



A STUDY OF CAREER  
PATTERNS OF MANAGERS IN A DEVELOPMENT LABORATORY

by

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## ABSTRACT

A STUDY OF THE CAREER PATTERNS OF MANAGERS  
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by Donald J. Gavis

The field of management selection and development has considered many approaches to the problem of identifying and increasing managerial potential.

The purpose of this study was to determine if there was a linear relationship between institutional factors and a manager's potential. The institutional factors which were studied were: areas of managerial assignment, managerial responsibilities, and time spent reaching different managerial levels of the organization.

The study was conducted in a large electronic computer company. The managers were selected from the Development Laboratory of this company, and the data on these factors was obtained by interviewing a total of 58 senior managers.

By use of the Linear Discriminant Function, it was possible to show a significant difference between two groups of managers with different potential ratings. In addition, institutional factors in the areas of managerial assignment, management responsibility, and time in reaching the senior level of management were identified as being the largest contributors to the differences between the groups.

Thesis Advisor: Paul A. Pigors

Title: Professor of Industrial Relations

May 14, 1965

Professor William C. Greene  
Secretary of the Faculty  
Massachusetts Institute of Technology  
Cambridge, Massachusetts 02139

Dear Professor Greene:

In accordance with the requirements for graduation, I herewith submit a thesis entitled "A Study of the Career Patterns of Managers in a Development Laboratory".

I want to express my appreciation for the advice and assistance of Professor Paul A. Pigors, Chairman of my thesis committee and Mr. Barnard E. Smith, member of the committee. Their guidance was most helpful.

Secondly, I want to thank Mr. Paul DeBaldo for his unstinting efforts in my behalf in the obtaining of the data for this study.

Finally, I am indebted to those managers who were selected and who furnished the data for this thesis for their time and effort in responding to my questionnaire.

Sincerely yours,

Signature Redacted

✓  
Donald J. Gavis

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## CHAPTER I

### PURPOSE, HYPOTHESIS AND BACKGROUND

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#### Purpose

It is the purpose of this study to analyze the career patterns of a selected group of managers in order to determine if there are certain institutional factors which affect potential rating.

The field of management selection and executive development is replete with studies which have investigated and reported success with methods which range from purely qualitative appraisals of the candidate to the method involving testing of the candidate from an intelligence as well as a psychological standpoint.

Whatever the degree of success of these approaches, there has been very little investigation of the institutional factors that the candidates have been exposed to by the company.

It was felt that by an analysis of the career patterns of a group of managers that have been exposed to the institutional factors and have been evaluated by their management as to their executive potential, a statistical basis for these institutional factors could be determined. This is not to be considered as supplanting other methods of evaluation of potential, but only as a means of supplementing these methods.

### Hypothesis

It was proposed that the collective work histories of the individual managers might be identified as being statistically significant to the potential rating.

In particular, it was hypothesized that the duration of occupancy of specific job positions and responsibilities as well as time spent in different supervisory levels would combine in a linear manner to provide a means to indicate a significant difference between groups of managers with different potential ratings.

It was deemed unlikely that all of the experiences would provide a positive contribution to a high potential rating. It was further assumed that the organization possessed some unattractive managerial assignments, and to these it was hypothesized that the managers with the high potential rating would either not hold these or hold them for shorter durations.

It was further considered that these differences in career patterns could be used as a basis for a change in career development for other managers.

Another aspect of this study was that the manager's perception of his present assignment and future goals would also be of benefit.

## Background

The laboratory involved in this study is part of a large corporation whose business is the development, production, and marketing of data processing equipment.

This laboratory's prime mission lies in the area of developing electronic data processing systems and the associated support, i. e., programming, field maintenance procedures, etc.

The laboratory started approximately 20 years ago with a total force of 60 people. By 1958 the population was approximately 2000 people. A considerable part of the growth has occurred in the last six years since today's population is 5600 people.

The requirements of developing these complex systems has resulted in the partitioning of the management responsibility to relatively small groups. This has caused the need for the number of managers to grow to the present level of 715. Of this total management population, approximately 127 have reached a senior level of management. From this group a selection has been made by their management of the managers that are considered to have potential to be promoted to an executive level of responsibility.

## CHAPTER II

### METHODS AND PROCEDURES

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#### Introduction

In this chapter, the methods of selecting the sample group, collecting the data, and categorization of the data is described.

Following this, a description of the composition of each of the categories is provided.

Lastly, the summary description of the statistical method used in this study and its application in this study is discussed.

### Selection of the Group

As has been mentioned, there are two groups of managers at the Senior level -- those who are presently considered to have executive level potential and the rest of the Senior managers. These will be represented hereafter as Groups A and B, respectively.

The total of the 127 managers included some managers who were in the administrative areas of the laboratory. Since the experience in this area is vastly different than that of the line managers, they have been excluded from this study. This resulted in a total of 103 Senior managers, 58 of whom are the sample population in this study.

These 58 managers were selected by the Management Development Department, and included 100% of Group A which numbered 15 and 43 of Group B. These 58 managers were, at the time of this study, in four organizational areas of the laboratory. The following is the tabulation indicating the total Senior management population and the sample population.

<u>Organizational Area</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Total	18	39	22	24
Sample	9	27	7	15

The separation and identification of Groups A and B was not known by the writer until all interviews, all data collecting, and coding was completed to assure the prevention of any unrecognized bias.

### Data Collection

The collection of the data was conducted in two phases. The data that referred to the managers' ages, promotional progress, and education were obtained from the records of the Personnel Department. The data that pertained to the managers' assignments, responsibilities, and attitudes towards their present assignment and future goals were obtained by personal interviews.

The interviews were centered around the respondent's managerial experience. The interviews usually were free form in nature, but these specific questions relative to their experiences were always covered during the interview. These questions were:

- (1) What managerial positions have you had in this corporation and how long were these positions held?
- (2) What were the specific responsibilities for these positions that you had during the tenure of each assignment?
- (3) Do you believe that your present position represents the best use of your talents and experience from the standpoint of the Corporation?
- (4) Do you believe that your present position is helping you to achieve your long range goals with respect to progress in the field of management?
- (5) What are your long range goals with respect to achievement of higher management levels?



### Categorization of Data

The data from both of these sources was then categorized in the following method:

#### Area Assignment:

1. System Area.
2. Machine Technology.
3. Advance Technology.
4. Programming.
5. Federal Systems.
6. Special Systems.
7. Other.

#### Managerial Responsibility:

1. Development Manager.
2. Planning Manager.
3. Technical Direction.
4. Technical Contribution.
5. Product Engineering Manager.
6. Management Staff.
7. Sales Management.
8. Other.
9. Administration.

### Progression Measurements

1. Age promoted to Senior Level Manager.
2. Elapsed months for promotion to First Level Manager.
3. Elapsed months for promotion to Second Level Manager.
4. Elapsed months for promotion to Senior Level Manager.

### Perception of Present Assignment

### Future Goals in Management Level

### Definition of Categories

#### Area Assignments:

##### A. Systems Area

This area is comprised of all of the respondents who indicated that their assignments dealt with the system design and development of the corporation's regular line of electronic computers. This area has been, and at the time of this study was, responsible for providing the impetus for the complete system that is developed and delivered to customers. This area is responsible for determining the customer requirements, developing the specifications for the system, and then translating these into hardware. They are further required to establish and control all of the schedules, cost estimates, and are looked upon as being the total responsibility

for the systems under development. As a result, this requires the constant attention of the managers as to the action and progress of many of the other areas of the business -- such as Testing, Manufacturing, and Programming -- to ensure that everything that relates to satisfactory performance in the customer's eyes is under control. This necessitates that these managers have a breadth of knowledge and understanding of the corporation's goals and actions that is unequalled in the rest of the corporation.

B. Machine Technology Area

The types of responses that were classified in this area were those that related to activities directed toward unit design of the system components. These would include tape units, memories, and associated activities. Also included in this category are experiences on punched card equipment.

C. Advanced Technology Area

This area is comprised of those respondents who were engaged in design activities at a very early stage in the development

cycle. This would include circuit and component design -- especially those which were undertaken prior to their identification as part of an intended system usage. It also included activities in areas that did not relate to any ultimate usage as part of a system, such as exploring new areas of machine or unit design.

D. Programming

This area included all respondents who indicated any assignment associated with programming either in the laboratory or in the customer environment. All responses were considered equal even though the types of assignments ranged from the use of a programming language through the design of a programming language or system.

E. Federal Systems

These responses were classified as such whenever activity which was directed toward a special bid for the Federal Government, or where a long term contract was involved. These respondents included all aspects of system and unit design and the main identifying characteristic of the grouping was that it did not usually involve the respondent in the corporation's usual frame of activity. All of this experience

is not related to the main stream of effort of the corporation and has in recent years decreased in size and scope drastically in this laboratory's complex. Many of the activities that exist in the System Area (A) are also present in this area; however, a large difference exists in the type of experience gained due to the nature and size of the market which each area serves.

F. Special Systems

This area is comprised of those activities which involve the periphery customer demands that are placed on the Systems Area (A). This area is responsible for special and either unusually small or unusually large modifications to the regular product line. This area relies on the normal product line for all of the basic needs of the system being provided to the customer, and is considered to be only responsible for the modifications or additional components that it adds to the normal products.

G. Other

In the interests of reducing the number of variables being processed, this category was included. It is intended to handle those responses in which the subject was clearly not

in the laboratory environment during some period of his management career or if it was impossible due to organizational changes which have occurred to relate his experience to a meaningful framework in today's technology.

Responsibility Assignments:

A. Development Manager

This classification was assigned whenever the respondent had the total engineering management responsibility for a system, component, or unit which was in the process of a development cycle. This was irrespective of the area in which he was assigned at the time.

B. Planning Manager

This responsibility category was assigned to the respondents who indicated that their responsibilities involved the process of determining market requirements and translating these into objectives or specifications for machine or system functions. These responsibilities could also be discharged in almost all of the preceding areas.

C. Technical Direction

This category denotes any respondent who had as his singular duty the direction of a technical project. These were usually

small in nature and usually occurred when the respondent had on some occasion taken on a staff assignment rather than a managerial one.

D. Technical Contribution

This category is almost identical to Category C with the exception that in this case the responsibilities were such that the respondent could discharge them without having a group under his direction or when he was part of a technical group under someone else's direction.

E. Product Engineering Manager

This assignment included those responsibilities in Engineering that are required after the development cycle has culminated in delivery of the product to customers. It is principally one of liaison with the maintenance area of the corporation and involves minimal engineering activity.

F. Management Staff

This responsibility was assigned to those respondents who were assigned to a staff function at any level of the corporation. The responsibilities were usually those consistent of staff functions and varied by the level of the assignment in the organization and the nature of the manager of that area.

G. Sales Management

This category was assigned to all respondents who at some time in their management career were involved with the point of sales responsibility.

H. Other

This category was used to denote responsibilities in areas that were not in the laboratory and could not be linked to equivalent types of assignments in the laboratory. As an example, some of the respondents had been assigned to a manufacturing area during their management career.

I. Administration

This category includes those respondents who had either the responsibilities which involved the service areas of the laboratory - such as finance or personnel - or also by the nature of the organizational requirement were performing only the administrative management requirements of a technical area some part of their management career.



### Progression Measurements

#### Age Promoted to Senior Level Manager:

This category was selected as opposed to the present age of each manager in order to obtain an indicator of progress. Promotion to the senior level in the laboratory is a significant achievement in a management career, and promotion to this level is much more difficult to achieve than the preceding levels.

#### Elapsed Time (Months) for Promotion to First, Second, and Senior Level Manager:

are the next three categories, and again were used as indicators of progress.

### Perception of Present Assignment

The responses to Questions 3 and 4 were categorized on a Yes or No basis.

### Future Goals of Management

These responses were categorized in the following method which indicates the management level that the respondent desired to achieve:

1. Executive Level.
2. Laboratory Manager Level.
3. System Manager Level.
4. Corporate Staff Assignment.
5. Technical Direction of Small Group.
6. Remain at Present Level.

### Statistical Method

The statistical method used in this study was the Multiple Discriminant Analysis. This technique, while similar to multiple regression, has been designed for use when the dependent variable is dichotomous (such as Yes or No, Group A or B) and the explanatory variables are numerical.

This linear discriminant function was first used by R. S. Fisher<sup>/1</sup> and has since been used in Marketing Studies as well as the field of Behavioral Sciences.

The purpose of this function is to provide the maximum separation of two groups. This is accomplished by maximizing the ratio of the difference between the specific means to the standard deviation within the groups.

In this study, the computations involved in the use of this function were performed using an IBM 1620 and a Users Program entitled "Discriminant Function Analysis (Stepwise) U.S. U. 6". The contributors of this program were Rex L. Hurst and Gwen Wiser of Utah State University.

With this program it was possible to obtain a figure for the two groups which represented the linear combination of all of the variables included in the model. This figure is denoted as  $\bar{Z}$ . The program also provided the

<sup>/1</sup> R. S. Fisher - "Contributions to Mathematical Statistics, 32.184"  
John Wiley and Sons 1950

the ability to determine the significance level of the differences, and also isolated the variables which contributed the least to these differences.

The first step in the process is the establishment of the coefficients and sums of the squares due to the coefficients in order to determine the computed  $\bar{Z}$  values for each group as well as isolating the variable with the least contribution to the differences in  $\bar{Z}$  values.

After establishing the coefficients and sums of the squares for each coefficient with all 20 variables, the model was reduced to include only the nine most significant variables.

These variables were then related to the source data to establish the meaningfulness of considering these variables as a guide to lower level management assignments.

#### Comparison of Perceptions of Present Assignment and Future

Lastly, the data from the questions dealing with the respondent's perception of his present assignment and future management goals was compared for Groups A and B.

## CHAPTER III

### RESULTS OF INSTITUTIONAL FACTORS

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### RESULTS OF INSTITUTIONAL FACTORS

#### Introduction

In this chapter, I will discuss the identification of the variables included in this model and the steps in the statistical analysis showing the group means, coefficients, and significance tests when the model included 20 variables, 9 variables, and 5 variables. An analysis of the most significant five variables is then discussed.

#### Identification of Variables:

The variables included in the statistical model are listed in Table I. The data for Variables 1 - 17 were obtained from the respondents in Questions 1 and 2 as outlined in Chapter II. Variables 18 - 20 were obtained from the Personnel Department.

Variables 1 - 17 are measured in years; Variables 18 - 20 are measured in months.

The tables in Appendices A and B illustrate the data for the 15 respondents in Group A and the 43 respondents in Group B for these variables.

Table I. Identification of Variables.

<u>Variable</u>			<u>Name</u>
1			System Area
2			Machine Technology
3			Advance Technology
4	Area Assigned	-	Programming
5			Federal Systems
6			Special Systems
7			Other
8			Development Manager
9			Planning Manager
10			Technical Direction
11	Technical Contribution		
12	Responsibility Assigned	-	Product Engineering Mgr.
13			Management Staff
14			Sales Management
15			Other
16			Administration
17	Age promoted to Senior Manager		
18	Elapsed time for promotion to First Level Manager		
19	Elapsed time for promotion to Second Level Manager		
20	Elapsed time for promotion to Senior Level Manager		

The first step in the Discriminant Analysis is the computation of the Group Means for each variable. Table II lists the group means for each variable. An examination of the Group Means shows that the two groups are indicating differences in almost every variable.

Table II. Group Means for Each Variable.

<u>Variable</u>	<u>Name</u>	<u>Group A</u>	<u>Group B</u>
1	System Area	4.06	2.26
2	Machine Technology	1.00	0.98
3	Advance Technology	0.13	0.76
4	Programming	0.80	0.88
5	Federal Systems	0.26	1.04
6	Special Systems	0.60	1.32
7	Other (area)	1.06	0.88
8	Development Manager	5.06	4.65
9	Planning Manager	0.00	1.30
10	Technical Direction	0.93	1.23
11	Technical Contribution	0.00	0.51
12	Product Engineering Manager	0.40	0.18
13	Management Staff	0.20	0.28
14	Sales Management	0.13	0.72
15	Other (responsibility)	0.26	0.18
16	Administration	0.93	0.70
17	Age promoted to Senior Manager	33.26	35.40
18	Months to First Level Manager	48.40	53.90
19	Months to Second Level Manager	31.66	24.76
20	Months to Senior Level Manager	21.20	33.09

The next step is the computation of the coefficients and the sums of the squares due to the coefficients for all 20 variables. Table III lists the variables in rank order of importance measured by the size of the sum of the squares (SS) due to the coefficient.

Table III. Ranking of 20 Variables.

<u>Variable Number</u>	<u>Name</u>	<u>Coefficient</u>	<u>Coefficient</u>
14	Sales Management	- 0.1391	1.4152
7	Other (area)	0.1915	0.9994
9	Planning Manager	- 0.0677	0.7328
13	Management Staff	- 0.2266	0.5919
16	Administration	- 0.1495	0.4674
12	Product Engineering Manager	0.2272	0.4258
11	Technical Contribution	- 0.0659	0.3251
1	System Area	0.0775	0.3090
10	Technical Direction	- 0.0484	0.1810
20	Months to Senior Manager	- 0.0046	0.1566
18	Months to First Level Manager	- 0.0017	0.0848
3	Advance Technology	0.0324	0.0613
4	Programming	0.0346	0.0506
15	Other (responsibility)	0.0310	0.0445
17	Age promoted to Senior Manager	- 0.0092	0.0362
8	Development Manager	- 0.0021	0.0170
2	Machine Technology	- 0.0136	0.0148
5	Federal Systems	- 0.0154	0.0135
6	Special Systems	- 0.0073	0.0028
19	Months to Second Level Manager	- 0.0004	0.0009



Based on these coefficients, the  $\bar{Z}$  values for Groups A and B were:

<u>Group A</u>	<u>Group B</u>
- .1074	- .6138

This difference exists with an F ratio of 1.90 with 20 and 37 degrees of freedom. At the 95% level, the F ratio is significant if it is larger than 1.86, and is significant at the 99% level if it is larger than 2.415. It can be seen by the coefficient values and the SS due to the coefficients that many of the variables are not contributing significantly to the differences between the groups. The order of importance lies in the size of the SS due to the coefficient.

#### Results with 9 Variables:

It was desirable from two standpoints to reduce the size of the model -- first, in an attempt to increase the significance level and, secondly, to make the model less cumbersome for management purposes. As a result, elimination of the variables was carried out to a point where the model only included the nine most significant variables.

At this level, the computed  $\bar{Z}$  values were:

<u>Group A</u>	<u>Group B</u>
.2483	- .1975

These  $\bar{Z}$  values were obtained when the F ratio was 4.2, with 9 and 48 degrees of freedom. F is significant at the 1% level if it is larger than 2.8.

Since the new model is only comprised of 9 variables, an entirely new set of coefficients result. Table IV lists - in rank order by the contribution due to the sum of the squares - the variables now present in the model.

Table IV. Ranking of 9 Variables.

<u>Variable</u>	<u>Name</u>	<u>Coefficient</u>	<u>SS due to Coefficient</u>
1	System Area	0.0763	2.1028
14	Sales Management	- 0.1230	1.3296
7	Other (area)	0.1711	1.2079
20	Months to Senior Level Mgr.	- 0.0074	0.6163
9	Planning Manager	- 0.0530	0.6070
13	Management Staff	- 0.1654	0.4748
16	Administration	- 0.1084	0.3592
11	Technical Contribution	- 0.0497	0.3294
12	Product Engineering Mgr.	0.1579	0.3188

It is here that a closer look at the variables which remain in the model is taken.

#### Discussion of Most Important Variables

##### System Area:

The largest contributor to the differences between Groups A and B is the System Area (Variable 1). As the

System Area was described in Chapter I, the managers in it have been exposed to broader responsibilities than any other area in the laboratory. It is also evident that in looking at Group A, 11 out of the 15 (or 73%) in the group have been in the system area as opposed to 21 out of 43 (or 49%) in Group B.

The total years and group means for this variable also differ significantly. The data for this variable shows Group A having been assigned to the system area for a total of 56 years and a group mean of 4.0 years. This differs significantly from Group B since they have been assigned to the system area for a total of 97 years with a group mean of 2.2 years.

#### Sales Management:

The second variable to be examined is the Sales Management responsibility (Variable 14). This variable, by virtue of the minus sign, indicates that having the responsibility is adverse to being a member of Group A. (This is true of all the variables whose coefficients are negative.) Again the source data illustrates the importance of Variable 14. Group A has one respondent out of 15 (or 7%) for a total of 2 years and a group mean of .13. Group B, however, has 7 respondents out of 43 (or 16%) for a total of 35 years and a group mean of .72.

In retrospect, the variable of Sales Management can be seen as a detriment to belonging to Group A. The overall managerial requirements in a technically oriented laboratory do not lend themselves to be satisfied by a person who has, by nature of his experience, been in the Sales part of the corporation.

Other:

This variable is the most difficult to relate to the world of the laboratory. Intended originally as a means of consolidating extraneous responses, it became one of the most significant. The differences in the two groups are only slight on the surface, 26% of Group A have had this exposure for a total of 16 years and a group mean of 1.06 years. This is compared to Group B's exposure of 20% for a total of 29 years and a group mean of 0.88 years.

In reviewing the assignments of the individuals that were categorized as "Other", it was found that many of these were very similar to those in the System Area (Variable 1). They differed usually in the fact that they were involved with the System Area but not assigned to this area. Such assignments as Testing, Customer Engineering, and System Analysis are frequently exposed to the same broad aspects of the Company as the System Area.

Elapsed Time for Promotion to Senior Level Manager:

Variable 20, which is the number of months that each respondent experienced between promotion to second level manager and promotion to senior level manager, is the next variable of importance. The model indicates a negative coefficient for this variable, showing that the longer the respondent takes to make this step the less likely he will be a member of Group A. The means for Group A and Group B for this variable are 21 months and 33 months respectively. In addition, the range for Group A is 5 to 59 months, while the same parameter for Group B is 9 to 80 months.

When considering this variable, it should be known that promotion to the senior level is usually accompanied by a more stringent review of the candidate. These reviews are usually established by the Personnel Department, but in some cases an informal type of peer evaluation is conducted. This further review has the effect in many cases of delaying the promotion of some managers. Many times these managers would be proposed for promotion repeatedly before this hurdle was cleared. The degree of difficulty each candidate experienced appears to be related to his managerial potential.

### Planning Manager:

The responsibility of Planning Manager is the next variable (9), and is clearly a negative coefficient for the obvious reason that Group A does not include any respondent who ever had the responsibility -- whereas Group B had 15 respondents (or 35%) with a total of 70 years and a group mean of 1.3 years. As outlined in Chapter II, the respondents who have had this responsibility have, in the main, either come from the Sales part of the corporation or have started their careers in the planning function without any other experience in the engineering field.

### Discussion of Least Important Variables

The remaining variables in the model at this time are Management Staff, Administration, Technical Contribution, and Product Engineering Manager. These all contribute very little to the differentiation of the group. The sums of the squares are all at least 4 times smaller than the System Area.

These variables are all in the management responsibility category and, when the model is considering only two areas of assignment, the importance of the management responsibility is diminished.

Results with 5 Variables:

The model was then run with only five variables, 1, 14, 7, 20, and 9, and produced the following results:

Table V. Ranking of 5 Variables.

<u>Variable Number</u>	<u>Name</u>	<u>Coefficient</u>	<u>SS due to Coefficient</u>
1	System Area	0.0704	1.8591
14	Sales Management	-0.1158	1.3298
7	Other (area)	0.0967	1.1111
20	Elapsed time for promotion to Senior Level Manager	-0.0080	0.7848
9	Planning Manager	-0.0479	0.5175

The rank order for these variables is still consistent with that found with the preceding ranking. At this time, the computed  $\bar{Z}$  values are:

<u>Group A</u>	<u>Group B</u>
0.2038	- 0.1670

These variables resulted with an F ratio of 6.13 with 5 and 52 degrees of freedom. F is significant at the 1% level when it exceeds 3.9 with these degrees of freedom.

### Summary

As the preceding has shown, there is a significant difference between the two groups at almost all levels of significance regardless of the number of variables considered.

The variables which contributed the most to this difference lie in all three of the groupings of the total of 20 variables. Area assignments in the "System" and "Other (area)" categories have positive correlation to belonging to Group A. The Responsibility assignments of "Planning Manager" and "Sales Management" have a negative correlation to belonging to Group A. Lastly, the longer the time period experienced between promotion from second level manager to senior level manager has a negative correlation to belonging to Group A.



## CHAPTER IV

# MANAGERS PERCEPTIONS OF PRESENT ASSIGNMENTS AND FUTURE GOALS

CHAPTER IV  
 MANAGER'S PERCEPTION OF PRESENT ASSIGNMENTS  
 AND FUTURE GOALS

Introduction

This chapter discusses the results of Questions 3, 4, and 5 of the questionnaire dealing with the manager's perception of the importance of his present assignment and his future goals.

Perception of Present Assignment

Table VI. Responses to Present Assignment Questions.

<u>Question 3</u>		<u>Yes</u>	<u>No</u>	<u>Total</u>
Do you believe that your present position represents the best use of your talents and experience from the standpoint of the Corporation?	Group A	13	2	15
	Group B	30	13	43
<u>Question 4</u>		<u>Yes</u>	<u>No</u>	<u>Total</u>
Do you believe that your present position is helping you to achieve your long range goals with respect to progress in the field of management?	Group A	11	4	15
	Group B	27	16	43

There is no need to discuss the respondents who answered Yes to these questions and, therefore, the following will only address the negative responses.

Group A Negative Response to Worth of Present Position:

The two negative responses to Question 3 in Group A are explained by the further comments of the respondents. In one case, the respondent amplified his answer to indicate that he knew that his present assignment was one in which he was being asked to perform in order to demonstrate a specific capability.

In the second case, the respondent indicated that while it was clearly recognizable to all that his present assignment was a major responsibility, it did not take advantage of a specific talent of technical planning which, in his opinion, was his strongest attribute. (This respondent also later indicated that his long range goals were directed specifically toward technical planning.)

Group B Negative Response to Worth of Present Position:

The larger negative response (30% as compared to 13% for Group A) in Group B was due to a variety of reasons, all dealing with the specifics of the present assignment. If there could be any generalization, it would be that the respondents felt a need for more challenge in their assignments.

More than half of these negative responses came from managers who, while in the senior category, were assigned the management responsibility for very small groups. In essence, their management responsibilities were akin to those of a first line manager. In addition, these groups were usually performing some sort of staff activity, primarily technical in nature.

Group A Negative Responses to Achieving Goals  
Through Present Assignment:

In Question 4 there were four negative responses in Group A. These resulted from two respondents stating that their present assignments, while valuable to the corporation, were not providing any additional training or responsibility to the respondents.

The other two responses were from respondents who viewed their assignments as a natural progression toward higher management levels whereas their desires were directed toward more active technical participation in the engineering field.

Group B Negative Responses to Achieving Goals  
Through Present Assignment:

The larger negative response in Group B was related to Question 3, since 11 of the 16 had also answered negatively to Question 3.

This relationship was an obvious one in that these respondents felt that regardless of what their long or short range goals were they could not be achieved by remaining in an assignment that was not active, important, and in the main stream of effort. This need for being in the main stream of effort was mentioned frequently by respondents in Group B (many of whom had made recent changes in assignments to achieve this goal).

The remainder of the negative responses was caused by the fact that the individuals desired goals dealing with technical achievements which could not be satisfied with their present managerial assignments.

The requirement for achieving satisfaction from technical activities appears to be a strong factor in the desires of many of the senior managers. It would appear that many of these managers who are performing staff assignments with small groups may be classified incorrectly as senior managers.

Group A and B Responses to Future Goals:

Question 5 was directed toward ascertaining the individual's long range goals as they related to levels of management. The results of this question for both Groups A and B are:

Table VII. Groups A and B Management Goals.

	<u>Group A</u>	<u>%</u>	<u>Group B</u>	<u>%</u>
Executive Level	6	40	3	7
Laboratory Manager Level	3	20	5	12
System Manager Level	2	13	17	40
Corporate Staff Assignment	1	7	1	2
Technical Direction of Small Group	3	20	14	32
Remaining at Present Level	<u>0</u>	<u>0</u>	<u>3</u>	<u>7</u>
	15	100	43	100

The most significant comparison that can be made from this data is that in Group A 60% of the respondents aspired to levels of management which are at least two levels above their present level, as opposed to Group B's figure of only 19%. After obtaining these responses, I am convinced that, at least in the data obtained from Group B, many of the respondents selected lower levels for their goals due to the fact that they have been conditioned either by their management's direct action or lack of action that they should not consider reaching for these goals.

There are two other salient aspects of the responses to this question from both Groups A and B. On frequent occasions, the respondents indicated that they did not aspire to higher levels of management for the prime reason that it appeared to require more time and effort than any reward they could visualize. This was many times related to the demonstrated performance of the present higher levels of management and was looked upon as a necessity to perform at these levels by these respondents.

The second aspect of these responses in both the A and B groups was an attitude that progression to higher levels of management would not afford any opportunity to contribute or participate in the technical aspects of their professions.

### Summary

It was assumed at the outset of this study that the responses to the questions dealing with the manager's perception of his present assignment and future goals would provide a means to modify a career development program. After obtaining this data, it became apparent that the initial assumption relative to these perceptions was not valid. While the data may be of specific interest when viewed in the light of a specific response, it is too qualitative in nature to be collated and generalized.

CHAPTER V

CONCLUSIONS



## CHAPTER V

### CONCLUSIONS

It was assumed at the outset of this study that there would be significant differences in the career patterns of the two groups. In particular, it was hypothesized that the duration of occupancy of specific job positions and responsibilities as well as time spent in different supervisory levels would combine in a linear manner to provide a means to indicate a significant difference between groups of managers with different potential ratings.

The results of this study show that two variables of job position (System Area and Other Area) with two areas of managerial responsibility (Planning Manager and Sales Management) and one progression measurement (Time for Promotion to Senior Manager) do combine to show a very significant difference between Group A and Group B.

It was the intention of the study after identifying the differences to use them as a means to effect a change in career development for other managers. As such, it is necessary to look for the reasons that these variables are important in separating the two groups.

Area Assignment Variables:

The variable which stands out as the uppermost different in career patterns for the two groups is the Area Assignment variable, Systems Area. As has been previously outlined, this assignment offers opportunities to the manager which allow him to become broader, more knowledgeable of the corporation's goals, and also a more attractive candidate for more responsible positions. This is further borne out by the fact that the next variable in the Area Assignment category is the Other Area. Managers in this area also had opportunities for broadening and becoming more knowledgeable about the corporation.

In considering these variables, it may be possible to relate them to the aspect of the importance of job rotation. The need has been well established for rotating managers in their job assignments. In both the Systems Area and Other Area variables, the effect of rotation is accomplished by the constant need to approach and solve different types of problems, assess different environments, and have frequent interpersonal relationships with other areas of the corporation.

The process of job rotation in general is viewed by many as an important aspect of management development. Dr. E. H. Shein suggests that the influence of management development has three phases - unfreezing, changing, and refreezing.<sup>12</sup> Without this opportunity in the laboratory, an important part of the change process involved in management development is being lost.

<sup>12</sup> Dr. E. H. Shein - "Management Development as a Process of Influence" - Industrial Management in Review II, II - May 1961

The Bell System has extended the principle of rotation to the degree of formal incorporation of it into a Management Assistant Program. This program involves the rotation of management trainees for a period of one year throughout many departments, and it has been received very favorably by both the participants and the management.

Consideration should be given to rotating more managers into the System Area as a means of offering the benefits of this experience to an increased number of managers.

There is also the consideration that the managers who have the highest potential are placed in the System Area more frequently than any other area by design explicit or implicit. While this possibility was not considered as part of this study, there is no evidence that the men assigned to this area initially have indicated higher potential than men assigned to other areas. It may be a possibility that this area attracts better candidates as they progress upward in the laboratory, but there is no available evidence on this possibility either.

#### Responsibility Assignment Variables:

A difference exists between Groups A and B for the variables of Sales Management and Planning Manager. Since these variables are both viewed as being detrimental to the probability of a manager being in Group A, there are two possible avenues for consideration.

One approach could be that these managers are laboring under a severe handicap in the laboratory by competing with the engineers and other technical professions. If this is the case, then perhaps the assignments in the laboratory should be viewed as temporary for Sales oriented managers and Planning managers. This would allow them to return to their original environment with added technical skills to utilize in a less technically competitive world.

This approach offers the advantage to the corporation of a constant flow of the latest information from and to the laboratory.

The second approach is that the present method of recruitment is correct, and that these managers are not destined to rise in the management hierarchy for reasons not covered in this study. Since the study could not encompass all aspects of this area, it is not possible to determine the entire nature of this negative correlation.

Progression Variable:

The progression variable of Elapsed Time for Promotion to Senior Level offers another tool in the development of the managers. As was outlined, in many cases promotion to this level is usually more difficult than promotion to the first two levels. Most of the areas in the laboratory have utilized a form of peer or independent evaluation of the candidates for promotion to this level. Since this variable has a strong

correlation to belonging to Group B, it is obvious that these managers have had more difficulty in overcoming the additional ground rules for promotion to senior level. Since this additional hurdle has contributed to differentiating between the two groups of managers, it may be the first indication that the manager is being viewed as being deficient in potential.

Consideration should be given to using this procedure for all promotions to senior level manager. In addition, since earlier determination of potential is desirable, consideration should also be given to using this procedure at lower levels of management.

Perception of Managers Towards Present Assignments and Future Goals:

As the results indicate, this area did not provide any conclusive evidence that could be used as a means to aid career development. The data proved to be subjective in nature and specific to the individual respondents.

There were indications that some of the managers felt a need for increased challenge in their assignments. This is a well known requirement for any managerial assignment and does not require further amplification.

Suggested Topics for Further Study:

One of the facilities that could be available in the Multiple Discriminant Analysis is the establishment of a Z value which is the boundary line between the two groups. This would require the separate individual computation of each manager's Z value, and then weighting these values by the size of the two groups.

An interesting study would result if, after this critical value of Z was established, the Z values of the second line managers or additional senior managers who are known to be considered members of Groups A and B were compared to the critical level to determine the predictability of this model. The additional managers should still be evaluated by the same qualitative measures used to establish the present Group A.

The further use of the Linear Discriminant Function should consider the work done by Mr. Wm. G. Cochran. This is covered in the article entitled "On Performance of the Linear Discriminant Function" in the Technometrics Journal, May 1964, Volume 6, No. 2.

## BIBLIOGRAPHY

## A. BOOKS

Dooher, M. J. and Marting, E., Selection of Management Personnel.  
Vols. 1 and 2 AMA 1957

Sayles, Leonard, Managerial Behavior. New York: McGraw Hill, 1964

Dill, William R., Hilton, Thomas L., and Reitman, Walter R.,  
The New Managers. New Jersey: Prentice Hall, 1962

Cooley, William W. and Lohnes, Paul R., Multivariate Procedures  
for the Behavioral Sciences. New York, John Wiley and Son, 1962

Frank, R.E., Kuehn, A. A., and Massy, W. F., Quantitative Techniques  
in Marketing Analysis. Illinois, Irwin, Inc., 1962

## B. ARTICLES

Argyris, Chris, Some Characteristics of Successful Executives.  
Personnel Journal, Vol. 32, pp 50-55, 1953

Cochran, William C., On Performance of the Linear Discriminant Function.  
Technometrics, May 1964, Vol. 6, No. 2

Gardner, Burleigh, B., What Makes Successful and Unsuccessful Executives.  
Advanced Management, Vol. 13, pp 116-125, 1948

Shein, E. H., Management Development as a Process of Influence.  
Industrial Management in Review II, II, May 1961

APPENDIX A

INSTITUTIONAL FACTORS FOR ALL RESPONDENTS

IN GROUP A



APPENDIX A

INSTITUTIONAL FACTORS FOR ALL RESPONDENTS IN GROUP A

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1		4				2	4	2		4					4		34	66	18	59
2	2	4						4									33	53	31	11
3	6	2						8									38	62	32	40
4	8							8									37	33	73	07
5	5	1						6									31	33	33	23
6	9							9									33	52	35	10
7	6		1					6	1								38	99	24	27
8	1				4	5		7				2					31	39	18	05

APPENDIX A - cont'd.

INSTITUTIONAL FACTORS FOR ALL RESPONDENTS IN GROUP A

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
9	5							5		2							31	29	22	15
10	8		1					9									30	52	23	21
11	2	4		1			5					4	2			7	31	35	50	14
12				6				1		3						2	30			14
13	4			2				4		2							29	35	44	29
14				5			2	3						2		2	36	81	52	16
15				3			5	4					1			3	37	62	32	40
Total	56	15	2	17	4	9	16	76	0	12	0	6	3	2	4	14	499	731	487	331
Percent of Respondents	73	33	13	33	7	20	27	93	0	33	0	13	13	7	7	27	100	93	93	100

APPENDIX B

INSTITUTIONAL FACTORS FOR ALL RESPONDENTS  
IN GROUP B

APPENDIX B  
 INSTITUTIONAL FACTORS FOR ALL RESPONDENTS IN GROUP B

Respondent	Variable																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	2		6					6					2				33	61	22	22
2		11					4					5				10	37	99	16	63
3			7							7							32	18	08	25
4		13						13									44	99	42	22
5			10							10							39	58	16	66
6	2	4							6								38	28	14	28
7	6						2		6				2				40	78	09	64
8	9								9								34	09	15	80
9	5	3	1						8				1				31	64	23	09
10	4					1	2			7							39	94	38	44
11	5	1								4	2						35	99	11	46
12	6		3							4	5						37	54	36	30
13	5							5									29	54	22	20
14					5	3			8								36	76	24	44
15	5		6									11					48	51	10	47

APPENDIX B - cont'd.

INSTITUTIONAL FACTORS FOR ALL RESPONDENTS IN GROUP B

Respondent	Variable																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
16	5					1			5								38	82	37	22
17	1				4	2			6							1	33	50	25	26
18					7	1			7	1							32	52	37	18
19		1				7	1	8								1	37	94	16	49
20					7	1		8									29	24	23	43
21	2	3				4	1	9								1	38	39	28	21
22	3						4							3		4	32	90	31	12
23					4	3	2	1				3	5				33	65	09	38
24	5								5								35	94	11	23
25	7								1					6			36	40	50	22
26	7								4					3			40	25	31	29
27		2			8	2				2					8	2	42	62	34	39
28					5	2		7									40	81	08	30
29	3			2		2			5		2						32	29	26	29
30						8		6		2							31	38	25	55

APPENDIX B - cont'd.

INSTITUTIONAL FACTORS FOR ALL RESPONDENTS IN GROUP B

Respondent	Variable																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
31						4			4								35			22
32						8		8									35	40	31	25
33						8		8									35	50	07	22
34				6					1	5							35	29	27	24
35		4		1			3	5								3	39	30	11	26
36				1		2	9					2	7		3	33	28	28	32	
37	6			1					3				4			33	99	16	37	
38	3			1				3	1							32	51	08	26	
39	6			2					8							33	78	25	19	
40				8				4		4						31	19	47	14	
41				5			8						8		5	35	44	92	28	
42				4	4			4		4						32	19	39	30	
43				7				1		4	2					34	24	37	52	
Total	97	42	33	38	44	59	36	96	87	54	22	8	12	31	8	29	1522	2318	1065	1423
Percent of Respondents	49	19	14	26	19	40	23	37	40	28	12	5	12	14	2	21	100	98	98	100