving 82 candidates and 12 assessors (second level supervisors trained for the process). Most of those involved in this test run felt that the assessment center should be continued. A study accomplished later confirmed that 94% of the managers felt that information received from the assessment center was at least marginally useful (Friedman, 1975).

Based on the information from the test run it was decided to implement the assessment center on an operational basis. Formal establishment was announced in July 1974 by Lt Gen James Stewart, then Commander of ASD. In addition, ". . . it was recommended that the Assessment Centers be expanded to other AFSC organizations" and to career fields other than scientific and engineering (ASDRP 30-1, 1974). The information received from the assessment was formally incorporated into the Merit Promotion Plan, ASD R40-4, on 13 January 1975 (Bryant, 1975a).

The assessment center was discontinued in December 1975 (Clayton, 1975). This was due to a Judge Advocate decision that there was ". . . no authority (within the meaning

of the Privacy Act) for collecting, maintaining or using such records as are kept by the Assessment Center [DiPasqualucci, 1975_7]."

In all, 284 civilians were assessed in the assessment center which included nine sessions in the trial run and 16 sessions in the operational run. A revision of the Merit Promotion Plan in 1977 deleted the assessment center as a factor in the determination of promotability (Wissman, 1981).

The content, internal, and predictive validities of the assessment center were examined in a recent master's thesis (Komar and Wise, 1980). On content validity they found that ". . . based on the thorough job analysis, assessment center design, training, trial run, and evaluation, the ASD Management Assessment Center appears to possess content validity." The internal validity was tested through correlation of the dimensions, inter-rater reliability, factor analysis, and regression of dimensions with the overall Assessment center rating. Their findings indicated that, in general, the assessment center information was reasonable and consistent. Negative findings were identified by Komar and Wise [1980_7] as follows:

1. Acquiring information should be excluded from the interview. The correlation of this dimension with the final dimension rating indicates that very little weight was given to this dimension by the assessors in that exercise.
2. The organizational problem exercise needs

to be examined for possible problems in the measurement of dimensions within that exercise. Inter-rater reliabilities for all four dimensions within that exercise were considerably lower than for any other exercise.

3. Definition problems exist for the stress tolerance dimension. This was indicated first by the low inter-rater reliability and second by reviewing the assessor worksheets. In some cases, the same assessee was given both a zero and a five rating by different assessors because no stress was observed.

The predictive validity was ascertained through correlation analysis of the 14 dimensions and overall assessment center rating with four indicators of managerial success. The criteria chosen as indicators were the assessee's present grade, present salary, most recent merit appraisal rating, and the number of promotions received since the assessment center. Resultant correlation coefficients are shown in Table 2-3. Based on these results, Komar and Wise determined that as the coefficients were statistically significant, the assessment center was valid as a predictive instrument. (One minor problem found in predictive validity was the insignificance of the Empathy dimension. Komar and Wise recommended deletion of this dimension.)

Predictors and Criteria of Managerial Success

Overview. "Managers are accountable for performance the central idea for managers to keep in mind about performance is that it can always be more efficient and more effective [Albanese, 1978]." Since the manager is responsible

TABLE 2-3

CORRELATIONS OF FINAL DIMENSION AND OVERALL ASSESSMENT RATINGS
WITH INDICATORS OF MANAGERIAL SUCCESS (N=143 except as noted)

Dimensions	Promotions	Salary	APP***	Grade	Mean
CC	.18*	.26	.31	.32	.27
LE	.25	.18*	.22	.25	.23
EN	.23	.09**	.19*	.18*	.17
EM	.00**	-.10**	.07**	-.03**	-.02
FO	.27	.13**	.20*	.22	.21
PE	.23	.09**	.20*	.22	.19
FL	.19*	-.01**	.11**	.12**	.10
ST	.20	.15*	.27	.24	.22
RT	.20	.02**	.28	.14*	.16
AI	.19*	.07**	.11**	.16*	.13
CS	.17*	.15*	.22	.22	.19
PS	.25	.11**	.24	.23	.21
DM	.29	.09**	.24	.21	.21
WC	.19*	.18*	.29	.25	.23
Mean	.20	.10**	.21	.20	
Overall Assessment	.27	.15*	.28	.24	

*** N = 110

Significance: $p \leq .01$ except as noted

* $.01 < p \leq .05$

** $p > .05$

See Figure 2-1 for explanation of dimensions

Source: Komar and Wise, 1980

for performance, then one measure of managerial success is the attainment of an acceptable level of performance. An acceptable level, or levels, is in a large part determined by the organizational policy and goals. One author defined effective managerial job behavior as follows:

Any set of managerial actions believed to be optimal for identifying, assimilating, and utilizing both internal and external resources toward sustaining, over the long term, the functioning of the organizational unit for which a manager has some degree of responsibility [Campbell et al, 1970_7].

Effective behavior and acceptable performance are ascertained by conducting an analysis of the job in question. This involves definition of a job description (the responsibility and job structure relationships) and job specifications (job characteristics and qualifications). These are formulated to serve as a basis for choosing performance criteria. "A measure of any given manager's effectiveness should be based on a careful definition of the total domain of his job responsibilities . . . [Campbell et al, 1970_7]." Those measures which are used to forecast how a person will do in a given job environment are known as predictor variables. Those measures which are used to reveal how a person is currently doing in a given job environment are known as criteria variables. In determining what measures to use as predictors or criteria, an element of objectivity and job specificity must be maintained. As the measures become more vague with respect to the job in question and the organization, the accuracy of those measurements becomes questionable.

Predictors. Predictors are used to predict how a person will do or his potential to do something in the future. The methods available for the prediction of managerial success are varied in number, style, and validity.

The most concrete method of measurement is the paper and pencil test. Tests come in a variety of formats and contents to measure different attributes of a person or suitability for a specific job. Paper and pencil testing has come under legal observation because of the suspicion that such tests may be unfair to minority groups and women (Huck and Bray, 1976).

Mental ability tests comprise a major component of testing in general. These are usually in the form of achievement tests, measuring past accomplishments, aptitude tests, designed to predict future potentialities of a person, and proficiency tests, measuring the attained skill in a task. A literature review by Norton and Edinger (1978) found validity coefficients of "moderate" value ($r=.20s$) for mental ability tests. They later conclude that these tests are the only traditional predictive method (as opposed to 'new' methods, such as the assessment center) which was consistently valid. However, a number of studies have shown that assessment center ratings explain 10% to 20% greater criterion variance than tests alone (Bray and Grant, 1966) (Bray and Campbell, 1968) (Carleton, 1970) (Finley, 1970) (Moses, 1971) (Wollowick and McNamara, 1969).

Another type of test is the personality/interest test. Personality tests reveal characteristics of a personality that may affect a person's success in adjusting to the work. Interest tests help a person identify just what type of work that person likes (Massie and Douglas, 1977). A literature review by Norton and Edinger (1978) concluded that these tests are generally less consistent in results achieved than mental ability tests; validation results were mixed.

Norton and Edinger also found mixed results in validation of projective personality tests. These tests attempt to assess a person through his or her fantasies and interpretations (Szilagyi and Wallace, 1980). Disadvantages noted with these tests are the high expense involved and legal problems due to low face validity.

Besides testing, another predictive technique is the interview. The interview process involves questioning the individual to be rated on various aspects of education, experience and general beliefs in order to ascertain some measure of how that person will operate in the proposed job position. The complexity of the interview can range from simple, unstructured (no set agenda or questions) one to one conversations to organized, highly structured panel interviews. A Norton and Edinger literature review led to the conclusion that, standing alone, the interview is not a valid predictor. However, the incorporation of the interview into the AT&T Assessment Center led to increased validity of that model

(Bray and Grant, 1966).

The use of personal data sheets, or biographical information, in essence an interview on paper, has proven to be a good predictor of managerial success (Campbell et al, 1970). Its use, however, is limited due to the confidentiality of the information (Norton and Edinger, 1978).

Supervisory ratings, those ratings derived from the person's supervisor, have been a common method of prediction in both civilian and military organizations. A study by Norton, Balloun, and Konstantinovich (1980b) concluded that supervisory ratings, by themselves, are not a good predictor. Ratings so used are subject to uncertainties and distortions so as to make such ratings suspect (Rowland, 1970). In addition, there are many common supervisory rating errors which include central tendencies, leniency, strictness, and halo errors (Szilagyi and Wallace, 1980).

Finally, a variant to supervisory ratings are peer ratings. Peer ratings are overall ratings of managerial success obtained from a person's coworkers. Although generally subject to the same deficiencies (as an accurate predictor) as supervisory ratings, peer ratings have been found to be better as predictors (Campbell et al, 1970). This has been attributed to the fact that peers have a better chance of observing the rated individual both in different situations and the frequency of observation.

Criteria. Criteria are measures of managerial effectiveness, or how a person is doing in the current job. As

with predictors, criteria should encompass all important aspects of the job in question. Again, as with predictors, there are various types of criteria.

One type of criteria is known as behavior observation. This is the defining of those managerial behaviors necessary to effective job fulfillment (usually accomplished in a thorough job analysis) and the subsequent rating of those behaviors. Problems with the use of this criteria are (1) the possibility of using a deficient job analysis (necessary behaviors either poorly defined or omitted altogether), (2) a difficulty in assuring objectivity among raters (deviations include central tendencies, leniency, strictness, and halo rating), and (3) the lack of consistency among raters (different raters reporting a single occurrence differently) (Campbell et al, 1970).

A second type of criteria are objective measures, measuring the effectiveness of the work environment created by the manager. Included in this category are methods such as the direct measurement of physical aspects of a job, for example, quantity output from the organization, absence rates, and turnover rates. Another objective measure is a job attitude survey, given to subordinates, which measures their feelings about the job. These feelings are then translated into an effectiveness measure for the organization. A difficulty found with objective measures is that they tend to focus on only a few of the necessary managerial behavior aspects and, thus, represent a limited effectiveness or success rating

(Campbell et al, 1970).

The remaining criteria fall under the general category of global ratings. Global ratings measure a broad spectrum of managerial behavior in a single rating. If the sample size is small enough and the personnel to be rated can be evaluated as a part of a group, ranking may be used. This method involves arranging the personnel in a hierarchy of effectiveness, the most effective personnel first. As the number of personnel to be rated increases, however, this method becomes less feasible. Other global ratings are salary and level attained in the organization (these are usually adjusted for time in the organization). These methods cover a number of managerial behavior aspects in that they incorporate the sum of all past supervisory judgements of the individual in the salary and promotion recommendations made by those supervisors. However, this is also a factor which can confound results using salary and level in that luck (in having a good or poor rater throughout the career) plays a part. A problem found with global ratings in general is that it may be difficult to ascertain if the rating is confounded by information which is irrelevant to the job. Irrelevant factors which may have an impact are the physical bearing and friendliness of the rated individual (e.g., someone possessing large amounts of these factors may tend to be rated higher than his true effectiveness)(Campbell et al, 1970).

Summary. Whereas predictors, e.g., assessment centers, are used to predict how a person will do or his potential

to do something in the future, criteria are measures of managerial effectiveness against which the predictors may be compared. Predictors make a forecast of how a person will do; criteria, taken at a later date than the predictors, measures how a person is doing. A comparison of the two gives a measure of the accuracy, or validity, of the forecast made with the predictor.

Predictive Validity

An evaluation technique may be conceptually sound, but if the technique cannot accurately predict the desired element (e.g., managerial success), then it is of little value.

A traditional measure of the validity of any given selection or evaluation method is the correlation coefficient (symbolized 'r') (Morton and Edinger, 1978). This coefficient measures the strength of the relationship between variables (Harnett, 1975). Higher coefficient values indicate a stronger, more predictive relationship. In the ASD assessment center, the center ratings are the predictors, and the measures of managerial success are the criteria (e.g., salary level).

Studies of various assessment centers have resulted in correlation coefficients ranging from $r=.01$ to $r=.65$ (Finley, 1970) depending on the criterion used. Reviews of 19 assessment centers by Cohen, Moses, and Byham (1974) and of 22 centers by Byham and Wettengel (1974) both resulted in

median correlation coefficients of $r=.37$. Dr. Moses indicated that the ASD assessment center should prove to have a predictive validity well above $r=.50$ while the ASD Director of the assessment center expected to achieve a correlation with job success criteria within the approximate range of $r=.40$ to $r=.60$ (Bryant, 1975d).

A review of assessment center validity studies and the relationship between the correlation received and the criterion used are summarized on Table 2-4. Those studies by Komar and Wise were on the 1974-1975 ASD assessment center. The statistical significance of the correlation values is not considered on this table. This is dependent on the sample size.

Taking a simple situation in which a person is truly capable, or truly incapable, of performing a managerial job, the assessment center will make the correct recommendation for that person (i.e., recommend if capable and not recommend if not capable) a percentage of the time and be incorrect the remainder of the time. A formula to determine the relationship between the correlation coefficient and the percentage of correct recommendations in a dichotomous (Correct/Incorrect) situation was derived by Tate and Clelland (1957). This formula is graphically illustrated in Figure 2-3.

As can be seen on the graph, a correlation coefficient of $r=0$ is equivalent to pure chance, e.g., a flip of a fair coin. As the correlation coefficient increases in value, the percentage of correct decisions increases at a faster rate.

TABLE 2-4

SUMMARY OF ASSESSMENT CENTER CORRELATIONS

Criteria	Location	Correlation Coefficient	Reference
Promotions	AT&T USAF	r=.44 r=.27	Moses, 1971 Komar and Wise, 1981
Salary	AT&T IBM SOHIO USAF	r=.48 r=.37 r=.24 r=.15	Bray and Grant, 1966 Hinrichs, 1969 Mitchel, 1975 Komar and Wise, 1980
Position Level (Management Resp)	IBM IBM USAF	r=.37 r=.46 r=.24	Wollock and McNamara, 1969 Hinrichs, 1978 Komar and Wise, 1980
Ratings (Mgmt Potential)	SOHIO SOHIO AT&T PACE (Civil Service)	r=.65 r=.63 r=.59 (Whites) r=.54 (Blacks) r=.47	Carleton, 1970 Finley, 1970 Huck and Bray, 1976 Norton, Dunne, & Thornton, 1980
Ratings (Management Effectiveness)	AT&T Caterpillar Tractor SOHIO SOHIO Various Hospitals AT&T PACE (Civil Service) USAF	r=.51 r=-.09 to +.26 r=.25 r=.32 r=.57 r=.34 r=.41 (Whites) r=.36 (Blacks) r=.47 r=.28	Bray and Campbell, 1968 Bullard, 1969 Carleton, 1970 Finley, 1970 McConnell and Parker, 1972 Ginsburg and Silverman, 1972 Huck and Bray, 1976 Norton, Dunne, & Thornton, 1980 Komar and Wise, 1980

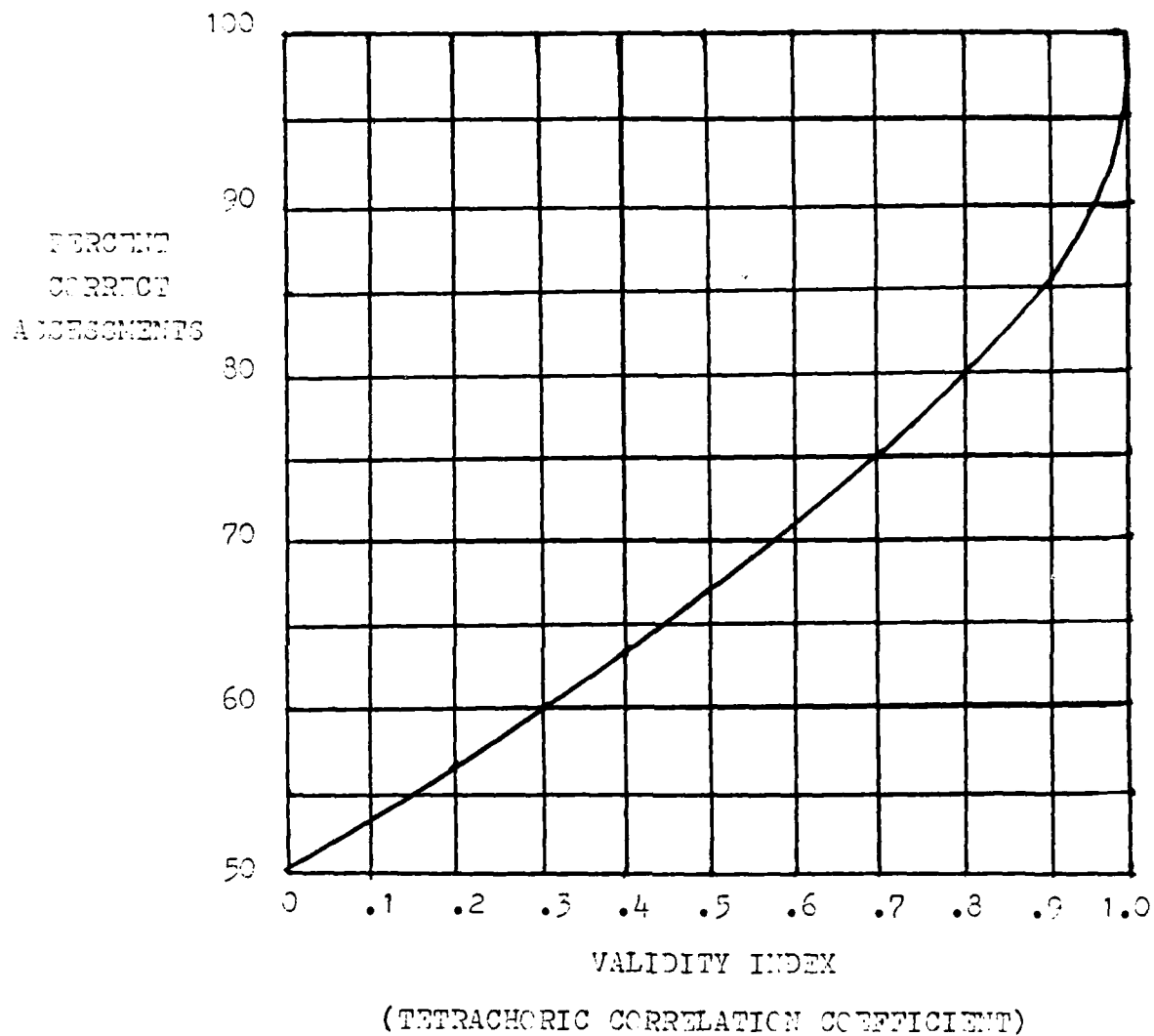


FIGURE 2-3
VALIDITY INDEX VERSUS PERCENTAGE CORRECT ASSESSMENTS

Source: Tate and McClelland, 1957

Therefore, although a given correlation coefficient may be statistically significant given the sample size, it is always possible, and desirable, to decrease the chance of an incorrect decision.

Summary

This chapter has described the history of the assessment center in general and, specifically, the ASD assessment center, the subject of this study. In addition, it reviewed the concepts of predictors and criteria of managerial effectiveness. Finally, the validity issue and, specifically, predictive validation of assessment centers was discussed. The next chapter outlines those procedures used to meet the stated objectives.

CHAPTER 3

METHODOLOGY

Overview

The methodology used in this thesis effort was structured so as to best meet the stated objectives. The 1974-1975 ASD assessment center resulted in data used to predict the managerial success for civilian personnel being considered for promotion to the first level supervisory position. Using this data as the predictor variables, a set of questions and ratings were derived to act as criteria. The criteria data were statistically compared with the predictor data to measure the predictive validity of the ASD assessment center.

Statistical analyses were accomplished using the Statistical Package for the Social Sciences (SPSS) (Nie et al, 1975). The Aeronautical Systems Division CDC 6600 computer was used to run all required programs.

Previous Studies

There has been only one comprehensive research study of the 1974-1975 ASD assessment center and its predictive validity. As stated in Chapters 1 and 2, this was a thesis completed by Komar and Wise (1980). Criteria selected for use in that study were (1) salary, (2) number of promotions since the assessment center, (3) grade (GS level), and (4) most recent appraisal rating. In addition to a study of the

predictive validity of the assessment center, Komar and Wise conducted a thorough internal and content validity study of the assessment center. As these subject areas have already received sufficient research coverage, they were not addressed in this thesis effort. Results of the Komar and Wise study are as shown in Chapter 2.

Nature of the Sample

A total of 289 civilian personnel participated in the 1974-1975 ASD assessment center. A total of 25 centers were run, with each center split into two groups of six assessees each. The first nine centers encompassed the test program whereas the final 16 centers were operational. All assessees were in scientific and engineering related career fields and held a grade of GS-9 to GS-14. The target job of the assessment center was selection to the first level of supervision (Moses, 1973) (ASD/DPCU, 1973) (Stewart, 1974). Of the total of 289 civilian personnel who participated in the assessment center, 103, or 36%, have achieved supervisory status. A summary of the supervisory level for these 103 is shown in Table 3-1. Definitions of the supervisory level titles are shown on Figure 3-1.

As the assessment target level, first level supervisors, represents 45% of all supervisors and only 16% of the entire assessee population, it was decided to include all assessees having achieved any supervisory status. Although not true supervisors (in that, for the most part, they have

1. Part-time Supervision: General Schedule supervisors below GS-12 level with fewer than 3 subordinates and all Work Leaders.
2. First level of Supervision: Foremen and GS supervisors at lowest level of continuing supervision over 3 or more full-time subordinates.
3. Program Management: Employees covered by 10 U.S.C. 1581 or in grades GS-12 through GS-18 who have advisory research, scientific, engineering and/or complete or limited program responsibilities, i.e., usually with none or not more than two non-supervisory subordinates and normally no subordinates.
4. Executive Management: Employees covered by 10 U.S.C. 1581 or General Schedule Employees in grades GS-15 through 18 with full colonel or above equivalent AFSC. Has complete program responsibility and substantial continuing supervisory responsibilities, i.e., normally supervises at least two subordinate supervisory levels, or at least three subordinate managers, supervisors, or non-supervisory personnel.
5. Second level of supervision: Wage Schedule or General Schedule Supervisor
 - a. whose primary role is assuring accomplishment of the work assigned to the activity through at least one subordinate level of full-time supervision
 - b. but who does not meet the requirement for managerial positions as defined by FPM Letter 412-2, 29 January 1974.
6. First Managerial Level: Employees whose positions meet the requirements for identification as managerial as defined by FPM Letter 412-2, 29 January 1974 but are below the range for Executive Management (Code 5).

Figure 3-1

EXPLANATION OF SUPERVISORY LEVEL TERMS

Source: ASD/DPST
 SI 40-503,
 31 May 1979

no subordinates), program managers were included to increase the potential data base. These individuals are important resource managers and usually must interact with other people to significant degree.

TABLE 3-1
ASSEESSEE SUPERVISORY LEVEL IN 1981

Level	N	%
Part Time Supervision	2	2
First Level Supervision	46	45
Second Level Supervision	6	6
Program Manager	35	34
First Managerial Level	4	4
Executive Management	10	9
Totals	103	100

An attempt was made to contact all 103 supervisory assessees. Those contacted were informed of the subject and nature of the research effort. It was then requested that they verify that they were willing to be included as a research subject. Finally, if the assessees proved cooperative, it was requested that they give their permission for an interview and questionnaire on their current managerial effectiveness to be given to their supervisors.

After elimination from consideration those assessees and assessee supervisors who were on extended TDY, on extended

leave, and who refused to participate in the study, there remained 67 assesseees. These 67 assesseees represent a sample of the Komar and Wise study group, as well as additional assesseees from the original assessment center group. These additional personnel (23, or 34% of this sample) participated in the nine test program assessment centers which Komar and Wise did not study. A summary of the supervisory levels of these 67 is shown in Table 3-2. The major organizations for which the 67 assesseees worked are shown on Table 3-3. A summary of the grade level of the 67 assesseees is shown in Table 3-4. A final point of consideration is that all but one of the 67 assesseees are male.

TABLE 3-2
SUPERVISORY LEVEL OF ASSESSEES CHOSEN FOR STUDY

Level	N	%
Part Time Supervision	2	3
First Level Supervision	32	48
Second Level Supervision	4	6
Program Manager	22	33
First Managerial Level	1	1
Executive Management	6	9
Totals	67	100

The immediate supervisors of the assesseees were contacted and interviewed concerning the managerial effectiveness

of the assessee in their current jobs. When the immediate supervisor could not be contacted, when possible, someone senior to the assessee, yet still familiar with that assessee's performance (e.g., a former supervisor), was contacted and interviewed.

TABLE 3-3
ASSESSEE ORGANIZATIONAL MAKEUP

Organization	N	%
ASD	37	55
AFWAL	25	37
FTD	5	8
Totals	67	100

TABLE 3-4
DISTRIBUTION OF ASSESSEE GRADES

Grade	N	%
GS-12	1	2
GS-13	15	22
GS-14	44	66
GS-15	7	10
Totals	67	100

In all communications with the assessees and their supervisors it was emphasized that this was a voluntary, research effort only. It was made clear that data received

from the participants would not be used in any personnel decisions (e.g., salary or promotion) and would not appear in any personnel records.

The overall rating and dimension ratings from the assessment center (the predictor data) for the 67 assessees were taken from a summary sheet of assessment center results contained in each assessee's folder.

The Interview/Questionnaire

The interview and questionnaire (Appendix A) were constructed so as to obtain all information required to conduct an analysis of the predictive validity of the assessment center. A brief explanation of some of the ordering of the questions is warranted. Questions were ordered in an attempt to minimize the cross contamination of answers, however, raters were not prohibited from reviewing any answers which they had given previously.

The content of the rating instrument and the method of presentation were tested in a trial run prior to actual use. A supervisor in the civilian personnel division of ASD acted as an assessee's supervisor and was given the interview and questionnaire package. Upon completion of the test run, a critique of the rating instrument and the presentation method were discussed and, where warranted, implemented for use.

This rating instrument was presented to the raters in person whenever possible. This was accomplished so that (1)

any questions or clarifications requested by the rater could be answered quickly, (2) the fact could be emphasized that this was a research effort only, and (3) the raters could be suitably impressed with the fact that they should be as objective as possible in their responses. Even though the interview/questionnaire was presented in person, all instructions and questions were constructed so that it could be completed without any researcher supervision with only limited questions and clarifications.

The two overall ratings (general effectiveness and effectiveness with respect to peers) were separated by a time consuming question in an attempt to reduce cross contamination of the results. In addition, the scales used for the two ratings were made dissimilar for the same purpose.

The rating of the importance (criticalness) of the 14 dimensions was included after the 14 dimensions were rated so as not to contaminate those ratings. It was felt that the rater might attempt to match up a criticalness rating with the dimension rating with little regard to the actual job usage of that dimension.

The dimension definitions utilized in the questionnaire, used in conjunction with the dimension rating scales, were derived from the Komar and Wise (1980) thesis effort. These definitions were modified slightly so as to fully consider the sample population and integration with the remainder of the interview/questionnaire.

Demographic information derived from the interview

and not utilized in this study is presented in Appendix B.

The Ratings

All assesseees received a rating in the assessment center and in 1981 on 14 managerial dimensions (See Figure 2-1). These dimensions were rated on a five point scale. Three distinct sets of dimension ratings were utilized in this study. The first set are those derived from the Komar and Wise study sample group and the ratings that they received in the assessment center. These are referred to as the 14 assessment center dimensions. The second set are those dimension ratings received in the assessment center by the 67 assesseees sampled in this study. These ratings are referred to as the 14 assessment center dimensions, 1981 sample group. Finally, the third set are those dimension ratings given by the supervisors of the 67 assesseees sampled in this study, referred to as the 14 1981 dimensions.

There are four overall ratings used in this study. The overall rating received by each assessee in the assessment center is referred to in this study as OVERAC or the assessment center overall rating. This rating is based on a four point scale. The remaining three overall ratings were ratings derived from the 1981 interview/questionnaire and are collectively referred to as the 1981 overall ratings. OVER1 is a global rating of managerial success using a five point scale. Due to a low number of '1' and '2' ratings received, these categories were collapsed into a single

category. This resulted in a four point scale consistent with OVERAC. OVER2 is a global rating of managerial success in which the assessee was rated on how successful he is with respect to his peers. This was measured on a continuous 13 centimeter scale. For simplicity, responses were recorded to the nearest .5 centimeter. The final overall rating, MEANDIM, is a composite of the 14 1981 dimensions. The dimensions for each individual assessee were summed and the result divided by 14. Since the dimensions were rated on a five point scale, this composite is a modified five point scale.

Internal Validity of the Criteria

Overview. The reliability of the criteria data derived from the supervisors was determined as follows:

1. Examination of the relations among the 1981 dimensions.
2. Examination of the relations between the 1981 dimensions and the 1981 overall ratings.
3. Identification of the nature of the underlying components of the dimensions.
4. As an adjunct to the first three steps, comparison of analysis results using 1981 data, analysis results using the 1981 assessment center data, and analysis results by Komar and Wise.

Specific data analysis techniques used are summarized in the following sections.

Correlation of Dimensions. The correlation among the 14 1981 dimension ratings was accomplished using the SPSS subprogram PEARSON CORR. The specific objective of this is to insure that predictive results are not confounded by dimensions having an unexpectedly weak or strong relationship with each other.

Dimension/Overall Relationship. The correlations between the 14 1981 dimensions and the three 1981 overall ratings was accomplished by the SPSS subprogram PEARSON CORR. In addition, a multiple regression analysis to show the relationship between the 14 1981 dimensions as a group and OVER1 and OVER2 (compared separately) was accomplished using the SPSS subprogram REGRESSION. This analysis utilized the step-wise regression option in order to ascertain those dimensions which were the most important to explaining the overall ratings.

Factor Analysis. The underlying pattern of relationships between the 14 1981 dimensions was analyzed using the SPSS subprogram FACTOR.

Relationship of 1981 Sample Group with the Parent Population. This analysis serves the purpose of insuring that the underlying perceptions of supervisors concerning job structure have not changed drastically between 1975 and 1981. If there was a drastic change in the data base, the analytical procedures utilized in this study would be of questionable value and, as such, a reexamination of criteria and analysis

techniques would be warranted.

A correlation of the 14 assessment center dimensions for the 1981 sample group was accomplished using the SPSS subprogram PEARSON CORR. This information was then visually compared against the correlation matrix using the sample group from the Komar and Wise (1980) study to ascertain if the two groups could logically, based on gross coefficient comparisons, be considered to be from the same overall population.

An SPSS subprogram FACTOR was run using the 14 assessment center dimensions from the 1981 sample group. The resulting factor patterns were compared with the similar analysis of the 14 1981 dimensions and those results achieved by Komar and Wise (1980) to again determine if they represented the same underlying population of data.

Finally, a comparison was made between the measured dimension criticalness (how important a given dimension is perceived to be to managerial success) found in the 1981 sample group and that found by Dr. Moses in his initial analysis (1973). This was accomplished using a Spearman's Rho test (Harnett, 1975) on the rankings of the dimensions. In that Dr. Moses' data was split between the AF Avionics Laboratory (AFAL) and ASD, the 1981 data was similarly split so as to give a more accurate comparison.

Predictive Validity

The SPSS subprogram PEARSON CORR was accomplished to determine the predictive validity of the assessment center.

The predictor variable used was the assessment center overall rating, OVERAC. The criteria of managerial success used were OVER1, OVER2, and MEANDIM. In addition to the comparison of the overall ratings, the 14 1981 dimensions and the 14 assessment center dimensions (1981 sample group data) were compared to each other and to the overall ratings (with the exception of SUMDIM) using the SPSS subprogram PEARSON CORR.

Subgroup Data Analysis

Predictive validity techniques used for the overall sample were also accomplished on specified subgroups pairs of that sample. This was accomplished to ascertain if there were any significant findings which could be attributable to a given subgroup. The subgroup pairs analyzed are as follows:

1. AFWAL assessees and ASD assessees.
Note: FTD assessees were considered to be a separate group but, given their sample size (N=5), were excluded.
2. Program Managers and First Level Supervisors.
Note: Other supervisory levels were not included due to their small sample size.
3. Military raters and Civilian raters, i.e., the assessee's supervisor.
4. Assesseees with no (or inconsequential) budget responsibility and those with a budget responsibility.

Selected groups were also analyzed using the SPSS

subprogram DISCRIMINANT. This program attempts to statistically distinguish between two groups using a set of discriminating variables (Nie et al, 1975). The discriminating variables used are the 14 assessment center dimensions (1981 sample group) and, in a separate analysis, the 14 1981 dimensions.

Summary

This chapter has described the methodology used to accomplish the objectives. This included a review of previous studies for this particular assessment center and a description of the sample used and how it was chosen. Finally, a specific set of procedures to achieve the objectives was outlined. The next chapter presents and analyzes the results obtained in this study.

CHAPTER 4

ANALYSIS AND RESULTS

Overview

The quantity of data derived from the analysis was extensive. Therefore, only the collated and reduced forms of the data which have a significant impact on the explanation of the objectives are presented here. In addition, data from the Komar and Wise (1980) research is used extensively.

Internal Validity of the Criteria

The criteria data were analyzed to determine (1) if the sample population could be considered to be a valid sample of the overall assessment center population and (2) if the responses given by raters could be considered to be reliable.

Correlation of Dimensions. The correlation coefficients among the 14 assessment dimensions (1981 sample population) are shown in Table 4-1. Table 4-2 shows the correlation coefficients found by Komar and Wise (1980) for the 14 assessment center dimensions. Finally, Table 4-3 reflects the correlation coefficients for the 14 1981 supervisory dimension ratings in addition to the 1981 overall ratings.

Assessment Center Relationship. Table 4-1 reflects the 1981 sample assessment center dimension correlations as well as their correlations to the overall assessment rating. This is as compared to the Komar and Wise results, Table 4-2. As with Komar and Wise all results were highly significant

TABLE 4-1
CORRELATIONS AMONG OVERALL AND DIMENSION RATINGS
ASSESSMENT CENTER DATA (1981 SAMPLE)
(N=67)

Dimensions	OVERAC	OCS	L	EN	EM	FO	PE	FL	ST	RT	AI	OS	PS	DM	WCS
OVERAC	-	.64	.82	.65	.20	.76	.78	.80	.56	.52	.62	.76	.68	.74	.46
OCS	.64	-	.57	.54	.25	.65	.58	.62	.52	.32	.37	.52	.40	.47	.45
L	.82	.57	-	.80	.19*	.79	.67	.76	.50	.51	.48	.62	.52	.65	.34
EN	.65	.54	.80	-	.11*	.75	.53	.68	.36	.54	.50	.42	.48	.56	.38
EM	.20	.25	.19*	.11*	-	.07*	.12*	.24	.25	.15*	.18*	.17*	.19*	.13*	.31
FO	.76	.65	.79	.75	.07*	-	.69	.67	.57	.58	.38	.57	.50	.65	.39
PE	.79	.58	.67	.53	.12*	.69	-	.71	.58	.42	.48	.72	.64	.67	.36
FL	.80	.62	.76	.68	.24	.67	.71	-	.54	.56	.58	.68	.63	.61	.40
ST	.56	.52	.50	.36	.25	.57	.58	.54	-	.41	.38	.57	.43	.51	.32
RT	.52	.32	.51	.54	.15*	.58	.42	.56	.41	-	.47	.52	.52	.69	.33
AI	.62	.37	.48	.50	.18*	.38	.48	.58	.38	.47	-	.65	.68	.58	.48
OS	.76	.52	.62	.42	.17*	.57	.72	.68	.57	.52	.65	-	.75	.73	.45
PS	.68	.40	.52	.48	.19*	.50	.64	.63	.43	.52	.68	.75	-	.80	.50
DM	.74	.47	.65	.56	.13*	.65	.67	.61	.51	.69	.58	.73	.80	-	.50
WCS	.46	.45	.34	.38	.31	.39	.36	.40	.32	.33	.48	.45	.50	.50	-

See Figure 2-1 for explanation of dimensions

Significance: $p \leq .05$ except as noted

* $p > .05$

TABLE 4-2
CORRELATIONS AMONG DIMENSION RATINGS (KOMAR AND WISE)
(N=144)

Dimensions	OCS	L	EN	EM	FO	PE	FL	ST	RT	AI	OS	PS	DM	WCS
OCS	-	.56	.53	.56	.57	.47	.18	.57	.41	.44	.56	.50	.47	.43
L	.56	-	.80	.77	.69	.64	.22	.42	.56	.50	.69	.55	.60	.29
EN	.53	.80	-	.79	.62	.59	.14	.34	.49	.42	.53	.41	.45	.31
EM	.18	.22	.14	-	.12	.26	.35	.22	.24	.22	.07*	.21	.19	.03*
FO	.56	.77	.79	.12	-	.69	.55	.44	.57	.41	.53	.49	.50	.25
PE	.57	.69	.62	.26	.69	-	.58	.49	.56	.50	.66	.60	.64	.37
FL	.47	.64	.59	.35	.55	.58	-	.40	.42	.53	.52	.54	.50	.29
ST	.57	.42	.34	.22	.44	.49	.40	-	.40	.36	.53	.46	.46	.40
RT	.41	.56	.49	.24	.57	.56	.42	.40	-	.53	.55	.55	.61	.26
AI	.44	.50	.42	.22	.41	.50	.53	.36	.53	-	.61	.64	.57	.40
OS	.56	.69	.53	.07*	.53	.66	.52	.53	.55	.61	-	.74	.70	.47
PS	.50	.55	.41	.21	.49	.60	.54	.46	.55	.64	.74	-	.72	.51
DM	.47	.60	.45	.19	.50	.64	.50	.46	.61	.57	.70	.72	-	.44
WCS	.43	.29	.31	.03*	.25	.37	.20	.40	.26	.40	.47	.51	.44	-

See Figure 2-1 for explanation of dimensions

Significance: $p \leq .05$ except as noted

* $p > .05$

TABLE 4-3
CORRELATIONS AMONG 1981 OVERALL AND DIMENSION RATINGS
(N=67)

Dimensions	OVER1	OVER2	OCS	L	EN	EM	FO ^a	PE	FL ^a	ST	RT	AI	OS	PS	DM	WCS
OVER1	-	.73	.50	.59	.31	.37	.48	.58	.47	.39	.39	.47	.53	.61	.61	.39
OVER2	.73	-	.54	.68	.52	.40	.66	.58	.47	.56	.61	.57	.51	.75	.66	.40
OCS	.50	.54	-	.50	.39	.24	.53	.53	.27	.36	.33	.39	.33	.47	.39	.47
L	.59	.68	.50	-	.49	.49	.57	.53	.44	.59	.59	.49	.43	.54	.60	.42
EN	.31	.52	.39	.49	-	.33	.50	.37	.30	.53	.52	.34	.30	.41	.32	.22
EM	.37	.40	.24	.49	.33	-	.28	.43	.41	.41	.26	.24	.33	.19*	.39	.34
FO ^a	.48	.66	.53	.57	.50	.28	-	.47	.25	.33	.57	.56	.44	.64	.61	.36
PE	.58	.58	.53	.53	.37	.43	.47	-	.44	.40	.42	.33	.35	.50	.56	.36
FL ^a	.47	.47	.27	.44	.30	.41	.25	.44	-	.50	.29	.20	.20*	.34	.24	.27
ST	.39	.56	.36	.59	.53	.41	.33	.40	.50	-	.54	.44	.46	.42	.52	.37
RT	.39	.61	.33	.59	.52	.26	.57	.42	.29	.54	-	.49	.28	.53	.60	.28
AI	.47	.57	.59	.49	.34	.24	.56	.33	.20	.44	.49	-	.60	.71	.61	.35
OS	.53	.51	.33	.43	.30	.33	.44	.35	.20*	.46	.38	.60	-	.61	.51	.44
PS	.61	.75	.47	.54	.41	.19*	.64	.50	.34	.42	.53	.71	.61	-	.66	.33
DM	.61	.66	.39	.60	.32	.39	.61	.56	.24	.52	.60	.61	.51	.66	-	.37
WCS	.39	.40	.47	.42	.22	.34	.36	.36	.27	.37	.28	.35	.44	.33	.37	-

a: N=66 for these dimensions

See Figure 2-1 for explanation of dimensions

Significance: $p \leq .05$ except as noted

* $p > .05$

(at greater than the .05 level) except those associated with the Empathy dimension. Many of these coefficients were significant at the .10 level and some were not significant.

A visual comparison between Table 4-1 and Table 4-2 reveals that the 1981 sample compares favorably to those results achieved by Komar and Wise. This lends credence to the necessary condition that the 1981 sample be a valid subset of the Komar and Wise sample population and the parent population.

The strongest correlations between the overall assessment center rating and dimensions on Table 4-1 (for the 1981 sample) were Leadership (.82), Flexibility (.80), Persuasiveness (.79), Forcefulness (.76), Organizing Skills (.76), and Decision Making (.74). The weakest correlations were Written Communications Skills (.46) and Empathy (.20). These findings relate well to the Komar and Wise study which found Persuasiveness, Leadership, Decision Making, Problem Solving, Organizing, and Forcefulness as the most highly correlated with the overall assessment rating and Written Communications Skills and Empathy as the lowest correlated (Komar and Wise, 1980).

Dimensions/Overall Rating Relationship. The overall rating using the absolute scale (OVER1) and the overall rating comparing the assessee with his peers (OVER2) were compared to each other and to the 14 1981 supervisory dimension ratings. The resultant correlation coefficients are shown in Table 4-3. All coefficients were significant at greater than the .05

level except Problem Solving with Empathy and Organizing Skills with Flexibility. These were marginally significant at between the .05 and the .10 level.

A further review indicates that the strongest correlations between the supervisory ratings and the OVER1 overall rating were Decision Making (.61), Problem Solving (.61), and Leadership (.59). Energy (.30) had the lowest correlation. The strongest correlation between the supervisory ratings and the OVER2 overall rating were, again, Problem Solving (.75), Leadership (.68), and Decision Making (.66), but additionally included Forcefulness (.66). The weakest correlations were Empathy (.40) and Written Communications Skills (.40). These findings again relate well to the results found in the Komar and Wise study.

In order to determine which of the 14 1981 dimensions, as a group, best related to the overall ratings, multiple regression analysis was accomplished. Variables were entered into the equation in a stepwise fashion. As with Komar and Wise (1980) some variable subsets resulted in a high R^2 value and are included in the final analysis.

The multiple regression equation involving the 14 1981 dimensions and OVER1, the absolute overall rating, is shown in Table 4-4. Inclusion of additional variables from those shown resulted in an R^2 increase no greater than .02. The variables included, Decision Making, Flexibility, Organizing Skills, and Oral Communications Skills, account for 56.9% of the variance of OVER1. Decision Making has the

highest simple correlation of all the dimensions.

TABLE 4-4
MULTIPLE REGRESSION OF 1981 DIMENSION RATINGS
ON OVER1 RATING

Variable	R ²	R ² Increase	B Weight	Overall F	Sig of F
DM	.376	---	.279	37.97	.000
FL	.485	.109	.190	29.21	.000
CS	.534	.049	.185	23.28	.000
OCS	.569	.035	.166	19.82	.000
Constant			-.219		

The multiple regression equation involving the 14 1981 dimensions and OVER2, the overall rating with respect to peers, is shown in Table 4-5. Any subsequent inclusion of variables would result in an R² increase no greater than .009. The variables, Problem Solving, Leadership, Forcefulness, and Stress Tolerance, explain 70.5% of the variance of OVER2. Problem Solving, Leadership and Forcefulness had three of the highest simple correlations with OVER2.

As a measure of comparison between the assessment center (1981 sample group) and the 1981 dimensions, Table 4-6 reflects the means and standard deviations of these variables. Both sample groups were measured on a five point scale, one being the lowest value and five the highest value for effectiveness in that dimension. Table 4-7 reflects the ranking of the dimension means and their relative

ordering with respect to each other.

TABLE 4-5
MULTIPLE REGRESSION OF 1981 DIMENSION RATINGS
ON CVER2 RATING

Variable	R ²	R ² Increase	B Weight	Overall F	Sig of F
PS	.556	---	1.071	79.00	.000
L	.666	.110	.555	61.82	.000
FO	.684	.013	.436	44.10	.000
ST	.705	.021	.451	35.82	.000
Constant			.059		

In all cases except Oral Communications Skills and Stress Tolerance, the 1981 dimension means were greater in magnitude than the assessment dimension means. In addition, most of the assessment dimension standard deviations were greater than the 1981 dimension standard deviations. This implies that the 1981 raters were more prone to give high ratings with less variance from that rating. This suggests either the possibility of rating inflation on the raters part, a strictness in the assessment center ratings, or the possibility that all assessees truly improved themselves in all dimensions. Further research on these findings may be warranted.

Dimension Criticalness Ratings. In order to ascertain if there was any significant shift in the perceived importance of the dimensions, the means for the assessment

TABLE 4-6

MEANS AND STANDARD DEVIATIONS OF DIMENSIONS (1981 SAMPLE)

Dimensions	AC Rating	1981 Rating
CCS	4.09 (.75)	3.80 (.85)
L	3.09 (1.15)	4.10 (.88)
EN	3.72 (1.07)	4.23 (.74)
EM	3.34 (.71)	4.03 (.86)
FC	3.42 (1.08)	3.98 * (.86)
PE	3.13 (.90)	3.84 (.77)
FL	3.04 (.96)	3.99 * (1.00)
ST	4.15 (.74)	4.13 (.81)
RT	3.34 (.88)	3.92 (.84)
AI	3.43 (.94)	4.04 (.86)
CS	3.54 (.99)	4.13 (.81)
PS	3.43 (.92)	4.01 (.78)
DK	3.39 (.92)	4.04 (.84)
WCS	3.60 (.91)	3.93 (.79)

Means/(Standard Deviations)

See Figure 2-1 for explanation of dimensions

N=67 (Note: N=66 for asterisked dimensions)

TABLE 4-7
RANKING OF DIMENSION MEANS (1981 SAMPLE)

Dimensions	AC Rating	1981 Rating
CCS	2	14
L	13	4
EN	3	1
EM	11	7
FO	8	10
FE	12	13
FL	14	9
ST	1	2
RT	10	12
AI	6	5
CS	5	3
PS	7	8
DM	9	6
WCS	4	11

See Figure 2-1 for explanation of dimensions

Spearman's Rho	r_s	r_s^2	Sig (t-test)
	.24	.06	.10

center derived from a study by Dr. Moses (1973), and those derived in 1981, are shown in Table 4-8. Rankings of these criticalness ratings are listed in Table 4-9.

In the original study Empathy was not included as a dimension. Included in the study, but not in the assessment center, was the dimension Originality, the ability to approach problems in a new way (Moses, 1973). These dimensions were not utilized in comparisons between the old and new data.

An examination of the means reveals that, in general, there were no major differences between the two sample groups. Exceptions to this are a fairly large (approximately 15% or 0.5 on a five point scale) decrease in importance of the Risk Taking dimension and a large increase in importance of the Acquiring Information dimension within both subgroups and of the Energy dimension within the AFWAL subgroup. One possible reason for this change is that perhaps management emphasis is changing from a deductive, or even luck, basis (Risk Taking) to an inductive basis (Acquiring Information).

The dimensions were ranked (Table 4-9) according to the magnitude of their means. Ties were broken by a comparison of the modes of the dimensions. A rank order correlation coefficient within and between the sample groups was accomplished by the computation of a Spearman's Rho.

Results indicate that supervisors in the labs (AFWAL) and ASD view the ordering of the dimensions similarly. This also holds true between the 1973 sample and the 1981 sample.

TABLE 4-8
CRITICALNESS RATING MEANS

Dimensions	Assessment Center		1981		
	AFAL (N=87)	ASD (N=60)	AFWAL (N=25)	ASD (N=37)	Overall (N=67)
CCS	4.44	4.28	4.40	4.38	4.42
L	4.30	4.36	4.56	4.65	4.64
DI	3.56	3.41	4.24	3.39	4.05
EM	a	a	3.92	3.51	3.67
FO	3.57	3.71	3.44	3.97**	3.79*
FE	4.14	4.03	4.04	4.27	4.13
FL	4.21	4.25	4.32***	4.33	4.37*
ST	4.20	4.23	4.00	4.14	4.12
RT	4.09	4.05	3.48	3.51	3.52
AI	3.30	3.13	4.36	4.35	4.39
CS	4.68	4.03	4.60	4.38	4.49
PS	4.04	3.93	4.24	4.62	4.51
DI	4.45	4.55	4.32	4.41	4.42
WCS	4.33	4.18	4.36	4.30	4.36
Originality	3.79	3.50	a	a	a

See Figure 2-1 for explanation of dimensions

a: Not Rated

*: 66 Cases

** : 36 Cases

***: 24 Cases

TABLE 4-9
RANKING OF CRITICALNESS

Dimensions	Assessment Center		1981		
	AFAL	ASD	AFWAL	ASD	Overall
OCS	4	3	3	5	4
L	1	1	2	1	1
EN	14	14	9	13	11
EM	-	-	12	14	13
FC	13	12	14	12	12
PE	8	7	10	10	9
FL	6	4	7	7	7
ST	7	5	11	11	10
RT	9	8	13	4	14
AI	11	11	5	8	6
CS	2	9	1	6	3
PS	10	10	8	2	2
DM	3	2	6	3	5
WCS	5	6	4	9	8
Originality	12	13	-	-	-

See Figure 2-1 for explanation of dimensions

Spearman's Rho	r_s	r_s^2	Sig (t-test)
AC AFAL vs AC ASD	.862	.743	.000
AC AFAL vs 81 AFWAL	.681	.464	.005
AC ASD vs 81 ASD	.928	.861	.000
81 AFWAL vs 81 ASD	.922	.850	.000

The only notable exception to this is in the comparison of the 1973 and 1981 ASD ranking of Problem Solving, which rose from tenth place to second. No explanation for this is apparent.

Factor Analysis. A factor analysis (Varimax rotation with Kaiser normalization, as with Komar and Wise) of both sets of 14 dimensions (assessment center ratings with the 1981 sample and the 1981 ratings) was accomplished to identify any underlying factors and to compare the Komar and Wise factor analysis, Table 4-10.

The analysis of the 14 assessment center ratings (1981 sample group) resulted in the identification of three factors with eigenvalues of 7.71, 1.19, and 1.07. Results are shown on Table 4-11. Factor I was comprised of Leadership, Energy, Forcefulness, Persuasiveness, and Flexibility. This equates to the first factor of Komar and Wise and is referred to as interpersonal skills. Factor II includes Risk Taking, Acquiring Information, Organizing Skills, Problem Solving, and Decision Making. This is again consistent to the second factor in Komar and Wise and may be referred to as administrative skills. The third factor was determined by Oral Communications Skills. Stress Tolerance contributed to factors I and III while Written Communications Skills contributed to factors II and III. Empathy made no significant contribution to any of the factors.

Table 4-12 reflects the factor analysis of the 14 1981 dimensions. The analysis originally listed two factors

TABLE 4-10

FACTOR ANALYSIS RESULTS: LOADING AFTER VARIMAX ROTATION
ASSESSMENT CENTER DATA, KOMAR AND WISE

Dimension	Factor I	Factor II	Factor III
OCS	.517	.514	.052
L	.840	.335	.127
EN	.893	.189	.014
EM	.068	.062	.945
FO	.387	.235	.022
PE	.657	.482	.197
FL	.584	.354	.403
CF	.291	.582	.170
RT	.492	.463	.256
AI	.287	.666	.251
CS	.463	.743	.007
PS	.301	.798	.173
DM	.375	.722	.165
WCS	.052	.766	.154

Variance explained by the three factors: 69.1%

See Figure 2-1 for explanation of dimensions

Source: Komar and Wise, 1980

TABLE 4-11

FACTOR ANALYSIS RESULTS: LOADING AFTER VARIMAX ROTATION
ASSESSMENT CENTER DATA, 1981 SAMPLE

Dimension	Factor I	Factor II	Factor III
CCS	.528	.127	.635
L	.797	.339	.224
EN	.780	.308	.093
EM	.020	.110	.369
FC	.840	.270	.247
PE	.526	.445	.404
FL	.609	.442	.397
ST	.382	.302	.468
RT	.457	.531	.056
AI	.243	.650	.260
OS	.330	.673	.425
PS	.238	.834	.268
DK	.448	.751	.193
WCC	.186	.408	.401

Variance explained by the three factors: 71.2%

See Figure 2-1 for explanation of dimensions

TABLE 4-12

FACTOR ANALYSIS RESULTS: LOADING AFTER VARIMAX ROTATION
SUPERVISORY DATA, 1981 SAMPLE

Dimension	Factor I	Factor II	Factor III
CCS	.434	.413	.172
L	.400	.543	.459
EN	.212	.321	.557
EM	.128	.618	.153
FC	.602	.222	.410
PE	.368	.540	.239
TL	.073	.570	.246
CT	.261	.525	.449
RT	.389	.195	.693
AI	.755	.132	.255
CS	.634	.281	.112
PS	.778	.169	.332
DM	.634	.303	.360
WCS	.399	.480	-.005

Variance explained by the three factors: 63.7%

See Figure 2-1 for explanation of dimensions

as having eigenvalues greater than one. In order to be consistent with the other factor analyses, the output was forced to three factors with eigenvalues of 6.62, 1.32, and 0.98. Factor I consists of Forcefulness, Acquiring Information, Organizing Skills, Problem Solving, and Decision Making. This compares favorably to the second factor in the other analyses. Factor II consists of Leadership, Empathy, Persuasiveness, Flexibility, and Stress Tolerance. This compares favorably to the first factor of the analyses using assessment center dimension data. The third factor includes Energy and Risk Taking. Oral Communications Skills and Written Communications Skills contribute to both the first and second factors.

Predictive Validity

The predictive validity consisted of a computation of the correlation coefficients of the overall assessment center rating and the 14 assessment center dimension ratings with the 14 1981 dimension ratings and the two overall ratings used as criteria measuring managerial success. In addition, stepwise multiple regression analyses were accomplished between the overall assessment center ratings and between the 14 assessment center dimensions and the two 1981 overall ratings.

Table 4-13 reflects a matrix of correlation coefficients of all involved variables. The overall ratings for 1981 had very low correlation coefficients with the assessment center overall rating (.002 with OVER1 and -.019 with OVER2).

TABLE 4-13
CORRELATIONS AMONG OVERALL AND DIMENSION RATINGS
ASSESSMENT CENTER DATA (1981 SAMPLE) VS 1981 DATA
(N=67)

Dimensions	1981 Ratings															
	OVER1	OVER2	OCS	L	EN	EM	FO	PE	FL ^a	ST	RT	AI	OS	PS	DM	WCS
OVERAC	.002	-.019	.31*	-.00	.22*	-.10	.02	.06	.05	.13	.05	.13	-.03	.00	-.03	.04
WCS	.08	.11	.31*	.20	.26*	-.02	.24	.14	.14	.20*	.12	.24	.11	.24*	.13	.14
L	-.01	-.08	.23*	-.07	.24*	.10	.03	.05	.06	.10	.06	.07	-.05	-.03	-.02	.02
EN	-.04	-.07	.28*	.05	.31*	-.03	.11	-.04	.11	.10	.12	.10	-.16	.01	.02	.08
EM	-.01	-.16	-.07	-.11	.05	-.02	-.12	-.13	-.17	-.01	-.11	-.01	-.01	-.14	.04	.00
FO	-.06	-.07	.22*	.03	.25*	-.03	.16	-.02	.05	.11	.10	.08	-.06	-.06	-.09	.02
PE	.01	-.04	.30*	.12	.24	-.13	.15	.09	.06	.09	.15	-.14	-.01	.11	.01	.13
FL	.07	-.03	.34*	-.04	.20	-.08	.08	.12	-.01	.09	-.01	.07	-.08	-.01	.07	.11
ST	-.05	-.06	.12	.05	.03	-.08	.06	-.01	-.16	.01	.02	.19	.09	.06	.06	.20
RT	-.01	-.09	.12	-.05	.16	.04	-.05	-.04	.01	.01	.01	-.05	-.12	-.20*	-.09	.00
AI	.17	.11	.31*	.12	.09	-.04	.05	.10	.09	.09	.12	.17	.03	.09	.17	.13
OS	.07	.04	.18	.02	.13	-.06	.08	.05	.04	.14	.11	.22*	.11	.08	.09	.11
PS	.10	.06	.22*	-.01	.21	-.06	.10	.11	.03	.12	.09	.23*	.19	.13	.12	.08
DM	.07	.06	.19	-.01	.27*	-.17	.07	.01	-.01	.12	.12	.15	.19	.05	.01	.12
WCS	.14	.27*	.21*	.23*	.43*	.07	.11	.14	.12	.27*	.26*	.24*	.24*	.17	.11	.19

a: II=66

See Figure 2-1 for explanation of dimensions

Significance: $p > .05$ except as noted

* $.01 < p \leq .05$

** $p \leq .01$

The significance of these correlations greatly exceeded the .05 level and, in fact, can be considered chance occurrences.

The only 1981 dimensions which showed fairly consistent correlations with the assessment center data were Oral Communications Skills and Energy. In a like manner, the assessment center dimensions Oral Communications Skills and Written Communications Skills correlated significantly (at less than the .05 level) with many of the 1981 dimension and overall ratings.

Overall, the predictive validity results in this research effort compare very poorly with the Komar and Wise results (shown on Table 2-3) and with those results shown on Table 2-4.

Multiple regressions between the 1981 supervisory ratings and assessment center data were run to ascertain if any predictive validity may be realized. Table 4-14 reflects the multiple regression of the 14 assessment center dimension ratings and the CVER1 rating. The inclusion of additional variables beyond those listed resulted in no greater than a .02 increase in R^2 for any one variable. In addition, inclusion of additional variables caused a further inflation of the significance (i.e., a degradation) of the equation, therefore, analysis was terminated.

Table 4-15 reflects the multiple regression of the 14 assessment center dimension ratings and the 1981 CVER2 rating. As can be seen, although statistically significant,

the four variables included (Written Communications Skills, Empathy, Forcefulness, and Oral Communications Skills) only account for 21.7% of the variation of the overall rating used. The inclusion of additional variables (beyond these four) in the equation did not add to the R^2 value more than .000 for any one variable. Empathy and Forcefulness correlated with the OVER2 rating negatively (thus, the negative Beta weights) and Written Communications Skills had the highest single simple correlation with the OVER2 rating (Table 4-13). This equation represents the best predictive results of this study (for ASD and the labs combined).

TABLE 4-14
MULTIPLE REGRESSION OF ASSESSMENT CENTER
DIMENSION RATINGS (1981 SAMPLE) ON OVER1 RATING

Variable	R^2	R^2 Increase	B Weight	Overall F	Sig of F
AI	.03	----	.123	1.94	.169
Constant			2.635		

The multiple regression between the 14 1981 dimensions and the overall assessment center rating (OVERAC) is shown in Table 4-16. The four variables included (Oral Communications Skills, Empathy, Energy, and Forcefulness) account for only 20% of the variance of OVERAC, but are statistically significant. Inclusion of additional variables beyond these four did not increase the R^2 value any more than .04 for any

single variable. Oral Communications Skills and Energy had the highest simple correlations with OVERAC. The usefulness of using one predictor variable to explain four criteria variables is limited.

TABLE 4-15
MULTIPLE REGRESSION OF ASSESSMENT CENTER DIMENSION
RATINGS (1981 SAMPLE) ON OVER2 RATING

Variable	R ²	R ² Increase	B Weight	Overall F	Sig of F
WCS	.074	---	.917	5.03	.029
EM	.139	.065	-.935	4.99	.010
FC	.134	.045	-.730	4.58	.006
OCS	.217	.033	.706	4.17	.005
Constant			9.869		

TABLE 4-16
MULTIPLE REGRESSION OF 1981 DIMENSION
RATINGS ON OVERAC RATING

Variable	R ²	R ² Increase	B Weight	Overall F	Sig of F
OCS	.09	---	.398	6.51	.013
EM	.13	.04	-.212	4.49	.015
EN	.15	.02	.314	3.67	.017
FC	.20	.05	-.266	3.67	.010
Constant			1.805		

A final criterion of managerial effectiveness used

was MEANDIM, the sum of the 14 1981 dimension ratings divided by 14. This in effect is a composite of the 14 dimensions and gives no regard to the relative weighting of the dimensions. A simple correlation of MEANDIM with the overall assessment center rating, OVERAC, resulted in a correlation coefficient of .08 at a significance level of .28. This is consistent with the poor results found with the other 1981 overall ratings and consistent given the poor simple correlations between OVERAC and the individual 14 1981 dimensions.

Subgroup Data

Numerous subsets of the 67 assessee sample group were statistically analyzed to determine if there were any significant results. Those results of note are presented here.

Military/Civilian Supervisors. The most significant correlation between overall ratings was found within the group of assessees with military supervisors (N=19). In a comparison of OVERAC, the overall 1981 rating, a correlation of $-.40$ was achieved, representing a significance of .045. This could be considered to be a good result were it not for the fact that it is a negative coefficient. This implies that military supervisors rate their personnel opposite from that of the assessment center. For example, if the assessment center rated an individual poorly, these results indicate that chances are that this individual's military supervisor would rate him highly. The correlation of the same variables considering only those assessees with civilian supervisors

(N=48) resulted in insignificant findings. The coefficient was .16 with a significance of .154.

AFWAL/ASD. The most significant results of this study occurred between the subgroup of AFWAL assessees (N=37). A correlation analysis between OVERAC, the overall assessment center rating, and OVER2, the overall rating with respect to peers, was accomplished in each of the organization subgroups. The AFWAL correlation coefficient was .57 for a significance of .035. This implies that within the AFWAL laboratory complex, the assessment center is a valid predictor of managerial effectiveness.

The correlation coefficient between OVERAC and OVER2 within ASD organizations was again significant at the .043 level. However, the coefficient, $-.24$, implies that the assessment center predicts the opposite managerial effectiveness from that which the assessee ultimately achieves (based on the current supervisor's rating). This is not unlike those results found with the military rater subgroup. A comparison of Fisher's Z test (Guilford and Fruchter, 1973) revealed that these groups are significantly different at less than the .02 level.

The correlation between OVERAC and the absolute 1981 overall rating, OVER1, was insignificant for both AFWAL ($r=.22$, $\text{sig}=.146$) and ASD ($r=-.22$, $\text{sig}=.092$). Once again, though, the ASD value was negative implying reverse prediction for the assessment center overall predictor variable.

In that these overall predictive validity results were confounded by the extreme ratings in opposite directions, a discriminant analysis was accomplished using AFWAL and ASD as the groups to be distinguished. The first analysis was done using the 14 assessment center dimensions. Results of this analysis are shown in Table 4-17. Persuasiveness, Risk Taking, and Written Communications Skills were the variables entered which had the best discriminative powers. Persuasiveness was more important to identifying ASD while Risk Taking and Written Communications Skills were important to identifying AFWAL. Given the significance of the discriminant function (.076) and Box's M equality test (.002), there was no significant difference between the two groups.

Table 4-18 shows the results of analysis using the 1981 dimension ratings. Dimensions considered significant were Energy, Empathy, Flexibility, and Problem Solving. Dimensions important to the identification of AFWAL were Energy and Flexibility. Dimensions important to identification of ASD were Empathy and Problem Solving. The significance of the discriminant function (.0007) and Box's M equality test (.084) leads to the conclusion that these two groups are significantly different.

Summary

An analysis of the data resulting from the interview/questionnaire package was accomplished. The relationship of the data to the Komar and Wise and assessment center

TABLE 4-17

DISCRIMINANT ANALYSIS USING ASSESSMENT CENTER DIMENSIONS

Variable	Classification Functions		Discriminant Function
	AFWAL	ASD	
PE	1.31	1.72	.515
RT	3.02	2.45	-.705
WGS	3.74	3.13	-.733
Constant	-15.27	-12.47	
Significance			
	Discriminant Function		.076
	Box's M Equality Test		.002

TABLE 4-18

DISCRIMINANT ANALYSIS USING 1981 DIMENSIONS

Variable	Classification Functions		Discriminant Function
	AFWAL	ASD	
EN	5.58	4.21	-.928
EM	2.52	3.63	.373
FL	1.57	1.09	-.429
PS	1.40	3.25	.650
Constant	-25.60	-25.75	
Significance			
	Discriminant Function		.007
	Box's M Equality Test		.084

population was determined and the internal validity of the data was examined. The predictive validity of the assessment center using interview/questionnaire criteria was determined. Finally, an analysis of predictive validity for the ASD and AFMAL subgroups was accomplished. The final chapter of this study presents conclusions and recommendations based on the results of this and prior chapters.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Summary

Assessment centers have been used successfully in government and industry. Success in a given environment is dependent on the ability of an assessment center to accurately predict that which it is designed to predict. It must have predictive validity.

The 1974-1975 assessment center at ASD was designed to predict managerial effectiveness in supervisory positions in ASD and AFWAL. A study by Komar and Wise utilized a subset of the assessment center population and concluded, based on analysis of certain criteria, that the assessment center does have predictive validity, albeit at a moderate level.

This research also studied a subset of the 1974-1975 assessment center population in an attempt to better define the predictive validity. Alternate criteria of managerial effectiveness were used in this study. A subgroup analysis was included based on the organization to which the 67 assess-ees belonged (either AFWAL or ASD).

Conclusions

Based on an analysis of criteria for managerial success and a study of the work environment, the criteria selected in this study appear valid.

The results indicate that the sample of this study

is very similar to the Komar and Wise sample. Also, the comparison of the underlying dimensionality (factor analysis) of the 1981 supervisory ratings and the 1975 assessors' ratings show very similar patterns for conceptualizing the work environment. The results of this study, therefore, should compare favorably with the Komar and Wise study.

Given valid criteria and a representative sample, the results of this study do not support the predictive validity of the 1974-1975 assessment center. The correlations between the assessment center rating and the two 1981 overall effectiveness ratings were not significantly different than zero. Results indicate, however, that if its use was limited to the prediction of managerial effectiveness in AFWAL, then the assessment does have predictive validity at a greater level than that indicated by Komar and Wise. No apparent reason is evident as to the reason the assessment center predicts success in the AFWAL environment and not in the ASD environment.

Several possible overall conclusions are offered:

1. If this study -- criteria, sample, analysis, methodology -- is accepted, then the Komar and Wise criteria must be judged invalid and the predictive validity of the assessment center left undemonstrated.
2. Both sets of criteria may be accepted and the conclusion drawn that the assessment center

possesses predictive validity only for the AFVAL job environment.

3. This study, specifically the criteria used, may be judged or demonstrated to be flawed. Any significant results (positive or negative) found here might be considered to have been achieved randomly. The assessment center then would continue to be judged as having predictive validity.

As a final conclusion, in that comparisons of results within this study and between Komar and Wise results and this study are marginally conclusive and confusing, further research appears to be, not only apparent, but necessary.

Recommendations

Given the disparity between results of this research effort and that of Komar and Wise it is apparent that further study of the assessment center and criteria for managerial success is warranted. The following recommendations may be considered for further investigation:

1. Investigate the validity of the overall rating criteria used in this study through the use of a comparison with merit appraisal ratings.
2. Interviews with supervisor-raters who were also assessees revealed that it was possible that information on how to do well in, or

game, the assessment center was passed on from past assessees to those slated to go. A time trend analysis of assessment center results (both overall and the individual dimensions) may be investigated to ascertain if rating inflation exists.

3. Another criterion which may be utilized to test the validity of the assessment center is the time interval in promotions of assessees, i.e., time to promotion from the completion of the assessment center or time between subsequent promotions. This is as differentiated from the Komar and Wise study which used only the number of promotions as a criterion.
4. The validity of criteria may be tested in a comparison of results using the Komar and Wise criteria and those results using criteria from this study. This should be limited to the 67 assessees used in this study in that data is most readily available for these subjects.
5. Given the readily apparent difference in predictive validity between ASD and AFVAL

in this study, a similar analysis of Komar and Wise data is warranted. An analysis of the four Komar and Wise criteria within ASD and AFVAL should be accomplished and the results compared to those results found in this study.

APPENDICES

APPENDIX A
INTERVIEW/QUESTIONNAIRE

The following questions refer to the 1974-1975 Assessment Center and your subordinate, _____, who participated in it:

1. How long has he worked for you?
2. Have you worked with him prior to this present job?
3. How many professional subordinates (non-administrative) is he responsible for supervising?
How many of these are matrixed out to other organizations?
4. Is this person responsible for an annual budget? If so, on the average, how much is he responsible for?
5. Did you participate in the 1974-1975 Assessment Center? If so, were you an assessor or an assessee?
6. Would you like to see the Assessment Center reinstituted as an aid to the selection process?
7. Would you like to see any other procedure utilized to aid in the selection process? If so, do you have any specific suggestions?

FOR RESEARCH USE ONLY

Mark Appropriate Response

OVERALL EFFECTIVENESS

In this person's present job, how would you rate his overall effectiveness or success in that job?

SUPERIOR: Is an outstanding supervisor/manager. This person and, due to his supervision, those working for him consistently make important contributions to the overall ASD/AFWAL mission. Displays high technical and managerial competence in all important skill/knowledge areas. This person could serve as the nearly perfect model of a supervisor/manager for the organization.

EXCELLENT: Is a very fine supervisor/manager. This person and, due to his supervision, those working for him make important contributions to the overall ASD/AFWAL mission. Displays technical and managerial competence in the important skill/knowledge areas. One of the very valuable supervisors/managers in the organization.

FULLY SUCCESSFUL: Is an adequate supervisor/manager. This person and, due to his supervision, those working for him do solid work for the organization with the expected strengths and weaknesses. Displays good skills/knowledge in some areas, is working on some, and has some weaknesses. This person might be considered the typical supervisor/manager with some

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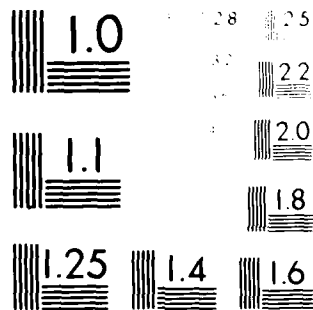
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FOR RESEARCH USE ONLY

Mark Appropriate Response

OVERALL EFFECTIVENESS (cont)

good and some not so good characteristics who clearly does an acceptable job.

MINIMALLY SUCCESSFUL: Is an acceptable, but sometimes marginal supervisor/manager. This person and, due to his supervision, those working for him at times do very good work but there are sometimes serious weaknesses. This person has some good skills/knowledges but needs to work on some important areas. This person might be considered a supervisor/manager who requires monitoring and occasional help by higher management but who can do acceptable work with such help.

UNSUCCESSFUL: Is a marginal performer as a supervisor/manager. This person and, due to his supervision, those working for him are often a source of concern for higher management. Acceptable work is at times produced, but this person is clearly lacking in some important skill/knowledge areas. This person is a supervisor/manager about which some action will probably be taken--transfer, training, special assignments, or others.

Briefly describe/highlight an incident in which the subject was most effective in his present job:

Briefly describe/highlight an incident in which the subject was least effective in his present job:

FOR RESEARCH USE ONLY

Compared to his peers, how would you rate him with respect to overall effectiveness on the following scale?

LOWER 25%	MIDDLE 50%	UPPER 15%	TOP 10%

Mark approximate area of placement of this individual.

FOR RESEARCH USE ONLY
Circle Appropriate Response

Oral Communications Skills

1 1 1 1 1
Poor Fair Good Excellent Outstanding

Leadership

1 1 1 1 1
Poor Fair Good Excellent Outstanding

Energy

1 1 1 1 1
Poor Fair Good Excellent Outstanding

Forcefulness

1 1 1 1 1
Poor Fair Good Excellent Outstanding

Persuasiveness

1 1 1 1 1
Poor Fair Good Excellent Outstanding

FOR RESEARCH USE ONLY
Circle Appropriate Response

Flexibility

1 1 1 1 1
Poor Fair Good Excellent Outstanding

Empathy

1 1 1 1 1
Poor Fair Good Excellent Outstanding

Stress Tolerance

1 1 1 1 1
Poor Fair Good Excellent Outstanding

Risk Taking

1 1 1 1 1
Poor Fair Good Excellent Outstanding

Acquiring Information

1 1 1 1 1
Poor Fair Good Excellent Outstanding

FOR RESEARCH USE ONLY
Circle Appropriate Response

Organizing Skills

1 1 1 1 1
Poor Fair Good Excellent Outstanding

Problem Solving

1 1 1 1 1
Poor Fair Good Excellent Outstanding

Decision Making

1 1 1 1 1
Poor Fair Good Excellent Outstanding

Written Communications Skills

1 1 1 1 1
Poor Fair Good Excellent Outstanding

ORAL COMMUNICATION SKILLS: How effective is this individual in expressing ideas orally? Are presentations logical and well organized?

Additional points to consider:

- Volume and projection
- Voice clarity and articulation
- Voice tone-pleasant and enthusiastic or monotone?
- Eye contact, gestures, and facial expressions
- Use of notes
- Distracting habits
- Organization

Note: Vocabulary and formal correctness are not critical unless they distract from the message being communicated.

LEADERSHIP: To what extent is this individual able to get others to work together as a group in accomplishing a task?

Additional points to consider:

- Attempts to lead. It is better to attempt to lead and fail than to never even attempt to lead.
- Effectiveness in coping with dissension and bringing about compromises.
- Appropriateness of leadership style.
- Success in gaining group support.

ENERGY: To what extent does this individual maintain a high level of activity? How much does this individual participate in activities?

Additional points to consider:

- Verbal inputs
- Note taking
- Consider the level of activity. Do not be concerned with the impact of the activity on the group.

FORCEFULNESS: To what extent is this individual able to command attention from others? Is this individual's presence felt by others? Is there any attempt to actively seek attention rather than passively react to events as they occur?

Additional points to consider:

- Aggressiveness
- Gaining attention and reaction
- Self confidence
- Display of initiative

Note: The difference between Leadership and Forcefulness is that while an individual may be forceful, i.e., able to command attention, this individual may not be effective in leading others to accomplish a task.

PERSUASIVENESS: To what extent is this individual able to sell his/her point of view and counter objections from others?

Additional points to consider:

- Attempts to sell ideas. The fact that a person tries is worth more than if they did not even try.
- Success in selling ideas
- Is this individual convincing?

Note: The difference between Leadership and Persuasiveness is that an individual may be able to sell ideas to others, but ineffective in bringing others together to accomplish the whole task.

FLEXIBILITY: To what extent can this individual adjust to new situations easily?

Additional points to consider:

- Reaction to new information
- Variation in behavior and style with different people
- Willingness to compromise
- Variation in tactics
- Acceptance of other's ideas
- Ability to change roles (e.g., from leader to follower)

EMPATHY: To what extent does this individual show concern for others?

Additional points to consider:

- Sensitivity or awareness of others' feelings
- Respect while others are speaking
- Do others feel comfortable around this individual?

STRESS TOLERANCE: To what extent does this individual exhibit stability of performance under pressure, opposition, or other difficult conditions?

Additional points to consider:

- Poise
- Display of nervousness or irritation
- Change in speech or behavior

RISK TAKING: To what extent is this individual willing to risk negative consequences in order to achieve objectives?

Additional points to consider:

- Willingness to state a position or take a stand
- Willingness to make a decision based on limited information
- Willingness to take an unpopular position
- Willingness to assume responsibility

ACQUIRING INFORMATION: To what extent is this individual able to obtain information

Additional points to consider:

- Number of questions asked
- How aggressive is questioning?
- Is questioning adjusted to data received in answers to previous questions?
- How much information is obtained?
- Follows through on questions
- Ability to determine what information is needed

ORGANIZING SKILLS: To what extent does this individual plan and organize his/her activities and those of others?

Additional points to consider:

- Are oral and written reports logical and understandable?
- is use of time efficient?
- Does the individual set goals and work toward them?
- Are activities structured?
- Are priorities assigned to different activities?

PROBLEM SOLVING: To what extent can this individual identify problems and find solutions?

Additional points to consider:

- Ability to sift out significant information or important facets of a problem and disregard nonessentials.
- Ability to size up a situation quickly, including the people involved.
- Are alternative solutions identified and examined?
- Amount of participation in group problem solving situations.

DECISION MAKING: To what extent can this individual make decisions based on sound rationale?

Additional points to consider:

Ability to determine key issues

Is decision making process logical and methodical?

Are all inputs considered?

WRITTEN COMMUNICATIONS SKILLS: To what extent can this individual effectively express ideas in a well organized, grammatically correct written form?

Additional points to consider:

Are sentences and paragraphs well structured?

Are reports easy to read and understand?

Are reports clear and concise, or are excess words used?

Handwriting should not be a factor unless it distracts from the message

Do reports have an introduction, main points, and conclusions (when required)?

FOR RESEARCH USE ONLY

In reference to the job this individual currently occupies, please rate the importance of the following managerial dimensions with respect to the effective completion of that job:

Use the following rating scale:

Critically Important	5
Somewhat Important	4
Usually Helpful	3
Somewhat Unimportant	2
Not Necessary	1

- _____ Oral Communications Skills
- _____ Leadership
- _____ Energy
- _____ Forcefulness
- _____ Persuasiveness
- _____ Flexibility
- _____ Empathy
- _____ Stress Tolerance
- _____ Risk Taking
- _____ Acquiring Information
- _____ Organizing Skills
- _____ Problem Solving
- _____ Decision Making
- _____ Written Communications Skills

If required, refer back to the questionnaire for the definitions of these dimensions.

APPENDIX B
DEMOGRAPHIC DATA

DEMOGRAPHIC DATA

Some data was collected and, subsequently, not used in the achievement of the thesis objectives. It was felt that this data may still be of interest and is included here.

Subordinates. The number of professional subordinates for whom the assessees were responsible for direct supervision was obtained in the interview. The range in number of subordinates was 0 to 46 with a mean number of 9.5 and a standard deviation of 9.6 subordinates. Only nine of those assessees had no subordinates. These were usually technical specialists or program managers.

Supervisory Time. During the interview, the supervisors were asked how long they had been supervisors of the assessees (as distinguished from being a coworker). This time ranged from a low of approximately 2 months to a high of 20 years. The mean time was 2.9 years with a standard deviation of 3.5 years.

Budget Responsibility. The amount of budget any given assessee was responsible for was also obtained from the interview. Overall, this amount ranged from \$0 to a high of \$2 billion with a mean of \$50.1 million and standard deviation of \$271.3 million. However, these figures are slightly misleading in that 42 of the assessees had no (\$0) budget responsibility. Taking only the 25 who did have a budget responsibility, the amount ranged from \$400 thousand to \$2 billion with a new mean of \$134.2 million.

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BIOGRAPHICAL SKETCH OF THE AUTHOR

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