COMMUNICATION AS THE BASIS FOR A DICHOTOMOUS CLASSIFICATION OF MANAGERIAL WORK

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Submitted to the Faculty of the
Graduate School of the
Oklahoma State University
in partial fulfillment of the
requirements for the degree of
DOCTOR OF PHILOSOPHY
August, 1960

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OF MANAGERIAL WORK

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PREFACE

In this dissertation, I am attempting to accomplish two things:

1. To classify the presently available knowledge of the management process so as to make it more readily available to students and practitioners in the field of management.
2. To provide a mechanism by which the performance of one manager can be factually and meaningfully compared to that of another.

The performance of managers is customarily evaluated in terms of the success or failure of the complexus, which they manage. Thus, managers of an industrial concern are judged to be successful if the enterprise they manage is profitable to its owners. Political leaders are successful if their party wins an election. Labor union officials are successful if they win concessions for their constituents, and so on.

This kind of evaluation, on the basis of past performance and experience, is quite general. It is essentially objective, because only the degree of success or failure is open to argument. It has, however, a major limitation in practice. This is due to the inherent condition that

the criterion of success can be applied only in retrospect. Thus, in hiring an industrial manager, or in electing an individual to office, one accepts a risk that he will not be successful. The question is, how can this risk be minimized?

In general, the problem of minimizing risks is an old one. The following example may serve as an illustration. An engineer designs a system to the consumer's specifications. The system is to be accepted only if it meets these specifications in the acceptance test. In designing the system, the engineer draws on his fund of specialized knowledge and leans heavily on fundamental laws, which govern the feasibility of his design. His risk of failure will be minimized if he is able to match the characteristics of his system to the critical requirements contained in the specifications. In the established areas of engineering, the techniques for this procedure are well developed and, consequently, the risk of failure is relatively low.

In managerial work, however, the situation is quite different. First of all, the pedagogical aspects of professional management education are in their infancy, and, secondly, we have no systematic and effective means to relate a managerial performance pattern of activities to specific requirements of executive or managerial positions. In other words, there are not, as yet, developed generally accepted and conceptually consistent curricula in manage-

ment education, and there is little factual information on how to pick a manager for a specific position. A reflection upon the extent of our knowledge is appropriate at this time.

In the preface of his Ph. D. dissertation, Dr. M. R. Lohmann, Dean of the College of Engineering at the Oklahoma State University, states that his study was undertaken as the result of a challenge by Chester I. Barnard. The challenge was to the effect that the treatment presented in his book, The Functions of the Executive, was " ... incomplete and unfinished in many respects ..." and that " .... many men and many years would be required to finish or complete such a study."

In acknowledging this challenge, he states:

> I hope, not to complete such a study, but only to advance the knowledge of management another step along the way.

Quoting again from the preface of his dissertation, he accomplished the following three things:

1. The construction of useful concepts of organization and management.
2. The creation of a vocabulary of words with extensional meanings.
3. The reduction of the complex art of management to relatively few fundamentals to facilitate their application.

In similar fashion, the present study is motivated by the urge to further facilitate the understanding and application of the body of knowledge of the management process, which has been accumulating over the years.

This subject matter is complex and extensive. It appears to be particularly difficult because of the absence of a comprehensive classification of the constituent elements which, in their aggregate, represent the body of knowledge.

The conceptual scheme represents a frame of reference by which experience can be transformed into knowledge. A good classification system renders available knowledge more accessible to those who lack experience, and, at the same time, it facilitates systematic study for those who have had experience in the subject matter area.

These thoughts have prompted an effort to establish a classification system for the management process. As a result, the objective of this treatise is to formulate a system for the classification of activities which are involved in managerial work. The purpose of the classification, which is proposed in this dissertation, is to facilitate the study, understanding and instruction of the subject matter area.

Any classification postulates the existence and availability of a body of facts about those items which are to be classified.

The reader who is familiar with Dr. Lohmann's work will readily recognize that the classification system, which I am proposing, is based on his Concept of Organization and Management. Also, the vocabulary of technical terms, which he defined, is used freely in this dissertation without

further explanation. However, for the sake of completeness and as a convenience to the reader, some of the basic and frequently recurring technical terms are redefined in the text of this dissertation.

In order to test the proposed classification, an actual case study was performed. The case study involved the cooperation of eleven executives. These men were given detailed, written instructions on how to keep a record of their activities. They kept such records for a varying number of days and supplied a total of forty-one man-days of their recorded daily activities. Upon analysis of these reports, a total of over 1,200 individual activities were isolated and all of them were found to be classifiable in accordance with the proposed system. Thus, it appeared that the classification was possible.

The next step involved a test of the usefulness of the proposed classification system. It seemed essential that the criteria for the evaluation of the merits of the classification be clearly defined and understood. After considerable study, it was decided to declare the proposed system useful if it provided a vehicle by which managerial work patterns could be either predicted or compared.

This requirement, in turn, led to the development of a quantification of the work pattern, which is believed to be original and which lends itself to statistical analysis. The quantification is performed with the aid of six relationships between defined and observable characteris-

tics of a manager's activity pattern. These relationships are originally developed in this dissertation. Since they represent a hitherto unidentified concept in the analysis of managerial work, an original and appropriate designation appeared desirable. Accordingly, these six relationships have been collectively designated as macroanalytic concepts.

A relatively simple statistical treatment was next presented, which permits the comparison of macroanalytic concepts of a group of executives. This treatment results in one of two conclusions. Either the executives do not display significant differences with respect to a particular macroanalytic concept or else they do. If they do not, a prediction is justified and if they do, a comparison between them is possible. The resultant predictions have statistical probabilities; the comparisons are in relative terms between executives.

Acknowledgments

It is a pleasure to acknowledge, at this point, many valuable contributions made by members of my Ph. D. Advisory Committee, faculty members, and industrial executives. In particular, I am indebted to Dr. M. R. Lohmann, Dean of the College of Engineering, for many valuable suggestions which have materially affected the progress of this study. Further, to Professors W. J. Bentley and H. G. Thuesen, both of the School of Industrial Engineering and Management,

for their stimulating and thought provoking discussions of various aspects of organizational and managerial work; to Dr. M. K. Jovanovic, of the School of Mechanical Engineering, for his suggestions in connection with the historical presentation in Chapter I; to Drs. Carl Marshall and Franklin Graybill, both of the Statistics Department, for their consultation in connection with the mathematical treatment of the data; and to Mr. A. Goldman, also of the Statistics Department, for checking the numerical computations.

Last, but certainly not least, I wish to express my sincere appreciation to the group of industrial executives, who, however, must remain anonymous, for the contribution of their activity record. Without their help, this study could not have been completed.

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CHAPTER I

INTRODUCTION

The last several decades have witnessed a tantalizing search for a theory which would explain the mechanism by which human effort is contributing to cooperative systems - how these systems originate, how they are maintained and how they terminate.

Many scientists and authors have studied and reported on selected topics observed within the area of cooperative human communities. Many independent as well as related disciplines have contributed to the sum total of the knowledge of the pattern of behavior of such communities. It is noteworthy, however, that the scholars of different disciplines have invariably gone their own way in interpreting the phenomena, which they have observed or postulated, and applied them to their own respective disciplines.

The obvious question, which now presents itself, is whether or not a synthesis of these isolated and in some respects unrelated ideas and concepts is possible and, if possible, whether it permits and supports a universal truth in the form of an abstraction to which all known cooperative systems can be considered to conform.

To date, there is no conclusive evidence, either in the affirmative or in the negative, to arrive at a definite conclusion. There are, however, hopeful indications that such an abstraction is indeed a possibility. To this author, it appears to revolve around a concept of "initiation and perpetuation of organized activity by means of communication".

In this context, the activity of communicating is the universal truth and the generating element through which initiation or perpetuation of organized activity[1] is achieved.

Projections of the purpose, based on analyses of the subject matter content of specific communications of recognized managers in their daily activities, are presented in this dissertation. The extent to which this abstraction is acceptable to students and practitioners in the field should be evaluated in terms of the usefulness of the concept, rather than in terms of the rigidity of its proof. There is ample precedent for such a procedure as the following examples in the history of science will show:

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[1]As defined, e.g., by C. I. Barnard, The Functions of the Executive (Cambridge, Massachusetts, 1951), p. 82: "An organization comes into being when (1) there are persons able to communicate with each other, (2) who are willing to contribute actions and (3) to accomplish a common purpose."; or by M. R. Lohmann, A Concept of Organization and Management (Ph. D. dissertation, University of Iowa, 1954), p. 28: "A unit organization comes into being and endures when two or more persons: (1) know and agree upon a prospective resultant of cooperation (2) recognize incentives that induce the contribution of activities and (3) perceive the acts needed to achieve the prospective resultant."

The philosopher, Herbert Spencer, suggested a synthetic process of evolution from relative simplicity to relative complexity of the universe. His theory postulates an "unknown and unknowable power" which underlies all sensible phenomena within the universe. He also suggested that in any group of organisms, the birth, growth, nutrition, reproduction and death of the community were comparable to the same phenomenon occurring within the individual. His theory found acceptance by some biologists, but was definitely rejected by most social scientists. Each group felt that it had good reasons for its particular viewpoint.

One may consider another example from the physical sciences dealing with particulate matter at the subatomic level. Physicists tell us that although subatomic particles might conceivably be arranged in an infinite variety of different kinds of atoms, actually in nature this variety is limited and comprises only atoms of the known elements and their isotopes. They add that this is true for any system of matter which exhibits quantum phenomena. Thus physical laws govern the possibility of coexistence and span of life of combinations of particles within atoms. The quantum concept was necessary in order to formulate the physical law. It has never been attempted to prove or disprove this concept. It was merely considered a tool, useful and indeed necessary in order to explain some observed phenomena. There may, however, come a time when the quantum concept will not adequately sup-

port new or perhaps additional observations. Some physicists argue that this point has already been reached. This simply means that an artificial model, which was creatively conceived as a crutch to the inquiring mind, has outlived its usefulness and must be replaced by a new one.

In considering human systems of cooperation, one is not dealing with an a priori problem of causality. One is not, in most cases, attempting to establish a cause and effect relationship of observed phenomena. As a rule, one is merely trying to understand, relate and predict conditions favoring or otherwise affecting the occurrence of the observed phenomenon.

As the scientific level of the comprehension increases, there appears to be a corresponding decrease in the merit of the a priori causality theory. Life scientists are increasingly more concerned with averages and means than they are with exact values. Even the physicist uses a random distribution in deciding which of two or more electrons will next be emitted from an unstable atom.

It is interesting, and pertinent to any study involving scientific techniques, to briefly review the methodology of two of the greatest thinkers, Newton and Einstein.

Newton adopted the scientific method of the Greeks which they perfected by geometrical theories. Euclid and Newton started with definitions, axioms and postulates. However, the Greeks limited their definitions essentially to geometry

and with but few exceptions, the basic postulates suggested themselves to their reasoning minds through essentially a system of symmetry. In physics and mechanics, the basic postulates are obtained from carefully conducted experiments. Newton's views on methodology were expressed by a single sentence: "Hypotheses non fingo" which means: I do not make hypotheses. What he implied was that a model, mathematical or otherwise, was not necessary in order to reach scientific conclusions or as a verification of experimental evidence.

Albert Einstein, on the other hand, explained many physical concepts by use of a mathematic model. His theory of relativity as a physical concept explains phenomena which Newton's approach does not explain. Einstein's concept is based on the fact that all experimental approaches are for the sole purpose of measurement, but in order to measure anything, a "platform" as he put it, is necessary.

The basic motivation of Einstein's studies was the urge to understand the meaning and implication of tests, experiments and their results.

A different approach was used in quantum theory. Here obsure principles are forced upon scientists not as the result of any urge to understand the significance of empirical facts but merely out of necessity to bring order into an otherwise incomprehensible chaos of perplexing observations. This is just another case of the model approach.

Similarly, in analyzing organized human activity, one is confronted with a perplexing array of apparently disconnected and unrelated observations concerning the over-all pattern of human behavior. If one attempted to construct a model to symbolize organized activity one would have to be concerned first with the isolation of some particular set of observations and second with the establishment of limiting relationships to which these observations appear to conform. Assuming that this can be accomplished satisfactorily for a given set of observations, one is at once faced with the question of the extent of applicability of a particular model to various sets of observations. The experience to date suggests that models tend to become inadequate as the level of sophistication of the observed phenomena increases.

The classical methods of physics and mechanics fall short of explaining all observed phenomena. The quantum theory approach, using a model, is useful only to the extent to which a particular system can be designed to simulate the problem situation. Einstein soon abandoned the model approach in favor of analysis by carefully designed experiment. His "experiments" however usually took the form of observations of a hypothetical situation.

One may consider, as Einstein did, a man inside an enclosure, comparable to an elevator cage falling at a constant acceleration of one "g" within the gravitational field of the earth. He is not aware of his external surroundings and

attempts to establish his position. In order to do this, he releases an object. It appears to remain poised in mid air. In reality it is, of course, falling, along with the elevator and the man, at exactly the same rate in accordance with Newton's laws of gravitation. Since the man in the elevator is not aware of his position in free fall, he views the apparent absence of gravity as an indication that he is outside the gravitational field of the earth, possibly poised somewhere in empty space. On the basis of his knowledge and experience, he has good grounds for this conclusion. The elevator has actually become an inertial system and there is no way for the man inside the cage to tell whether he is falling in a gravitational field or simply floating in empty space free of external forces.

One may next shift the scene. The man is still in the elevator, but this time he really is in outer space and not affected by gravitation of any celestial body. His cage travels upwards with constant acceleration of one "g". Again, he has no idea where he is and performs experiments to determine his situation. This time, he finds that his feet press solidly against the floor. He releases an object and finds that it falls to the floor. If he tosses it in a horizontal direction, it describes a parabolic curve with respect to the floor. Thus, while in reality he is climbing in his windowless car through interstellar space, he actually concludes that he is situated in quite ordinary circumstances on earth

and affected in a normal manner by the force of gravity. Under the circumstances, his conclusion, while erroneous, is perfectly reasonable.

On the basis of imaginary phenomena, such as the ones described, Einstein conceived the unifying concept of an inertial system in which gravitational effects are included.

In contrast to Newton's concept, Einstein's law of gravitation contains nothing about a force. It simply describes the behavior of objects in a gravitational field. The planets, for instance, are not considered in terms of attracting each other, but simply in terms of the paths they follow. To Einstein, gravitation is a part and parcel of inertia. The movements of the stars and the planets stem from their inherent inertia and the courses they follow are determined by the properties of the space-time continuum. Thus, the concept of gravitation, as understood by Einstein, is entirely different from the Newtonian point of view. Newtonian gravitation is simply a force, whereas Einstein's gravitation involves inertia.

The preceding analysis and examples will serve to demonstrate that in many instances recognized classical procedures are not adequate or reliable in solving a problem. What is more, in the above examples, the application of a classical methodology in mechanics prevented and precluded the correct appraisal and understanding of an existing situation. Thus, it is distinctly reasonable to conclude that Newton's classi-

cal approach to mechanics lacks "universal truth". Is the same statement true for established relationships which govern the inter-actions of people in cooperative systems? In other words, are the presently recognized concepts and abstractions useful? If they are, do they enable one to arrive at useful classifications?

In this dissertation, organizational and managerial situations are analyzed within the framework of a concept developed by Dr. Lohmann.[2] His conceptual scheme is characterized by a juxtaposition of structural and behavioral elements of organized human activity.

The structural component is described as a kinetic social entity which is subject to the presence of delineating parameters. It is comparable in many respects to a biological organism whose existence and survival depend on favorable conditions within the universe in which it exists.

The behavioral component, on the other hand, is predicated upon conditions which are subjectively evaluated by the individuals who participate in organized activity.

The juxtaposition of those two elements culminates in the development of a managerial concept. This is accomplished by amalgamating the common components of both elements into a system in which the inherent instability of organizational activity, of some participants, is counterbalanced by the

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[2]M. R. Lohmann, A Concept of Organization and Management, (Ph. D. Dissertation, University of Iowa, 1954).

overt acts of other participants.

The philosophy underlying the development of this conceptual scheme includes the premise that muscular forces are the basic ingredient of all organized activity. This is equally true for operative[*] as well as coordinating[*] contributors to unit organizations.[*] In the case of operative contributors, in many cases, this is plainly discernible. The display of muscular force is obvious in cases where physical activities are utilized to bring about, e.g., a change in the environment. However, in the case of coordinating contributors, this muscular activity always takes a form appropriate to a particular type of communication. Another way of expressing this is to say that a manager takes action to transmit information to operative contributors so that they will act as the manager desires. The method by which he accomplishes this is invariably a communication. Specifically, it is a communication about a subject matter. According to Dr. Lohmann's concept, the subject matter must involve one or more of the following items:

1. Explanation of resultants of cooperation.
2. Offers of incentives to operative contributors.
3. Explanation of activities.

A major part of this dissertation is devoted to an analysis of the daily activities of recognized managers. The analysis is based on a frequency distribution of the above

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[*]For definition, see page 26 of this dissertation.

three items within the total activity analyzed.

Before proceeding further with the analysis of this concept, it may be well to illustrate some of its ramifications by an actual example representing a real situation observed in our society. In an interview with Lord Hailsham, Chairman of the British Conservative Party, the following conversation was reported:

> Q. Lord Hailsham, the Conservative Party here suffered a decisive defeat in 1945, but now it has just won its third straight election. How did you manage to make this comeback?
>
> A. We organized. The fact about this country is that socialism is not its fundamental creed and, therefore, the country wanted and demanded a conservatism to take over from the Socialists. They wanted an end to nationalization and controls. And all we have done is to think out what that involved and then do it.
>
> We've brought in new men. We've had new personalities and we've had the conviction, the enthusiasm and the dedication demanded for the task of resisting socialism in this country.[3]

This conversation occurred in October, 1959, shortly after the elections in Britain. It is interesting to analyze Hailsham's answer. His first statement, "We organized", implies, within the frame of reference of this dissertation, that those members of the conservative party who were responsible for the formulation of policy (i.e. coordinating contributors) recognized a need to consciously coordinate the activities of their party's membership (operative contribu-

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[3]Joseph Fromm, "How The British Conservatives Did It," U. S. News & World Report, October 26, 1959, p. 72.

tors). This recognition, followed by the coordination of activities of contributors, gave birth to the revitalized organization. It is implied that prior to this decision and its communication, the organization was either non-existent or dormant. This distinction, however, is of academic rather than practical interest. Since it appears that the organization was eminently successful, as measured by election results, it is reasonable to use it to test the criteria which are presented by Dr. Lohmann as simultaneous requirements of organizational existence. These are that (1) two or more people agree on a common resultant, (2) recognize incentives and are induced to action, and (3) perceive and contribute the needed acts.[4]

It is interesting to note that a verbatim quotation of five consecutive sentences from a political leader should lend itself to pinpoint the above three requirements of organizational existence.

Clearly, the statement with respect to the fundamental creed of a nation is a common resultant or objective of the citizens.

Equally clear is the statement of the recognition of the incentives in the next sentence and involving the removal of economic controls. In the following sentence, Hailsham

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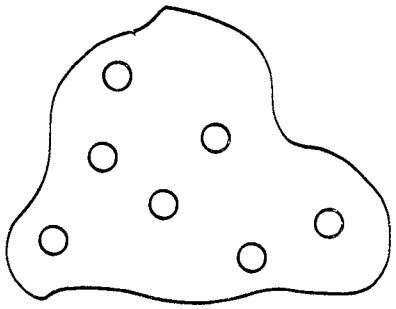
[4]M. R. Lohmann's simultaneous condition requirements have been used to graphically represent the development of an organization as shown on Page 13.

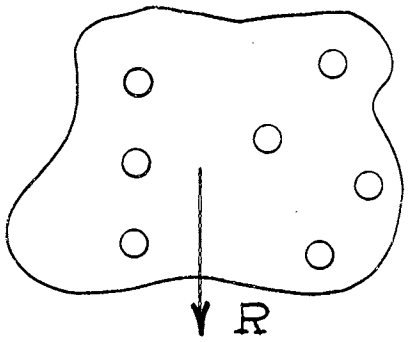
AN ORGANIZATION IS FORMED WHEN:

1. A RANDOM GROUP OF PEOPLE



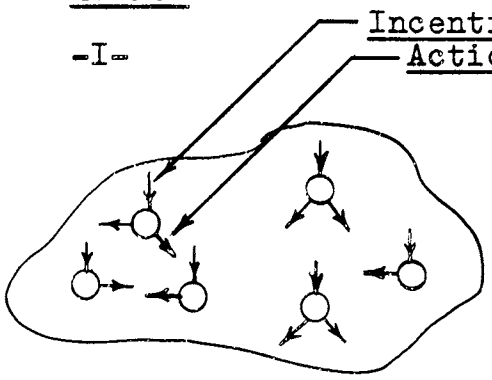
2. AGREE ON A COMMON RESULTANT

-R-



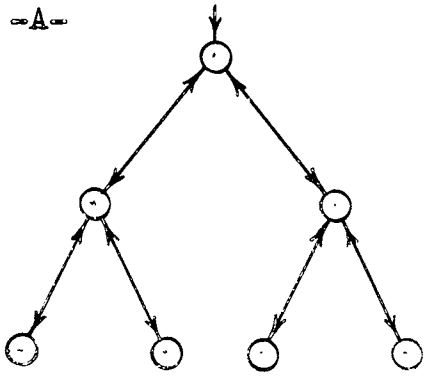
3. RECOGNIZE INCENTIVES AND ARE INDUCED TO ACTION

-I-

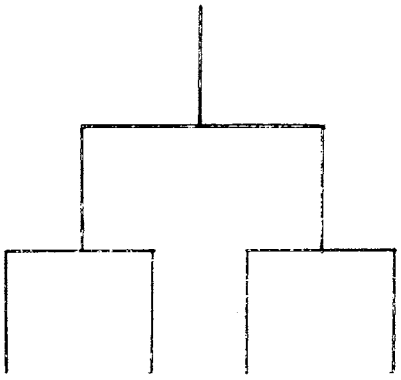


4. PERCEIVE AND CONTRIBUTE NEEDED ACTS

-A-



5. AN ORGANIZATION



BASED ON:
A CONCEPT OF ORGANIZATION AND MANAGEMENT
M. R. LOHMANN, 1954.

Figure 1. The Evolution of an Organization

goes on to say in effect that all that was left to do was to perceive and contribute the necessary acts. He then explains the nature of these acts in retrospect.

Fundamentally, a coordinative contributor must have a better understanding and greater perception of the three conditions which limit organizational activity. This will enable him to assist a marginal operative contributor to remain in organization. This assistance is given in the form of a managerial communication. Since it is intended to perpetuate organizational activity, or structure, it must relate to one or more of its necessary elements. Thus, one recognizes communications about resultants, incentives or activities. These will be discussed in more detail in the next chapter.

Summary

The mechanism which governs the contribution of human effort to cooperative human ventures has been explored by many scientists in relation to distinct areas of specialization.

This dissertation is concerned with an abstraction of a universal truth in the mechanism of the process of organized action and its coordination. The latter is commonly known as the process of managing.

It is suggested that regardless of the specialty concern of the investigator or the detailed purpose of a particular executive function, such an abstraction is possible. It is a

known fact that executives are able to understand each other with few words when they are discussing problems of organization only if the conversation bears no relation to specialized technologies.[5] Also, it has been found that conversations between executives provide sustained interest and understanding when concerned about practical problems rather than theoretical concepts. In view of this, the proposed abstraction must be specific enough to permit individual executives to identify practical problem situations within its terminology.

The abstraction which is proposed in this dissertation involves the acceptance of the concept that management is the activity of communication about the initiation and perpetuation of organized activity.

In accepting a generalization of this sort, it is helpful to remember that there is never a scientific basis for classification. The distribution of parameters for classification is usually a random one. Similarly, models facilitating the understanding or solution of physical problems have been used extensively. These, too, are neither right nor wrong; they are only helpful in understanding observed phenomena or solving problem situations.

Consider, for instance, the merit of the binary compared to the decimal system of numbers. Prior to the utilization

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[5] C. I. Barnard, Functions of the Executive, Preface.

of digital computers, no one had paid more than passing attention to the binary system. This does not mean that the system is wrong or inferior to another; it simply means that in the accustomed environment of mathematicians, statisticians, or accountants, it has not been considered useful prior to the development of digital computer techniques.

Finally, there is a quasi relativistic effect operative in the realm of human cooperative systems. Frequently, similar symptoms are characteristic of different conditions. This aspect will be considered in more detail in connection with executive communications in Chapter II. The proposed abstraction, in order to be useful, must provide the practitioner with necessary equipment to deal with a problem in its entirety in all kinds of different settings and not just a particular part of the problem or the environment.

The philosphy underlying the Lohmann concept of organization and management was outlined in this chapter as a basis for the proposed abstraction. An actual organizational example, taken from the recent political history of Great Britain, was used to demonstrate the significant agreement of this theoretical concept with realistic and practical experience.

CHAPTER II

DIVISION AND CLASSIFICATION OF MANAGERIAL ACTIVITIES

The Hypothesis

In this dissertation, a classification of managerial activities is proposed. The primary purpose of any classification is to provide a means for systematically organizing a body of knowledge. Since, however, there obviously are many different bases for classification, it is unavoidable that several systems, all applicable to the same subject matter area, may justifiably be established and used.

The hypothesis, which is presented as a basis for this study, deals with the justification of the proposed classification. It is presented as follows:

> The proposed classification system is (a) possible and (b) useful in the study, understanding and instruction of managerial work.

It will be noted that the hypothesis involves two parameters. The first one refers to the possibility of performing the actual classification and the second is concerned with the potential benefits to be derived from this particular classification. Criteria for the evaluation of

these parameters are considered in the following section of this chapter.

Criteria for the Acceptance of the Hypothesis

There are no known rules of procedure in the methodology of science which enable one to formulate solutions or answers to problems without first considering a suggested explanation of the difficulty which originated the inquiry. Such tentative explanations suggest themselves to the inquiring mind of an investigator as the result of previous knowledge and a logical process of thought. The results of such contemplations are formulated in a hypothesis.

Every hypothesis, once it is formulated, must be tested for its validity. In this dissertation, the hypothesis that a proposed classification of managerial activities is (a) possible and (b) useful, has been made. Thus, the classification itself, rather than facts surrounding managerial activities, is the subject of the hypothesis. The function of the hypothesis actually is to direct the inquiry into the order of facts. The classification which is proposed may represent an order among the facts which are involved in managerial activities. Whether it actually does represent such an order is the task of the inquiry. Since, however, a classification is dealt with here, an amplification of the foregoing statements is necessary.

It is well known that many classifications of the same subject matter area are justifiable. Formal logic requires only that a classification conform to the following basic rules:

1. The classification must be exhaustive.
2. The constituent classes must be mutually exclusive.
3. The classification must proceed upon one and the same principle at all stages. The principle is known as the fundamentum divisionis.[1]

These rules represent an ideal rather than an actual situation. There is historical evidence that generally accepted classifications have violated one or more of these rules, at least temporarily. For instance, in chemistry the subject matter area was classified into elements, compounds and reactions. This was obviously a violation of the third rule as stated above. The modern classification of chemistry is based on physical principles as the fundamentum divisionis. Also, one can never be sure that a classification is exhaustive or mutually exclusive. Any newly discovered aspect of a subject matter area may necessitate a revision of the existing class structure. Thus, scientific classification is not as formal a process as the above three rules would suggest. Also, by similar

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[1]Adapted from M. R. Cohen and E. Nagel, An Introduction to Logic and Scientific Method, Harcourt, Brace and Co., 1934, pp. 241-3.

reasoning, all but dichotomous classifications must be considered ephemeral in nature. The proposed classification of managerial work, as presented in a later section of this chapter, is dichotomous with respect to its two main classes.

The hypothesis which has been stated suggests that managerial work can in fact be classified according to the proposed system and that this system of classification is useful for the study, understanding and instruction of managerial work.

Thus, the hypothesis is subject to acceptance or rejection in two parts. The criterion of the first part is the physical possibility to classify the activities of managers. This in turn involves a breakdown of all of the job-connected activities which a manager performs and subsequent classification into one and only one of the proposed classes and subclasses. If a complete record of a manager's activities is so analyzed and classified, each activity must fit one of the definitions of a subclass without leaving a balance of unclassified activities. These conditions in effect express the first two of the three rules of classification as given on page 19.

It will be demonstrated in Chapter IV that the proposed classification system of managerial work actually does satisfy these conditions. The third rule is imposed by formal logic and has frequently been violated with relative impunity in the past. In the proposed classification,

however, it has been observed. The principle upon which classification is accomplished, i. e., the fundamentum divisionis, is the immediate purpose of the activity. Thus, the actual classification will proceed on the basis of a defined or otherwise adequately delineated purpose for which the activity is performed.

The second part of the hypothesis involves the utility of the proposed classification. It is generally recognized that various justifiable classifications may differ greatly in their logical and scientific merit. These differences are due to the fact that the various traits selected as a basis for classification vary in their appropriateness as criteria for organizing existing knowledge in a particular subject matter area.

As an example, one might consider a classification of internal combustion engines based on their manufacturer, as opposed to another classification based on the thermodynamic cycle they utilize (e.g., Diesel engines having essentially a constant pressure combustion as opposed to Otto cycle engines with their constant volume combustion characteristic).

Quite obviously, the latter classification is more informative and consequently more appropriate as a means of organizing fundamental knowledge about internal combustion engines. There is always, however, a possibility that yet another basis of classification will be conceived and that this new classification will be more significant in terms

of the nature of the particular objects or phenomena which are to be studied and classified.

Bearing these general limitations in mind, the evaluation of criteria for the usefulness of the proposed classification of managerial activities may now be accomplished.

At the present stage of development of managerial science and particularly in this study, a detailed understanding of those phases of the management process which are independent of the technological environment in which they take place is of concern. Thus, the utility of the classification will depend upon the extent to which it supports a generalization of the managerial activity pattern without regard to any particular industry, branch of government or other institutional or technical specialization.

Furthermore, it appears increasingly more desirable to predict the occurrence or recurrence of the various generalized activities involved in managerial work. This is particularly significant from the pedagogical aspect of management. Similarly, a useful classification system should provide a mechanism by which activity patterns of different managers can be compared.

It should be noted, however, that the proposed classification system itself cannot include a predictive frequency characteristic nor can it include a measure of an activity pattern. It can only provide a mechanism by which

pertinent pieces of information or facts are recognized and grouped within the classification order. If cyclic or other frequency relationships actually exist within or between these facts, they will become apparent in the analysis of the classified activities.

Thus, briefly stated, the classification system will be useful if it affords a mechanism to predict and compare managerial activity patterns. It will be seen later in this dissertation that this is actually the case. The method which is proposed for the prediction and comparison is described in Chapter III. It involves a quantification of relationships between classes of activities suitable for statistical analysis.

It will be seen in Chapter IV that comparisons of the managerial activity pattern are possible if statistically significant differences exist within the criterion group. The comparison is in terms of a statement that there is, or is not, a significant difference, with respect to a particular characteristic between any two or more managers.

Predictions as to the frequency of certain activities are also found to be possible - for a homogeneous criterion group - within the limits of statistically defined probabilities.

The Proposed Classification of Managerial Work

In this dissertation, it is proposed to classify managerial work into activities which managers normally per-

form. The classification is as follows:

A. Managerial Activities. These are communications about:

1. Resultants
2. Incentives
3. Acts

B. Non-Managerial Activities. These are:

1. Preparatory activities
2. Operative activities
3. Not-Related activities

The concept of studying a task by subdividing it into its component elements for detailed analysis is well established in present-day work analysis techniques. It originated as the result of efforts to improve efficiency of operations involving manual skills.

The above classification represents an extension of this concept to skills or performance patterns which are not manual in nature. The physical as well as the social environment in which a manager functions is substantially different to that which usually surrounds manual workers. Consequently, there are many differences in the technique of analysis relating to these two essential work areas.

It is not intended here to compare the analyses which apply to each of these categories; it is merely intended to point to the basic similarity of purpose which motivated this study. Motion study and other similar techniques have been eminently successful in improving work habits and the

efficiency of manual workers. It may hopefully be expected that equally effective techniques will ultimately be developed in connection with managerial work. The present study, it is hoped, will provide a frame of reference within which other investigators may successfully accomplish this objective.

During the course of a work period, every manager engages in a variety of different activities. Also, all activities which are consciously performed must reasonably be expected to have a purpose. Whether each or any activity of a manager accomplishes the purpose for which it was intended, is not now important. It is only necessary to assume that subjectively purposeful activities of managers are the basis for their particular and individual pattern of behavior. Thus, each manager will conduct himself in a manner which he considers appropriate to his purpose and environment.

Furthermore, if the over-all purpose of the management process is to initiate and perpetuate organized activity, then it is equally reasonable to suggest that the individual purposes of single activities should be consistent with the over-all objectives. These have already been defined in terms of three simultaneous existence requirements for organizations or unit organizations (footnote 1, page 2, Chapter I).

The proposed classification of managerial work is consistent with this definition. It involves a trichotomy of

the managerial communication function for the following three purposes:

1. The recognition of the resultants or objectives of cooperation.
2. The offering of adequate incentives to insure a sustained willingness for continued cooperation.
3. The facilitation of perception or the coordination of acts to be performed by individuals in order to lend effectiveness to the cooperative effort.

All of these purposes can be accomplished only by means of communication. The term "communication" is used in its broadest sense. It may include any activity by which one individual is capable of producing a stimulus for certain actions or purposeful omissions of such actions by another individual. This interpretation, while generalized, is in essence consistent with a mathematical concept of communication developed by Shannon and Weaver.[2]

In the following sections of this dissertation, the terms "operative" and "coordinative" contributor will be used. Both of these terms have been fully discussed and are defined in the literature as follows.

A contributor is a person who supplies acts (personal physical forces) to a unit organization.

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[2] E. C. Shannon and Warren Weaver. The Mathematical Theory of Communication. University of Illinois Press, 1949.

A person when supplying acts which are coordinated is an operative contributor.

A person when supplying acts which coordinate the acts of the operative contributor is a coordinative contributor.[3]

The above definition of "contributor" involves the term "unit organization". This is defined as follows:

A unit organization is a system of consciously coordinated activities of two or more persons.

When two or more unit organizations are in a system of cooperation, it is called an organization and is defined as follows:

An organization is a coordinated system of unit organizations.[4]

The process of management involves the coordination of activities of operative contributors and is accomplished by communication about one or more of the topics listed as the subclasses of the managerial class of activities.

It is therefore convenient to classify the activities of managers dichotomously into two main classes. The first includes all activities, performed by a manager, which require him to communicate with operative contributors for a particular purpose and the second main class

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[3] M. R. Lohmann, A Concept of Organization and Management. (Ph. D. dissertation, University of Iowa, 1954), pp. 23-24.

[4] Ibid., pp. 21-22.

consists of all activities which are not communicatory in nature. This latter group may include activities which are performed by a manager but which are indistinguishable from activities performed by operative contributors. (Examples of this are given in Dr. Lohmann's dissertation on page 124.) Managers, while so engaged, are obviously not doing managerial work and consequently they are not coordinative contributors to their respective organizations during such periods. Non-managerial work is characterized by the absence of the activity of communication. It includes work of a preparatory nature, i. e., activities performed for the purpose of preparing to communicate, or activities performed as operative contributor either in unit organization with other contributors or alone. Finally, the third subclass of activities in the non-managerial group has been labeled "not-related". The distinguishing feature of activities falling into this group is that they are performed primarily for the sake of convenience or convention. Their purpose is independent of the objectives from which the organization of the contributor derives the reason for its existence.

All of the above classification items will be considered in more detail in subsequent sections of this chapter.

Analysis of Activities for Classification

The mechanism by which managerial work may be analyzed is based on the classification. Thus, the first step

in the analysis involves the differentiation of managerial activities from those which are non-managerial. This step is relatively simple. By definition, a managerial activity is a communication. It is directed to another person or persons, known as operative contributors. Its purpose therefore is, in the phraseology of Chapter I, page 15, to elicit the initial or continued contribution of coordinated activities and thereby to perpetuate organized activity. Since there are three simultaneous requirements for the existence of organization, the managerial communication must apply to one of them. Thus, the subclassification of any particular communication can now proceed on the basis of its immediate purpose.

In the following three paragraphs, the subclasses of managerial activities (A-1, A-2, A-3, page 24) will be considered separately and in sufficient detail to provide a basis for the classification. The reader will observe that the order of presentation of managerial subclasses has been reversed in the following sections. This has been done advisedly in order to permit chronologically logical inclusion of the concept of the breakdown of resultants into subresultants and finally, into communications about acts.

Communications About Acts (A-3)

A communication about acts is one which, when implemented by the communicatee will result in the performance of a particular task, in a particular manner, at a partic-

ular time and place. The immediate purpose of the communication is to convey information in the form of a specific request, explanation, demonstration or similar process, about an activity which is to be contributed by the communicatee. Communications about acts are usually made in response to hypothetical or actual questions such as the following: "What shall I do?", "When shall I do it?", "With whom am I to do that?", "How shall this be done?"

Communications About Incentives. (A-2)

A communication about an incentive is made for the immediate purpose of offering or explaining benefits (or conversely burdens) to one or more potential or actual operative contributors. Burdens are considered as negative incentives, and, for purposes of this analysis, no further attention to this differentiation is necessary or useful in this connection. Examples of such communications are offers of salary increases, explanations of stock option plans, information about fringe benefits, threats of demotion or salary cuts, etc.

These incentives are tangible and material. There is, however, another and more subtle approach by which incentives can be offered. It involves non-material and less tangible incentives. Usually, this type of communication about incentives does not offer or explain a benefit or burden but represents such a benefit or burden in itself. Examples are a statement or letter of recognition or rep-

rimand, a congratulatory message upon an appropriate occasion, flattering or derogatory remarks and other similar expressions intended to produce willingness to cooperate or offset the lack of it. Communications about incentives include all communications of a coercive, persuasive or motivational nature.

Communications About Resultants (A-1)

Communications about resultants are those which are intended to convey information relating to the objectives to be achieved by the organized effort of contributors or of the organization to which efforts are being contributed. Thus, most orders and directives, which are transmitted by managers to operative contributors, fall into this subclassification. The recipient of this or any other communication is always an operative contributor, or potential operative contributor, at the time when he receives the communication. Frequently, however, he is required to subdivide such a communication and subsequently, re-communicate it in several parts to one or more other operative contributors. While he is doing this, he is a coordinative contributor and his communication may or may not be about resultants. Frequently, it is found that a communication about resultants, when implemented by a breakdown into several re-communications, results in communications about acts. This is particularly true for the lower echelons of middle management. At higher levels, communications about resultants usually imply the necessity of subsequent communica-

tions about sub-resultants. This division, however, is not significant for purposes of this analysis. Consequently, it has not been included in the proposed classification system.

In analyzing managerial activities, i. e., communications about resultants, incentives or acts for classification purposes, it is usually necessary to infer the purpose of the communication. It is a safe assumption that the majority of managers are not themselves aware of the trichotomy of their managerial activities and do not phrase their individual communications so as to make them readily recognizable as belonging into one of the three subclasses. Thus, an inference of the generalized purpose of a communication, in terms of the intention of the communicator, in contrast to its effect on the communicatee, must always precede the classification. This feature tends to make the classification a highly skilled task. It requires appropriate preparation, experience and judgment based on adequate knowledge of the subject matter area which is being classified.

The second major class (classification B, page 24) involves activities of managers which are regarded as non-managerial. The common characteristic of activities in this group is that their immediate purpose does not involve the coordination of activities of operative contributors. Thus, a manager, while engaged in such an activity, is not a coordinative contributor to an organization. As a mat-

ter of fact, he need not even be in organization while performing a non-managerial activity. The first of the three subclasses has been labeled "Preparatory Activities".

Preparatory Activities (B-1)

The immediate purpose of this group of activities is to acquire or to select information from available sources for potential and subsequent managerial communications. Thus, any activity which is intended to enable a manager to communicate, or to communicate more effectively about resultants, incentives or acts, is classified as preparatory. C. I. Barnard describes activities of this kind as "Discrimination of the Environment" (Function of the Executive, pp. 209-210).

It is, however, quite possible that a particular preparatory activity does not result in a communication or that it results in the omission of a previously contemplated communication. If this happens, it is because a decision has been made not to communicate about the particular topic under consideration. Thus, the decision making process is another example of a preparatory activity. Other specific examples are the reading of incoming correspondence, the study of reports which in some cases may, in other cases may not, require a remedial or other managerial action to be taken, or the preparation of notes for a report to be made or a lecture to be given. In short, any personal or thought process or other suitable conditioning

for the subsequent commission of a managerial activity is classified as a preparatory activity. It also includes the selection of a particular channel or medium of communication, as well as the mental process involved in formulating the information and content of the message.

It is fairly evident that a manager must give this phase of his activities rather detailed attention. It appears, however, that this is often done without conscious effort and frequently it is done outside the office or after regular work hours.

Incidentally, it seems appropriate at this point to recognize a difference of opinion among industrial engineers with regard to the classification of the decision making process as a non-managerial activity. If, however, the definition of management as a coordinative function is upheld, then it follows that a decision per se cannot be regarded as a managerial activity. Regardless of the importance of a decision, unless it is communicated and acted upon, it cannot affect the work of the organization. The manager who makes decisions, but does not communicate them is obviously not managing. The quality of the management process on the other hand does depend on the merit of individual decisions coupled with the mechanism by which they are communicated. Hence, communication is the *sine qua non* condition of the management process.

Operative Activities (B-2)

An individual, while engaged in an operative activity, is responding to a managerial communication previously conveyed to him by a coordinative contributor. He is carrying out an activity which represents work of the organization of which he is a member. He is distinctly not coordinating the efforts of other contributors.

The concept of a manager performing operative activities can further be clarified by recognizing that each and every manager or executive looks to his superior or to the established objectives of the organization for coordination of his own activities. These activities he subsequently performs either by coordinating the efforts of others or by coordinating his own efforts with those of other operative contributors. In the latter case, he himself acts as an operative contributor. As an example, a manager, who in preference to instructing someone else to perform a particular job, chooses to perform the task himself, is engaged in an operative activity. Thus, in performing the activity, the manager is discharging a non-managerial function which is part of the usual work of the organization.

Not-Related Activities (B-3)

In the course of a day, a manager performs non-managerial activities which are neither preparatory nor operative. These activities are not directly related to

the effort of the organization. They include personal activities performed during the normal course of a work period. They may be performed with, or in the company of other contributors, or alone. They usually provide personal comfort, social convenience, mental relaxation or stimulation.

Examples of not-related activities are general reading, coffee breaks or the entertainment of visitors at which no business is transacted, writing of personal letters, or conversations not involving organizational matters. To the casual observer, some of these activities might appear as a waste of company time. This, however, is a serious misinterpretation. It is fairly universally recognized that, e.g., an occasional informal bull session about last week's football game or next week's golf tournament adds cohesion and other intangible benefits to an existing organization.

Similarly, the reading of various weekly news media or daily newspapers is usual office routine for many managers. This activity does not directly add anything to the effort of the organization. Thus, not-related activities are those non-managerial activities which do not involve an element or elements essential for continued cooperation. They do, however, provide an atmosphere which is conducive to the improved functioning of the organization.

In reporting, as well as in classifying activities, there are two features which require particular attention.

The first can be described as multipurpose activities. If, e.g., a manager says, "You will be paid time and a half if you complete these assembly drawings by 5:00 P. M. Saturday so that manufacturing can start on Monday", he is communicating about an incentive and a resultant. The statement thus involves two managerial activities.

Another example of a multipurpose activity is when a manager performs work of the organization and at the same time explains the particular activities to a new employee. He is then performing an operative activity and at the same time he is also communicating about acts.

The second feature involves the transition of one activity into another; e.g., prior to the start of a conference or meeting, pleasantries are often exchanged which are not pertinent to the cooperative effort. This obviously is a not-related activity. At a certain point, this conversation is terminated and the conference involving matters related to the cooperative effort starts. At this point, the not-related activity stops and another activity starts.

Another example is when, for instance, general reading - a not-related activity - leads to ideas which are immediately developed for application to the cooperative effort - a preparatory activity.

These two features can always be recognized by the classifier, if the reported or recorded activities show sufficient detail to make the appropriate differentiation

and determination.

The Mechanism of Classification and Recording of Managerial Activities

In order to classify, record and subsequently analyze the activities of managers, it is first necessary to secure a log of such activities. Several methods might be used to obtain this activity log; one of these is described in detail in Chapter IV. Then, starting with the first reported activity, it is evaluated in accordance with the classification system and the time element or elements are entered in the appropriate column of the classification schedule. (See Figure 2.)

This form was devised as a convenient means to record the time distribution of the various activities in accordance with the proposed classification system. The heading of the form provides for the identification of the executive, his position and the industry. The body of the form is divided into twelve columns of which only the first nine are applicable to the classification. The balance of the informational content which is provided in columns 10, 11 and 12 is intended as a basis for further studies which have suggested themselves in the course of the present investigation. These will be outlined at a later and more appropriate stage in this development.

CLASSIFICATION SCHEDULE

EXECUTIVE: _____

POSITION: _____

INDUSTRY: _____ DATE: _____

1	2	3 4 5 6 7 8 9	10	11	12
ITEM	TIME	M I N U T E S	C O D E		
NO.	FROM TO	R I A P O NR NA	ORGANI-ZATIONS	UNIT OR-GANIZA-TION	TYPE OF AC-TIVITY
TOTAL					
AS A %			TOTAL .....%		

Figure 2. Classification Schedule

Column 1.

In this column, each activity is assigned a numerical designation. Ideally, there will be one item in the classification schedule corresponding to one item in the activ-

ity log. In practice, however, due to incomplete reporting, it may be necessary to use a breakdown into two or more classification items for only one reported activity and the time elements associated with each item must be estimated. In such cases, inference, based on experience and judgment, is necessary. This is always the case if, e.g., a multipurpose activity is reported on the activity log as a single activity.

Column 2.

This column refers to the time interval during which each activity takes place. This interval is stated by two vertically placed hour and minute notations. The upper figure represents the start of the activity whose number appears on the next lower row in the items column (column 1). The hour and minute notation (of column 2) in the same row as the item number represents the time of termination of the corresponding activity. As an example, in illustration 3 below, activity number 1 starts at 8:40 and terminates at 8:50. Similarly, activity 4 starts at 8:57 and terminates at 9:01.

Column 1.	Column 2.
-	8:40
1	8:50
2	8:53
3	8:57
4	9:01

Figure 3. Time Entries

This notation insures continuity because each time element reported represents both the beginning of one activity and simultaneously it also represents the time of termination of the activity immediately preceding it. If, for any reason, time gaps of not-reported activities do appear, their duration is shown in the "not-available" column, number 9.

Columns 3 to 8 inclusive, are labeled R, I, A, P, O and NR respectively. They refer to the classification system of activities. The first three are managerial activities, i. e., communications about resultants, incentives or acts, and the last three are non-managerial activities which have been designated as preparatory, operative or not-related.

Column 9.

It has already been stated that this column is used for the accounting of time for which insufficient or no information for classification purposes is available. Ideally, this column will not be used. In practice however there are instances when, in reporting his activities, a manager omits to keep track of his time for a part of the day, and, consequently, there is not enough information for continuous classification of all of his activities. In other instances, an individual may choose not to disclose the nature of some of his activities. There appear to be valid, even though subjective reasons, for such non-disclosures. For such cases, column 9 is provided to

eliminate the possibility of discontinuity of the classification schedule.

Columns 10 and 11.

These are not directly pertinent to the proposed classification system. The information recorded is in coded form and refers to the organization (column 10) and unit organization (column 11) to which the particular activity is being contributed. In this case, the code letter "a" is always taken to refer to the employer's organization. Letters b, c, d, etc., apply to other organizations to which the individual manager from time to time contributes his activities. These might include social, fraternal, professional, political, religious or civic organizations, as well as his own family. A convenient summary of organizations can be prepared in tabular form as shown in Figure 4.

Code	Organization
a	ABC Manufacturing Co. - Employer
b	Hill City Rotary Club
c	Presbyterian Church
d	Hill City School Board
e	Boy Scouts of America

Figure 4. List of Organizations

In column 11, reference is made to the unit organization in which the activity is performed. As a rule, this will apply to individuals singly or in relatively small groups, such as committees, boards, departments or other similar agencies.

For convenience, these are again coded in the classification schedule. The coding symbols used are numbered 1, 2, 3, ... etc. A list of unit organizations can also be helpful and a suggested form is shown in Figure 5.

Code	Unit Organization
1	Miss Smith - Secretary - Subordinate
2	Mr. McWilliams - President - Superior
3	Mr. Jones - Production Manager - Subordinate
4	Mr. Brown - Customer's Attorney
5	Mr. Robinson - Supplier's Salesman
6	Mr. Berry - Internal Revenue Service Agent
7	Mr. Winter - Program Chairman, Lion's Club
8	Mr. O'Tool - Vice President, Financial - Not Subordinate

Figure 5. List of Unit Organizations

The list of unit organizations includes, in applicable instances, a reference to the relative organizational

rank. This is expressed as "subordinate" or "superior" to the individual whose activities are being classified. In the case of the customer's attorney (code item 4), or supplier's salesman (code item 5) or Internal Revenue Service agent (code item 6), the designation of superior or subordinate obviously does not apply. The previously proposed designation of coordinative or operative contributor is, however, generally applicable because it is independent of organizational rank. The determination of this designation is inherently included in the classification schedule of activities.

Frequently, unit organizations are composed of more than two people. Whenever this is the case, it should be so recorded by a multiple entry in column 11 of the classification schedule or in the list of unit organizations by a single code number for a specified group of people.

Column 12.

This column is used to designate the type or kind of activity involved. The information contained in this column is not directly associated with the classification system. It does, however, permit an insight into the method by which the various classified activities are performed. The symbols used are as follows:

TC - Telephone conversation

PC - Personal conversation

OWM - Originating written material

RWM - Reading written material

GR General reading

TR Local transportation

TO Time out (off the job)

MT Manual task

PER - Personal activities

IPF - Inspection of physical facilities

This listing of descriptions of the type or kind of activities does not purport to be exhaustive. It was, however, found to be adequate to describe all activities reported and analyzed in Chapter IV.

Summary

In this chapter, the proposed classification system was formulated and the mechanics of classification of managerial work was outlined. A hypothesis relating to the merit of the proposed classification was made and criteria for its evaluation have been delineated. In the next chapter, a method of analysis of classified activities will be suggested.

CHAPTER III

ANALYSIS OF CLASSIFIED ACTIVITIES

In the hypothesis, it was stated, among other things, that the proposed classification system permits the comparison and prediction of the behavior pattern of managers.

Comparison of Managerial Behavior Patterns

It has previously been shown in Chapter II that a managerial behavior pattern consists of a distribution of various activities. In order to compare two or more patterns, it thus follows that the distribution of activities, which constitute the pattern, must be expressed in a way which lends itself to rational comparison. At the present time, no such mechanism is available. Hence, the first step of comparison involves the establishment of such a mechanism.

In contrast to this, physical sciences provide excellent means for the comparison of identifiable characteristics. Thus, a statement to the effect that an object weighs 3,000 pounds, is 20 feet long and moves with a velocity of 50 miles per hour on a slope of 2% is meaningful only because the various measures of weight, length, speed, and slope have previously been defined and accepted as a

basis of comparison of the characteristics they describe. Thus, the process of measurement is an absolute value comparison.

Another method applies for comparing two or more objects with each other directly. It utilizes only those characteristics of the objects to be compared which are significant in terms of representing a variation between the objects. Thus, one might compare two or more objects of different weight and different lengths moving at varying speeds on different slopes. The statement of comparison then would involve only relative values such as heavier, longer or shorter, faster or slower and more or less inclination. The actual difference in each characteristic can again be expressed in quantitative terms. This quantification, however, is theoretically independent of an absolute scale. The statement that one car is twice as heavy or half as long as another is self-explanatory and independent of any standard value. By contrast, this is a relative value comparison.

Before proceeding further with the comparison of managerial activities, one more analogy from mechanics appears desirable. Two or more mechanical characteristics of an object may be combined according to certain fundamental laws to yield resultant effects. In the example given, an object of 3,000 lbs. was moving at 50 m.p.h. This represents a momentum of:

$$\frac{3000}{32} \times \frac{88}{60} \times 50 = 6,875 \text{ lb. sec.}$$

If the momentum of a moving body were to be considered as the basis of comparison, it must be remembered that an infinite number of different combinations of weight and constant velocity, all within a constant gravitational field, will give the same momentum. Similarly, the same acceleration of a body can be obtained by an infinite number of combinations of force and mass.

In comparing managerial activities on the basis of the proposed classification, a number of characteristics have suggested themselves. These, in an extended sense, are analogous to the concepts of weight, size, velocity, etc. The analysis also provides a means for quantifying these characteristics and thus a relative value comparison is possible. Also, combinations of two or more characteristics may yield effects which have, however, not been included in this study. Following the analogy of mechanics, it is furthermore quite possible that a variety of different characteristics may combine to give identical effects.

Prediction of a Managerial Behavior Pattern

Prediction of a managerial behavior pattern is possible for a homogeneous group of managers and is based on statistical concepts of probability. Using again the previous example, assume that the weight of a large number of automobiles is established. It is found that they vary from 1,000 lbs. to 5,000 lbs. and that the mean weight is 3,000 lbs. Using the statistical concept of the "t" dis-

tribution, it is possible to establish a confidence interval on the mean. Let it be assumed that the 95% confidence interval on the mean was found to be ± 500 lbs. This then means that upon repeated sampling of the universe of automobiles, 95 out of 100 sample averages will be contained in the interval between 2,500 and 3,500 lbs.

The statistical analysis leading to prediction of the managerial behavior pattern is based on this type of analysis and includes some refinements involving only an analysis of variance and Duncan's Multiple Range Analysis.

Microanalysis of Activities

The analysis of activities can be carried out with variable degrees of precision. Just as a distance can be measured to the nearest mile, or foot or inch or thousandth of an inch, so activities can be broken down into fundamental components of varying size. The purpose of the measurement will usually suggest the extent of the desirable accuracy. Consider, as an example, a hypothetical conversation between the President of the ABC Manufacturing Company and his secretary.

(a) President: "Miss Smith, I am leaving for Pittsburgh in the morning and will be out of the office for the next three days. You will have to reschedule my appointments."

(b) Secretary: "You have an appointment tomorrow at 11:00 A. M. with Mr. Jones of X Com-

pany on the Uptown plant purchase."

(c) President: "Ask Mr. Jamison to talk to him and see that he has the correspondence file."

(d) Secretary: "Mr. Jamison is not expected back until tomorrow noon. He was delayed in Philadelphia."

(e) President: "In that case, call Mr. Jones and postpone the appointment to suit Mr. Jamison."

(f) Secretary: "Then there is the policy committee meeting on Friday, etc., etc., ..."

Microanalysis of this conversation would yield the following classification of activities:

(a) Communication about a resultant.

(b) Communication about an act.

(c) Communication about a resultant.

(d) Communication about a resultant.

(e) Communication about a resultant.

(f) Communication about an act.

In microanalysis, each part of the conversation is considered as a separate activity. The duration of each activity is only a few seconds and the value of this accuracy in the breakdown, for purposes of analyzing a managerial behavior pattern, is questionable.

Macroanalysis of Activities

On a larger scale, which, in this dissertation is originally designated as macroanalysis, the entire conversa-

tion would be classified as a managerial communication about resultants from the president with the secretary acting as an operative contributor. This is obviously more meaningful for purposes of the present analysis.

Macroanalytic Concepts

The analysis of the classification schedule provides the means for evaluating several concepts which may in turn be used for the purpose of comparing and predicting the managerial work pattern. These concepts have been isolated and a terminology is suggested in the following passages of this section:

1. The Time - Activity Ratio (TAR)

   This concept is a characteristic of the mean duration of activities. It may be considered a measure of the dispersion (or scatter) of the over-all activity pattern (i. e., managerial and non-managerial). It is expressed in minutes per activity and can be computed from the classification schedule directly. <u>The time-activity ratio is defined as the ratio between total reported work time in minutes and the total number of activities performed.</u> It can be evaluated on any convenient time basis, either daily, weekly, or other basis. Obviously, the higher the level of dispersion of activities in any selected time in-

terval, the lower will be the numerical value of TAR.

The time-activity ratio has been proposed as an indicator of a particular phase of the managerial performance pattern. Specifically, it is proposed as a measure of dispersion of activities. What then is the significance of such a measure?

Quite obviously, a manager, in the course of a day's work, performs a variable number of separate and distinct activities. Neglecting differences in the duration of a normal workday, it follows that the larger the number of separate activities, the shorter will be the time duration of each individual activity and the dispersion of activities will be greater. This involves a more frequent transfer of the manager's attention from one activity to the next one. Each such transfer requires the expenditure of mental effort in addition to that required for the performance of the activity itself. Thus, the greater the dispersion, the greater will be the demand on the mental capacity of the manager.

In an extended sense, this is analogous to the span of control which in classical

management science was developed as a means to limit delegation and supervision to realistic levels. While the span of control has been optimized empirically[1], it is premature to attempt more than a quantification of the time-activity ratio at this time. When and if an optimization of the TAR is possible, however, it will be more meaningful than the span of control which involves only the number of actual communication centers directly subordinate to the individual manager and does not take into consideration either the frequency of contact or other activities which do not involve these subordinate communication centers.

The formal span of control which appears on organization charts is easily determined for any manager who is included in such a chart. The actual, or true, span of control of an individual manager may coincide with that which is formally charted for him. Frequently,

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[1]Ernest Dale, Planning and Developing the Company Organization Structure, New York, AMA 1952, p. 60.

however, it does not coincide. If it does not coincide, it can either be greater or less than charted and this is often recognized informally by the other contributors to his unit organization. The individual himself is frequently not aware of any variation between his actual and charted span of control. This is particularly true if the actual is less than the charted span.

The time-activity ratio is quantified on the basis of an actually observed pattern of behavior. Hence, its determination is more tedious. It is, however, more inclusive than the span of control and is an over-all measure of the dispersion of a manager's daily activities.

2. The Mean Communication Ratio (MCR)

This concept represents the density of the managerial performance pattern. It is expressed as a percentage of time. It is defined as the ratio of time spent in managerial activities (i. e., communication about resultants, incentives and acts) and the total work time.

Here again, the mean communication ratio can be expressed on any convenient time basis. It is self evident that in

comparing ratios between different individuals, the time bases must be consistently chosen. A value of 100% MCR (Mean Communication Ratio) implies that in the selected period of time, the manager has performed exclusively managerial activities (i. e., communications about resultants, incentives and acts). Similarly, zero % MCR means that the manager has performed no managerial activities at all.

It has been stated in Chapter I (page 3) that the process of management involves the initiation and perpetuation of organized activity by means of communication. Thus, the density of a managerial behavior pattern is proportional to the extent to which he communicates. The mean communication ratio yields a quantification of such a pattern. Managers with high MCRs spend proportionately more time in purely managerial activities than managers with low MCRs.

It is reasonable to expect that on the basis of experience and observation, this value may, at some time in the future, be optimized. Quite obviously, such an optimization will be contingent on several fac-

tors relating to particular managerial environments. As an example, one would logically expect a lower MCR for a working foreman than for a company president.

Other factors would include the extent of preparation or other conditioning necessary prior to communication. It is again emphasized that preparatory activities are not managerial activities because they are not communicatory by nature. Thus, managers of organizations involving many specialized activities, which require large amounts of time for preparation and which utilize highly motivated and well qualified individuals as operative contributors, would generally have low MCR.

The classification of communications into those about resultants, incentives and acts logically leads into a corresponding breakdown of the MCR into the "R", "I" and "A" ratios as is discussed below.

3. The "R" Ratio

This is a measure of the relative emphasis on communications about resultants. It is expressed as a percentage of time. <u>It is defined as the ratio of time spent in communications about resultants and the total time spent in managerial activities.</u>

4. The "I" Ratio

This is a measure of the relative emphasis on communications about incentives. It is expressed as a percentage of time. It is defined as the ratio of time spent in communications about incentives and the total time spent in managerial activities.

5. The "A" Ratio

This is a measure of the relative emphasis on communications about acts. It is expressed as percentage of time. It is defined as the ratio of time spent in communications about acts and total time spent in managerial activities.

The above three ratios are measures of the emphasis which managers place on each of the three classes of communication.

In general, one might expect a high "R" ratio (i. e., proportionately heavy emphasis on communications about resultants) in cases where organized activity is to be initiated (rather than perpetuated) or where a partial or total reorientation of organizational objectives is in progress.

"I" ratios are a measure of the extent of communications deemed necessary to produce willingness to contribute acts toward a unit

organization. Thus, the "I" ratio (i. e., relative emphasis on communications about incentives) can be expected to be high for managers dealing with low paid or initially poorly motivated contributors. Also, communications about non-material incentives are more time consuming than those dealing with material incentives. Thus, the activity pattern of managers who are frequently compelled to dispense non-tangible incentives would tend to show comparatively high "I" ratios.

The "A" ratio measures the emphasis which a manager, by virtue of his communications, bestows on the perception of necessary acts. It is well known that an organization can continue to exist only if appropriately specialized acts continue to be contributed. No amount of enthusiasm for the organization can replace the knowledge or perception of these acts. Thus, the "A" ratio is an indicator of the amount of communication directed toward details of execution. It appears reasonable to expect that lower echelons of management will have higher "A" ratios than high echelons. It is equally probable that the reverse is true for the "R" ratio.

6. The Mean Communication Period (MCP)

This is a measure of the average duration of communications. It is expressed in minutes per communication and is defined as the ratio of total time in managerial activities (i. e., communication about resultants, incentives and acts) and the total number of communications performed in the corresponding time interval. Here again, the MCP can be referred to a daily, weekly or any other convenient basis of observation. The only requirement is that, for comparison purposes, consistency in the observational time basis must be practiced.

Managers are usually at liberty to use their own judgment in selecting channels or media of communication with operative contributors. They are also free to use their own preferred style of expression in both oral and written communications. With the exception of possibly some military type organizations, managerial communications are not standardized.

In view of this, it appears desirable to establish a criterion by which the variation of style of communication can be recognized. Several such criteria might be sug-

gested. In this study, it was decided to use the average duration of communication as the distinguishing characteristic. Thus, an individual who tends to have low MCPs is likely to be concise in his communications.

In applying this, or any other macroanalytic concept, it must be remembered that they represent mean values over a given period of time.

The above six macroanalytic concepts have actually been used as a basis for comparison and/or prediction of managerial work patterns. Results of this analysis, their use and interpretation are given in Chapter IV.

In some cases, it may appear that other or additional concepts for evaluating particular characteristics would be desirable. The presentation of the above six concepts is not intended to preclude the development of additional concepts. Rather, this analysis should be considered as an approach to the systematic study of managerial work. For instance, many a manager is required to divide his time and effort among several organizations fairly regularly. If this is the case, and if it is further suspected that this has an effect on the work pattern, it would appear desirable to quantify this as a managerial proliferation effect.

Columns 10 and 11 of the classification schedule lend themselves to the evaluation of a "Relative Proliferation

Coefficient". This is another new concept which, however, has not been included in the study reported in Chapter IV, but which may be significant in other investigations. The relative proliferation coefficient (RPC) has been defined by the author as follows:

$$RPC = \frac{\text{Number of Unit Organizations}}{\text{Number of (Unit Organizations - Organizations)}} - 1$$

The RPC is a measure of the range of influence which a manager exercises who regularly contributes activities, as a coordinative contributor, to several organizations. The effect of contributing activities to two or more organizations in coordinative capacities may actually be twofold, namely, interorganizational and intraorganizational. It would appear that proliferation with respect to organizations will increase interorganizational influence without necessarily affecting intraorganizational influence to any significant extent. The latter appears to be associated with the number of unit organizations within each organization as well as with other factors.

The above equation is based on an average number of unit organizations within each of the organizations to which managerial activities are contributed. Thus, it does not differentiate between the individual who contributes to a total of say four organizations with twenty unit organizations in each (i. e., eighty unit organizations) and another, who also contributes to four organizations with, however, seventy-seven unit organizations in one of them

and one in each of the other three organizations.

Another way to express this relationship is to say that the relative proliferation coefficient is a function of the ratio between the total number of unit organizations to which managerial activities are contributed and the number of organizations to which they pertain. This ratio is designated as the U. O. Ratio. The relative proliferation coefficients for U. O. ratios from 2 to 20 have been computed and are given below in Figure 6.

U. O. Ratio	RPC
2.00	1.000
2.50	0.670
3.00	0.500
3.33	0.430
4.00	0.330
5.00	0.250
6.67	0.180
10.00	0.110
15.00	0.072
20.00	0.053

Figure 6. Table of Relative Proliferation Coefficients

As an example: Managers, who regularly contribute managerial activities to two, three or four organizations with a total of ten unit organizations would have RPCs of 0.25, 0.43, 0.67 respectively. If twenty unit organizations are involved, the corresponding RPCs would be 0.11, 0.18, 0.25 respectively. This implies that a manager's range of interorganization influence increases as he contributes to more and more organizations (in a managerial capacity) and that it decreases as the total number of unit organizations increases, while, in each case, other conditions remain constant.

This statement is readily substantiated by reduction of the RPC equation (p. 61) to the following form:

$$RPC = \frac{1}{\frac{x}{y} - 1}$$

where:

x = number of unit organizations

y = number of organizations.

From the nature of the conditions previously discussed, it follows that:

$$x > y > 1$$

hence

$$\frac{x}{y} > 1$$

and the RPC is always positive.

Hence, if x (i. e., number of unit organizations) increases and y (i. e., number of organizations) remains constant, the RPC decreases. Similarly, if y increases and x remains constant, the RPC will increase.

It has been stated that the RPC is primarily a measure of interorganizational rather than intraorganizational influence. In other words, it will measure the effect of changes in the number of organizations, rather than unit organizations, to which a manager contributes coordinating activities. On a purely theoretical basis, this statement is not substantiated by the above equation. In practice, however, it must be recognized that the number of unit organizations is substantially larger than the number of organizations; $x \gg y$ and both must be integer numbers. Thus, a change of the y quantity will have a greater effect on the ratio of x over y than an equal numerical change of the x quantity would have.

Thus, for practical purposes, changes in the number of organizations will be reflected to a larger extent in the relative proliferation coefficient than equal changes in the number of unit organizations.

Summary

In this chapter, several new concepts have been developed and defined. These concepts serve as a basis for quantifying the managerial work pattern. The mechanism for evaluating these concepts numerically has also been

presented. A statistical treatment of quantified concepts suitable for prediction and/or comparison purposes was briefly mentioned.

In the following chapter, an actual research study is reported. It includes examples of an activity log, a classification schedule, quantification of macroanalytic concepts and finally a detailed description of the statistical treatment.

CHAPTER IV

A CASE STUDY

In order to test the feasibility of the proposed classification system and the potential value of the subsequent analysis, a complete classification and analysis was actually performed.

For this purpose, a criterion group had to be selected. This group consisted of eleven successful executives. If a scale of success and failure were to be applied, the eleven individuals would all be fairly close to the right-hand side of the scale of Figure 7. This is approximately represented by the shaded area.

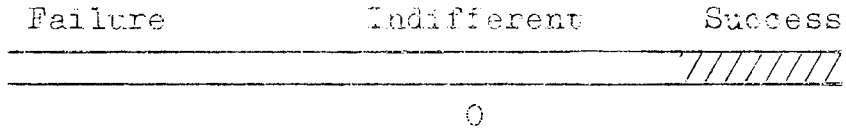

Figure 7. Performance Scale

The criterion group was homogeneous in the sense that all members had achieved status in their respective organ-

izations. They had all been promoted to their present offices from positions of lesser responsibility, i. e., they enjoyed the recognition of superior accomplishment and competence. None of them own a controlling interest in their respective companies, nor are any of them known to be related by blood or marriage to such an interest holder.

These eleven people were contacted and asked for their cooperation in this study. They were asked in particular to keep a record of their activities for at least three days. The instructions to them are reproduced in the Appendix on pages 124 to 127.

In this way, a total of 41 man-days of recorded activities was obtained, totaling 1,236 separate activities by these eleven executives.

The activity records were solicited on the basis that individuals as well as companies would remain anonymous. Consequently, it is not feasible to present the activity records in their original form. However, in order to present an example of such a record and to show the subsequent classification, an activity log for one day of an otherwise unidentified executive is presented in the Appendix, Table I (p. 128). All reference to company names has been deleted in this sample reproduction. In all other respects, however, the record is presented in its original form.

The classification schedule presented in the Appendix, Table II (pp. 136-139) is based on the above activity log.

It utilizes the form previously discussed in connection with Figure 2.

The corresponding lists of organizations and unit organizations are also reproduced in the Appendix, Tables III and IV on pages 140 - 142, as shown in Figures 4 and 5 respectively. Here again, in deference to propriety, names of individuals or companies have been blanked out.

In other phases of the subsequent analysis, the participating executives are identified by the numbers 1 to 11 inclusive. Their position and industry are given below:

Executive No. 1.

Compensations and Benefits Administrator
Petroleum Industry

Executive No. 2.

Superintendent
Petroleum Industry

Executive No. 3.

Manager of Engineering
Petroleum Industry

Executive No. 4.

Vice President
Public Utility Company

Executive No. 5.

Vice President
Public Utility Company

Executive No. 6.

Dean
Institute of Higher Learning

Executive No. 7.

Manager, Administration Department
Aircraft Industry

Executive No. 8.

Executive Vice President
Engineering Services Industry

Executive No. 9.

Manager, Engineering Department
Petroleum Industry

Executive No. 10.

Vice President, Operations
Petroleum Industry

Executive No. 11.

Department Head
Institute of Higher Learning

The cooperation of these eleven executives made the present study possible. In providing a record of their activities for a total of 41 man-days, they supplied the raw data on which the present analysis is based.

From the sample classification schedule, which is reproduced in the Appendix on pages 136-139, the following summary observations are obtained.

This particular executive reported seventy-nine separate activities (Column 1) covering a total of 486 minutes (Column 2) for this particular day. Within this period, he communicated about resultants (Column 3) 53 minutes, about incentives (Column 4) 4 minutes and about acts (Column 5) 210 minutes. Thus, his total "Managerial Activities" for that day consumed 53 + 4 + 210, or 267 minutes. He prepared to communicate 93 minutes (Column 6), he was an operative contributor for a total of 70 minutes (Column 7) and he performed "Not-Related Activities" for 56 minutes

(Column 8).

During the course of his day's work, he contributed his activities to three different organizations and twenty-seven different unit organizations. As was mentioned previously, a listing of these is presented in the Appendix on pages 140-142.

Evaluation of Macroanalytic Concepts

From the above summaries, the following quantifications of this particular behavior pattern are possible:

1. Time-Activity Ratio (TAR)

$$TAR = \frac{\text{Total work time}}{\text{Number of activities performed}} = \frac{486}{79} =$$

6.2 minutes per activity.

2. Mean Communication Ratio (MCR)

$$MCR = \frac{\text{Time in communication}}{\text{Total work time}} = \frac{267}{486} =$$

0.55.

Hence, MCR is 55%.

3. The "R" Ratio

$$\text{"R" Ratio} = \frac{\text{Total time in "R" communication}}{\text{Total time in communication}} =$$

$$\frac{53}{267} = 0.198.$$

Hence, the "R" Ratio is 19.8%.

4. The "I" Ratio

$$\text{"I" Ratio} = \frac{\text{Total time in "I" Communication}}{\text{Total time in communication}} =$$

$$\frac{4}{267} = 0.015.$$

Hence, the "I" Ratio is 1.5%.

Note: All percentages in the present analysis are rounded off to the nearest one per cent. Thus, in subsequent tabulations or computations, the above "R" and "I" ratios will be shown as 20% and 2% respectively.

5. The "A" Ratio

$$\text{"A" Ratio} = \frac{\text{Total time in "A" Communications}}{\text{Total time in communication}}$$

$$= \frac{210}{267} = 0.78.$$

Hence, "A" Ratio is 78%.

It will be observed that for a uniform observation period, the sum of the "R", "I" and "A" ratios will invariably be 100%.

6. The Mean Communication Period (MCP)

$$\text{MCP} = \frac{\text{Total time in Communication}}{\text{Total number of communications}} = \frac{267}{46} =$$

5.80 minutes per communication.

Hence, the Mean Communication Period is 5.8 minutes per communication.

In other words, the average duration of all types of managerial activities (i. e., communications about resultants, incentives or acts) for this particular individual

on the day of observation was 5.8 minutes.

It will be observed that, in all cases, the above sample computations of the macroanalytic concepts are based on an observation cycle of one day as reported in the activity log (pages 128-135) and the classification schedule (pages 136-139). The balance of the available information, which was obtained from the eleven participating executives, is presented in summary form only. Every item in the summary is based on a one-day observation cycle and is shown in Table V, under the heading of "Summary of Classification Schedules" (pages 143-144).

The Summary of Classification Schedules

(Table V, pages 143-144)

As the name implies, this Table is used to present, in summary form, all the essential information from the detailed and individual classification schedules. In particular, it is a convenient device for the rapid evaluation of some of the macroanalytic concepts for a large number of individuals whose activities have been classified. It is compiled from the totals appearing at the end of each classification schedule. One such sample covering a one-day observation cycle is presented on pages 136-139.

The summary of classification schedules has twelve vertical columns. The entries in these columns correspond closely to their counterparts in the classification sched-

ule.

Column 1.

This column serves only to identify and to separate the individuals whose classified activities are being summarized. This is accomplished anonymously by means of the numerical code as previously discussed.

Columns 2 to 8 inclusive.

The entries in these columns represent the percentage of time spent in the particular classified activity on the day of observation.

Columns 9 and 10.

These refer to the total number of different organizations and unit organizations respectively to which classified activities have been contributed. It has been stated previously that this information may be useful in some instances but that it has not been used in the analysis which is reported here. An example is the relative proliferation coefficient.

Column 11.

This refers to the time element of the cycle of observation and represents the total time, in minutes, during which activities are reported and classified. Thus, it is the sum of the individual time elements of all report-

ed and classified activities.

Column 12.

This column is used to record the total number of activities reported during the observation cycle.

It will be noted that the summary of classification schedules utilizes a varying number of horizontal rows of entries for each executive. Each row represents one observation cycle which in this case is one day (or part of a day).

The number of such observation cycles varies for different executives. Statistically, this implies a non-uniform sample size and introduces a slight complication in the subsequent analysis. This point will be discussed in more detail later in this chapter.

In connection with this study, forty-one observation cycles for eleven executives were available for classification. Consequently, forty-one classification schedules were prepared. Each one was summarized and is represented by one horizontal row. The total number of individual activities is 1,236. This figure can be obtained by actual count from the classification schedules or by totaling Column 12 of the summary of classification schedules.

Of the 1,236 separate activities, 642 are managerial (i. e., communications about resultants, incentives or activities). The rest are non-managerial (i. e., preparatory, operative or not-related) activities.

From the summary of classification schedules, the macroanalytic concepts for each executive for the corresponding observation cycle are computed as was demonstrated in the sample computations. These are summarized in the Summary of Macroanalytic Concepts, Table VI (pages 145-146)

Summary of Macroanalytic Concepts

(Table VI, pages 145-146)

The organization of this Table is analogous to the summary of classification schedules. Column 1 serves to identify the individual executive. Columns 2 to 7 inclusive are used to report the quantifications of the six macroanalytic concepts as previously defined and computed. All of these, except the mean communication period, can be computed from the summary of classification schedules. The MCP, however, must be computed, for obvious reasons, from the individual classification schedules as was previously demonstrated.

Statistical Treatment of Macroanalytic Concepts

Up to this point in the analysis, we have been concerned with the classification of activities of managers and with the establishment of a quantitative concept delineating several parameters of a manager's work pattern. This was accomplished in four distinct steps which are sum-

marized below:

1. Activity Logs. In this study, they were obtained from a particular criterion group consisting of eleven successful executives for a total of forty-one man-days. (See sample activity log on pages 128-135.)
2. Classification Schedules. These were prepared from the activity logs by classifying each reported activity and entering it in the appropriate column. In the present study, forty-one such schedules were prepared. One of these is reproduced as a sample classification schedule on pages 136-139. In all, there was a total of 1,236 activities to be classified. The satisfactory completion of these forty-one classification schedules suggests very strongly that the proposed classification is indeed possible. It will be remembered that the possibility of classifying the activities of managers was the first part of the hypothesis stated on page 17.
3. Summary of Classification Schedules. Individual classification schedules tend to be bulky and cumbersome to handle, particularly for a criterion group of eleven individuals. Furthermore, for purposes of the present study, only the totals for each classified activity

and their corresponding time elements are significant. These totals are made conveniently available in the summary of classification schedules as shown in Table V (pages 143-144).

4. Summary of Macroanalytic Concepts. This compilation represents a convenient summary of information necessary for the statistical treatment which follows. In effect, it is a parametric description of a manager's work pattern in which the quantified macroanalytic concepts represent actual measures of particular characteristics. The method of computing these various concepts has previously been discussed and sample computations have been presented on pages 70 and 71. A complete summary of macroanalytic concepts for all eleven executives, computed on a daily basis for a total of forty-one man-days, is given in Table VI (pages 145-146).

The above four steps are necessary preliminaries for the statistical analysis which will be performed next. This phase of the present study is concerned with the second part of the hypothesis which stated that the proposed classification is useful. Usefulness, in turn, was interpreted to imply that comparisons and/or predictions of the

managerial work pattern can be made.

The statistical treatment involves an analysis of variance of each daily macroanalytic concept for all individual executives in the criterion group. Since the macroanalytic concepts are evaluated as mean values, they will have distributions which approximate the normal and thus lend themselves to an analysis of variance.

With this informational background, the analysis of variance of the time activity ratio (TAR) can be performed.

The Time-Activity Ratio

Daily TARs (i. e., the average duration of activities) are listed vertically below each other for the same individual whose coded identification appears at the top of each column (1 to 11 in Table VII).

The calculated F value is 4.59 (Table VIII), whereas the tabulated F value for the corresponding degrees of freedom and at the 95% probability level is found to be 2.16.[1]

Thus, F calc) F tab.

The implication of this finding is that the null hypothesis must be rejected at the 95% level. Hence, there are significant differences between the TAR values of the execu-

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[1]See any table of probability points of the F distribution, where $\alpha = 5\%$, $\phi_1 = 10$ and $\phi_2 = 30$, e.g., Albert H. Bowker and Gerald J. Lieberman, Engineering Statistics, Prentice-Hall, Inc., 1959, p. 560.

TABLE VII

TABULATION OF DAILY TAR

Days ↓ \ Executives	1	2	3	4	5	6	7	8	9	10	11	
1	6.2	10.1	12.8	24.6	12.1	17.2	8.2	16.0	17.6	26.5	16.2	
2	23.3	14.5	11.4	34.4	20.6	21.5	16.0	14.0	18.4	19.8	18.4	
3		18.5	16.2	27.4	13.0	15.4	12.9	18.1	14.9	22.1	16.3	
4						13.5	11.0	14.2				
5						17.8	13.7	15.3				
6						20.8						
7						24.6						
8						14.1						
Σ(TAR)	29.5	43.1	40.4	86.4	45.7	144.9	61.8	77.6	50.9	68.4	50.9	699.6
Mean TAR	14.75	14.37	13.47	28.80	15.23	18.11	12.36	14.52	16.97	22.80	16.97	

The above tabulation is taken directly from the summary of macroanalytic concepts.

TABLE VIII

ANALYSIS OF VARIANCE OF TAR

Source	Degrees of Freedom	Sum of Squares	Mean Square	F
Total	40	$(6.2)^2 + (23.3)^2 + \cdots + (18.4)^2 + (16.3)^2 - \frac{(699.6)^2}{41} = 1{,}197.92$		
Between Executives	10	$\frac{(29.5)^2}{2} + \frac{(43.1)^2}{3} + \cdots + \frac{(68.4)^2}{3} + \frac{(50.9)^2}{3} - \frac{(699.6)^2}{41} = 724.73$	72.47	
Error	30	1,197.92 - 724.73 = 473.19	15.77	4.59

tives in the criterion group.

The next logical question is: Where, i. e., between which executives, are the differences in the mean TAR value significant? If this question can be answered satisfactorily, it might also be possible to establish subgroups of executives within the criterion group which have no significant differences in their mean TAR values.

A statistical test, known as Duncan's New Multiple Range Test[2], can be adapted to this determination. In general, this test is run if an analysis of variance has rejected the null hypothesis (i. e., rejected the hypothesis that there are no significant differences between the means) and it is desired to determine which particular differences are significant and which are not.

In other words, the analysis was initiated for a criterion group of eleven executives who are recognized to be homogeneous with respect to their success in a managerial position. Their mean TARs have been evaluated and it was found that the group is not homogeneous with respect to this particular macroanalytic concept. The next item to be considered is the determination of homogeneity of subgroups with respect to the same macroanalytic concept (i. e., TAR). This is accomplished by the previously mentioned new multiple range test.

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[2]David B. Duncan, "Multiple Range and Multiple F Tests," Biometrics, Volume XI, No. 1. (March, 1955), pp. 1-42.

The data necessary to perform this test are:

1. The mean TAR for each executive
2. The standard error of each mean
3. The degrees of freedom on which this standard error is based.

1. Mean TAR. The mean TARs are readily available from Table VI. For purposes of this test, it is, however, convenient to tabulate these means in ranked order of magnitude as shown in Table IX.

TABLE IX

RANKED TAR MEANS

Mean TAR	Executive
12.36	7
13.47	3
14.37	2
14.52	8
14.75	1
15.31	5
16.97	9
16.97	11
18.11	6
22.80	10
28.80	4

2. Standard Error of the Mean. The standard error of the mean (s_m) is a well established statistical concept and is readily computed in cases where the sample size within each variety is the same. Where the sample size is not uniform, as is the case here, an equivalent sample size is computed by the following equation:[3]

$$n' = \frac{1}{E-1}\left(N - \frac{n_1^2 + n_2^2 + \ldots n_n^2}{N}\right)$$

where:

n' = Equivalent sample size

E = Number of varieties, i. e., Executives; in this case $E = 11$

N = Total number of samples, i. e., TARs available; in this case $N = 41$

n_1, n_2, n_n = Number of samples in each variety, i. e., number of TARs for Executives 1, 2, ... n. In this case, e.g., $n_1 = 2$, $n_2 = 3$, $n_3 = 3$, $n_6 = 8$, $n_7 = 5$, $n_{11} = 3$.

Hence:

$$n' = \frac{1}{11-1}\left[41 - \frac{4 + 7 \times 9 + 2 \times 25 + 64}{41}\right] = 3.65$$

and the standard error of the means TARs of the executives

$$s_m = \sqrt{\frac{15.77}{3.65}} = 2.08.$$

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[3]Adapted from G. W. Snedecor, Statistical Methods, Iowa State College Press, Ames, Iowa, p. 270.

If each executive had reported his activities for the same number of days (say 3), the computation of the standard error would have been somewhat more direct. In that case, $n_1 = n_2 = n_3 = \ldots n_{11} = n = 3$

and consequently $n' = n = 3$;

thus

$$s_m = \sqrt{\frac{m.s.}{n}} = \sqrt{\frac{15.77}{3}}.$$

3. Degrees of Freedom. The standard error is based on a certain number of degrees of freedom, as has been shown in the analysis of variance. Since there are, in this case, forty-one TARs for eleven executives, the error is based on (41 - 1) - (11 - 1) or 30 degrees of freedom.

With this information, statistical tables can be used. A table of special significant studentized ranges is entered for a 5% level test at the row representing 30 degrees of freedom and for columns representing the number of items (p) between which the minimum significant range is to be computed. Thus, in this case, p = 2, 3, 4 ... 10, 11 and their corresponding tabulated values are: 2.89, 3.04, 3.12, 3.20, 3.25, 3.29, 3.32, 3.35, 3.37 and 3.37 respectively.[4]

The shortest significant range between p items is R_p and is obtained by multiplying the standard error

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[4]David B. Duncan, "Multiple Range and Multiple F Tests," Biometrics, Volume XI, No. 1, (March, 1955), p. 3.

of the mean by the tabulated value corresponding to p. Thus:

$R_p = s_m$ x Tabulated value and

R_2 = 2.08 x 2.89

R_3 = 2.08 x 3.04, etc.

It is convenient to arrange the computation in the form of a worksheet arrangement as shown below in Table X.

TABLE X

MULTIPLE RANGE TEST ON TAR

p	R_p	Mean	Executive	Subgroup A	Subgroup B	Subgroup C
1	-	12.36	7			x
2	6.02	13.47	3			x
3	6.32	14.37	2			x
4	6.48	14.52	8			x
5	6.64	14.75	1			x
6	6.75	15.23	5			x
7	6.83	16.97	9		x	x
8	6.90	16.97	11		x	x
9	6.96	18.11	6		x	x
10	7.00	22.80	10	x	x	
11	7.07	28.80	4	x		

Note: Any two means contained within the same subgroup as denoted by "x" are not significantly different. Any two means not contained within the same subgroup are significantly different.

The method of assigning the subgrouping is based on the relative magnitude of the difference between means and the corresponding shortest significant range. The test is described below.

The differences between means are tested in the following order: The largest mean minus the smallest mean, the largest mean minus the second smallest up to the largest minus the second largest.

Thus, in the case of this example, the order is (28.80 - 12.36), (28.80 - 13.47) and so on to (28.80 - 22.80). With only one exception, given below, each difference is significant if it exceeds the corresponding shortest range; otherwise it is not significant. Since (28.80 - 12.36) is the range of eleven means, it must exceed $R_{11} = 7.07$, the shortest significant range of eleven means, to be significant. Similarly, because (28.80 - 13.47) is the range of ten means, it must exceed $R_{10} = 7.00$ to be significant and so on.

The only exception to this rule is that no difference between two means can be declared significant if the means concerned are both contained within a larger range which has a non-significant difference.

Because of this exception, as soon as a non-significant difference is found between two means, it is convenient to group these two means and all of the intervening means together by placing a check mark "x" in the first subgroup, Column "A", of the worksheet. Thus, executives 4 and 10 are in the high TAR subgroup.

The next set of differences starts with the second largest minus the smallest, the second largest minus the second smallest and so on. In this fashion, the first non-significant difference is found to be $(22.80 - 16.97) < R_4$. Therefore, these two means as well as all intervening means are designated into subgroup "B". Next, the third largest minus the smallest, i. e., $(18.11 - 12.36) < R_9$. Hence, as before, these two means as well as all means between them are not significantly different and are grouped together in subgroup "C".

By means of this technique, the group of eleven executives has been divided into three subgroups, each of which contains executives who are homogeneous with respect to their TAR. The grouping reflects the order of magnitude of the mean TAR. The subgroups "A", "B", "C" represent high, intermediate and low TARs respectively.

These three subgroups are not, however, mutually exclusive. The intermediate group "B" overlaps the high group "A" at its low end and the low group "C" at its high end. Groups "A" and "C" are mutually exclusive as well as exhaustive. This means that some of the eleven executives

have mean TARs which fall into two subgroups simultaneously. As an example, executives 9, 11 and 6 are in both the low "C" as well as the intermediate subgroup "B" and executive 10 is in both the high "A" and intermediate subgroup "B".

In comparing the work pattern of managers, one is searching for differences between them. One such difference was found to exist insofar as their TAR is concerned. Other differences will be found later. All of them are based on relative value comparisons. This means that the differences which have been detected have a meaning only when related one to another. It is possible that at some time in the future, standard values or units of macroanalytic concepts will be established. If and when that happens, absolute value comparisons will be meaningful.

The relative value comparison with respect to the TAR may now be summarized as follows.

An executive whose mean TAR falls into exclusively the low TAR subgroup "C" has a significantly higher dispersion of activities than another executive whose mean TAR places him into exclusively the high TAR subgroup "A" and vice versa.

Those executives whose mean TAR places them into the intermediate subgroup "B" are also included in one or the other of the subgroups "A" or "C". Hence, no mutually exclusive comparison statement with regard to this group is possible.

The reason for and ramifications of the differences which have been found to exist between individual executives in these different subgroups, but within the same criterion group, may well become the subject of another investigation.

In this study, the mechanism for the evaluation and quantification of existing differences within the same criterion group has been presented.

The resultant subgrouping may conveniently be summarized in diagram form as shown below in Figure 8.

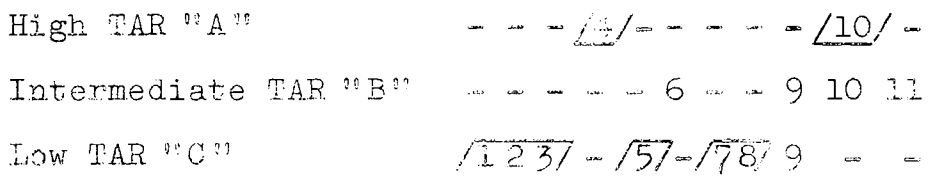

Figure 8. TAR Comparison Diagram

The interpretation of this diagram is as follows:

1. All of these eleven individuals are successful executives (the criterion group).
2. Their time-activity ratio, i. e., the dispersion of their activities is being compared.
3. Executives in any one horizontal row are not significantly different with respect

to each other (i. e., on the same row) so far as their dispersion pattern is concerned.

4. Executives in "top open" boxes have significantly higher TARs than executives in "bottom open" boxes.
5. No comparison statement is made about executives listed in "unboxed" numerals.

The above presentation of the mechanism of comparing quantified macroanalytic concepts, i. e., the statistical treatment of the mean TAR establishes the procedure for the balance of this investigation. In presenting the comparisons for some of the other macroanalytic concepts, much of the descriptive detail can now be omitted.

In some cases, the analysis of variance reveals, as will be seen, that there are no significant differences between any of the eleven executives so far as, e.g., their mean "A" ratio is concerned. In that case, a prediction of probable mean "A" ratios, rather than a comparison on the basis of differences in that respect, is presented.

The Mean Communication Ratio

The next macroanalytic concept to be analyzed statistically is the Mean Communication Ratio (MCR), (i. e., the average per cent of time in communication).

Daily MCRs of the same criterion group are listed in the summary of macroanalytic concepts. It will be observ-

ed that three of the forty-one MCRs listed have been omitted from the analysis. This procedure is justified and indeed required whenever a particular deviation is due to assignable rather than random causes. In these three instances, such was the case. They reflect variations due to non-typical conditions. These include work done on legal holidays, part day reports of activities performed in the office on a Sunday morning and extensive meetings of a non-recurring nature.

Thus, in the statistical treatment of the density of the managerial behavior pattern, there are a total of thirty-eight daily MCRs for eleven executives.

The analysis of variance of the MCR yields the results shown in Table XI.

TABLE XI

ANALYSIS OF VARIANCE OF MCR

Source	df	ss	ms	F
Total	37	3,978		
Executives	10	2,013	201.30	
Error	27	1,965	72.78	2.76

F tab = 2.41 at the 95% level

F cal > F tab

Thus, the null hypothesis is rejected and it follows that there are significant differences within the criterion group so far as the density of the managerial behavior pattern is concerned.

It is interesting to note, however, that the 95% confidence interval on the over-all mean MCR (which, incidentally is 42.1%) is 21.2% to 63.0%. This means that upon repeated sampling of a large number of successful executives, the average MCR value will be between those limits in 95 out of 100 cases.

Elsewhere in this study (page 106) it is reported that for the same criterion group, the ratio of oral to written communication is about 9 to 1. Thus, another significant prediction is that successful managers will spend, on the average, approximately 20 to 60% of their time in oral communications.

The multiple range test on the MCR is carried out in the same way as was done for the TARs and yields the analysis as shown in Table XII.

The interpretation of this diagram is that Executive Number One has a significantly higher MCR than Executive Number Eight. The remaining nine executives have MCRs which do not vary significantly.

At this point, a tentative relationship between the TAR and MCR of successful executives might be suggested. There is only one executive exclusively in the high TAR subgroup (Executive Number Four) and one other executive

exclusively in the low MCR subgroup (Executive Number Eight). The other nine are in either both of the intermediate subgroups of TAR and MCR or in both the low TAR and high MCR subgroups simultaneously. This observation appears to suggest that successful executives tend to have high dispersion of activities and high densities of communication, both as defined in Chapter III of this dissertation.

TABLE XII

MULTIPLE RANGE TEST ON MCR

p	Rp	Mean	Executive	Subgroup		
				A	B	C
1	-	28.4	8			x
2	13.42	35.7	11		x	x
3	13.91	37.3	3		x	x
4	14.52	39.3	10	x	x	
5	14.82	40.3	7	x	x	
6	15.1	43.3	9	x	x	
7	12.28	46.3	2	x	x	
8	15.43	47.0	5	x	x	
9	15.52	49.2	6	x	x	
10	15.62	49.3	4	x	x	
11	15.70	53.5	1	x		

The equivalent sample size $n' = 3.42$, and the standard error of the mean $s_m = 4.63$. The comparison diagram is shown in Figure 9.

High MCR "A"	/1/ 2 - 4 5 6 7 - 9 10 -
Intermediate MCR "B"	- 2 3 4 5 6 7 - 9 10 11
Low MCR "C"	- - 3 - - - - /8/ - - -

Figure 9. MCR Comparison Diagram

The "R" Ratio

The analysis of variance of the "R" ratio (i. e., the relative emphasis on communication about resultants) yields results as shown in Table XIII.

TABLE XIII

ANALYSIS OF VARIANCE OF "R" RATIOS

Source	df	ss	ms	F
Total	37	11,225		
Executives	10	7,640	764.0	
Error	27	3,585	132.8	5.76

Here again, it is found that at the 95% level, F cal > F tab.

Hence, the null hypothesis must be rejected and it follows that there are significant differences in the mean "R" ratios of the eleven executives in the criterion group.

As before, the next step is to determine the homogeneity of subgroups. This is shown in Table XIV, which follows.

TABLE XIV

MULTIPLE RANGE TEST ON THE "R" RATIO

p	R_p	Mean	Executive	Subgroup		
				A	B	C
1		31	1			x
2	18.09	33	2			x
3	18.95	42	6			x
4	19.51	47	3		x	x
5	19.92	48	7		x	x
6	20.03	51	9		x	x
7	20.58	51	4		x	x
8	20.75	62	10	x	x	
9	20.90	64	8	x	x	
10	21.00	65	5	x	x	
11	21.10	74	11	x		

The equivalent sample size, $n' = 3.42$

The standard error of the mean, $s_m = 6.23$

The comparison diagram is shown in Figure 10.

High "R" ratio - - - - 5 - - 8 - 10 /11/

Intermediate "R" ratio - - 3 4 5 - 7 8 9 10 -

Low "R" ratio /1 2/ 3 4 - /6/ 7 - 9 - -

Figure 10. "R" Ratio Comparison Diagram

Inspection of the "R" ratio diagram (Figure 10) reveals that Executive Number Eleven has a significantly higher "R" ratio than Executives Number One, Two and Six, and that the latter group of executives does not have significantly different "R" ratios. The diagram also indicates that three of the four vice presidents (i. e., Nos. 5, 8 and 10) in the criterion group have "R" ratios in the "A" subgroup and the fourth of them (No. 4), while in the next lower subgroup, is immediately adjacent to the other three. This may be suggestive of a trend concerning this particular echelon of management. Further detailed studies on this point would seem appropriate.

The "I" Ratio

Inspection of Table VI (page 145), Summary of Macro-

analytic Concepts, reveals a highly irregular pattern both between and within executives insofar as their "I" ratios (i. e., the relative emphasis on communications about incentives) are concerned. Executives Number 5, 8 and 10, all of whom are vice presidents, have not communicated about incentives on the days on which their activity log was kept. All but two of the remaining eight executives show at least one daily "I" ratio of zero per cent. Thus, it is reasonable to expect highly significant differences to exist between the executives of this criterion group with respect to their "I" ratios. The analysis of variance, which is presented next, bears out this expectation.

TABLE XV

ANALYSIS OF VARIANCE OF "I" RATIOS

Source	df	ss	ms	F
Total	37	7,476		
Executives	10	3,148	314.80	
Error	27	328	12.15	27.8

The calculated F value is found to be 27.8, which is about eleven times the tabulated F value for the above degrees of freedom at the 95% probability level. It will be remembered that in the case of the other macroanalytic con-

cepts, which have previously been computed, the calculated F value was of the order of twice the corresponding tabulated value.

Thus, the order of magnitude of the significance of the differences in the "I" ratios of these eleven executives is far greater than it was found to be with respect to the other macroanalytic concepts. The multiple range test shown in Table XVI reveals only two subgroups with one executive (No. 11) not included in either. Thus, there is the low "I" ratio group with means ranging from 0 to 6% and the high "I" ratio group with means between 19 and 24%. These two groups include seven and three executives respectively and the eleventh had a mean "I" ratio of 12%, which is significantly different from any other member of the criterion group.

In the event that similar mean "I" ratio distributions were to be observed for a large number of successful executives, it would be reasonable to conclude that managers, who are successful, have widely varying mean "I" ratios. This appears to be true for both the daily variation of the same individual as well as for the variation between individuals.

Hence, this macroanalytic concept may serve as an independent measure for a particular executive, or it may be used to compare a particular characteristic of two or more managers relative to each other.

TABLE XVI

MULTIPLE RANGE TEST ON THE "I" RATIO

p	R_p	Mean	Executive	Subgroup A	Subgroup B	Subgroup C
1	-	0	5			x
2	5.47	0	8			x
3	5.75	0	10			x
4	5.93	3	1			x
5	6.04	5	7			x
6	6.15	6	4			x
7	6.23	6	9			x
8	6.28	12	11		x	
9	6.32	19	6	x		
10	6.37	23	2	x		
11	6.41	24	3	x		

The equivalent sample size, $n' = 3.42$

and the standard error of the mean, $s_m = 1.885$.

High "I" ratio - /2 3/ - - /6/ - - - - -

Intermediate "I" ratio - - - - - - - - - - 11

Low "I" ratio /1/ - - /4 5/ - /7 8 9 10/ -

Figure 11. "I" Ratio Comparison Diagram

The "A" Ratio

In line with the previously established pattern, an analysis of variance of the daily "A" ratios (i. e., the relative emphasis on communications about acts), was performed. The results are shown in Table XVII below.

TABLE XVII

ANALYSIS OF VARIANCE OF "A" RATIO

Source	df	ss	ms	F
Total	37	12,711	345.3	
Executives	10	4,493	449.3	
Error	27	8,218	304.3	1.81

In this case, F cal < F tab.

Hence, the null hypothesis cannot be rejected at the 95% level. This means that there are no significant differences between the eleven executives insofar as their "A" ratios are concerned. If the eleven executives, whose activities have been classified and analyzed, are a truly representative sample of successful managers, then it can be concluded from this finding that there is in fact no significant difference in the mean "A" ratios of successful executives. The F test indicates this statement to be

subject to a risk level of 10%.

Within these limitations, a prediction of the mean "A" ratio range of successful executives is possible by simply determining the confidence interval on the mean of all "A" ratios observed. The procedure is as follows:

The mean "A" ratio is 39.0

The equivalent sample size is 3.42, as before. Hence, the standard error of the mean is

$$\sqrt{\frac{345.3}{3.42}} = 10.09.$$

The 95% probability point of the "t" distribution for 37 degrees of freedom is found to be 2.02.

Thus, the 95% confidence interval on the mean is

$$39.0 \pm 2.02 \times 10.09$$

$$39.00 \pm 20.20$$

or 18.80 - 59.20.

The interpretation of this statistic is that if the mean "A" ratios of a large number of successful executives were to be evaluated, 95 out of 100 sample means would be between the above two limits. Similarly, if a 90% confidence interval is considered satisfactory, i. e., a statement similar to the above but applying to only 90 out of 100 mean "A" ratios of successful executives, then their limits can be predicted to be between 21.90 and 56.10% and finally one-half of all mean "A" ratios of successful executives can be expected to be contained within the interval between 32.08 and 45.92%. These statements are statistically determined probabilities, which, on the average, can be ex-

pected to be true in nine cases out of ten.

Considering the "A" ratios of a group of executives, it is found that the 38 available ratios follow essentially a normal distribution with mean value of 39.0% and a standard deviation of 18.5. Hence, one can expect 2/3 of all successful executives to have individual "A" ratios varying between the mean plus or minus one standard deviation, i. e., 39.0 $\pm$ 18.5% or between 20.5 and 57.5%.

It should be emphasized that the above computations are presented only for the purpose of establishing and demonstrating a procedure. For greater precision in the determination of macroanalytic concepts, a larger sample should be used.

The Mean Communication Period

The last of the macroanalytic concepts to be analyzed is the MCP (i. e., the average duration of communications). The analysis of variance of Table XVIII shows that there are no significant differences within the criterion group.

TABLE XVIII

ANALYSIS OF VARIANCE OF MCP

Source	df	ss	ms	F
Total	40	825.3	20.63	
Executives	10	320.03	32.00	
Error	30	504.27	16.80	1.9

The tabulated F value for the above degrees of freedom at the 95% level is 2.51.

Thus, here again

F cal < F tab

and the null hypothesis cannot be rejected. This means that there are no significant differences with respect to the means of the MCPs. Since there are no differences, it is not feasible to effectively compare the executives of the criterion group to each other insofar as this particular characteristic is concerned. However, within the limits of the risk level determined by the F test, which is about 20%, it is feasible to predict a confidence interval on the mean of the MCPs.

The over-all mean of MCPs was 13.0 minutes per communication.

The equivalent sample size is $n' = 3.66$.

Hence,

the standard error of the mean $= \sqrt{\frac{20.63}{3.66}} = 2.375$.

Thus, using the "t" distribution for 40 degrees of freedom, the 95% confidence interval on the mean is

$13.0 \pm 2.375 \times 2.02 = 13.0 \pm 4.80$

or

8.20 to 17.80 minutes per communication and half of all sample means of the MCP of successful executives will be contained in the interval between

$13.0 \pm 2.375 \times .681 = 13.0 \pm 1.62$

or

11.38 to 14.62 minutes per communication.

Other confidence intervals can be computed by simply substituting the appropriate probability point of the "t" distribution.

Thus, using this technique, it is possible to predict the range of the average of the MCPs of a large number of executives. The prediction is, in effect, a statistical probability statement. In this case, it is associated with a 20% risk. This means that, on the average, eight out of ten predictions will be correct and two will be incorrect.

On this basis, Table XIX was prepared to show the predicted frequency grouping of the means of MCPs.

TABLE XIX

PREDICTION OF MEAN MCPs (80% PROBABILITY)

% of mean MCPs of successful executives	Mean MCP Minutes per communication
95	8.2 - 17.8
90	9.0 - 17.0
80	9.4 - 16.6
70	10.5 - 15.5
60	11.0 - 15.0
50	11.4 - 14.6
30	12.1 - 13.9
10	12.7 - 13.3

In considering the mean communication periods of individual executives, in contrast to the means of a group, it is found that 41 available MCPs have a mean of 13.0 minutes per communication and a standard deviation of 4.46. Hence, two-thirds of all successful executives will have a daily MCP of 13.0 $\pm$ 4.46. In other words, the mean duration of each communication of two-thirds of all successful executives will vary between 8.54 and 17.46 minutes per communication.

Similarly, approximately 95% of all individual MCPs of successful executives can be expected to lie in the interval between the mean of 13.0 and 2 standard deviations on either side of it, i. e., between 4.08 and 21.92 minutes per communication.

Ratio of Oral to Written Communication

In the course of this study, particularly in the analysis of the activity logs, information was obtained which was not pertinent to the proposed classification. Some of these items have already been mentioned in connection with the discussion of Columns 10 - 12 inclusive, of the classification schedule (see pages 41-45).

The type of activity column (Column 12 of Table II) lends itself readily to a determination of the ratio of oral to written communications. From the point of view of instruction in managerial work, it is certainly desirable to know what the order of magnitude of this ratio actually

is.

This analysis could be carried out by defining a concept involving this ratio and then applying an analysis of variance and multiple range test as was done for the various macroanalytic concepts.

On the other hand, if a fairly rapid estimate of this ratio is required, the following procedure might be used. A random sample of the available classification schedules is selected and the information shown in Table XX is computed on a daily basis from this sample.

TABLE XX

ORAL TO WRITTEN COMMUNICATION RATIO

Sample	Type of activity Min/Day				$\frac{\Sigma(PC + TC)}{\Sigma(PC+TC+OWM)}$
	ΣPC	ΣTC	ΣOWM	ΣPC+ΣTC	
1	174	43	50	217	81
2	272	1	3	273	99
3	74	44	0	118	92
4	182	6	27	189	86
5	158	0	29	159	84
6	155	43	20	198	95
7	140	28	12	168	94
8	320	0	30	320	91
9	106	0	12	106	90
10	135	37	37	172	82
				Average	89.4

Explanation of Table XX: Ten classification schedules were randomly chosen and are numbered 1 - 10 inclusively. From each schedule the total time spent in personal or telephone conversations, (PC or TC), which are classified as communications about resultants, incentives or acts, was compiled and entered in the appropriate column of the table. Similarly, the sum of the time elements associated with all written communications for each classification schedule is entered in the column headed "OWM". With this information the required ratio can readily be computed for each sample day and then averaged for the total period. In this case, the ratio turned out to be of the order of 9 to 1 in favor of oral communication.

Time Duration of Communications

The classification schedule also lends itself to an evaluation of a frequency characteristic of individual types of activities, in contrast to the daily macroanalytic concepts which have been considered in this study. There is, however, one important difference, namely, that the occurrence of any one particular activity cannot be assumed to follow a normal distribution law. It will be remembered that in the statistical treatment of macroanalytic concepts this assumption was made and justified by the fact that each such concept represents a daily mean. In this study, either 41 or 38 daily means of several macroanalytic concepts were analyzed in accordance with the

rules of statistical procedures governing normal distributions.

If, on the other hand, the analysis were to be applied to individual activities, a test for normalcy would have to be applied first. If this test proves the frequency distribution to approximate the normal curve, then the previously developed procedure is justified; if it does not approximate the normal, then the analysis cannot be used. It is for this reason that the macroanalytic concepts have been developed. They assure the validity of the analysis regardless of the frequency distribution of the activities they involve.

As an example, let it be required to analyze the data for a frequency pattern of communications of particular duration. A check of the classification schedule shows that a total of 642 individual communications are recorded. These vary in duration from one minute to over an hour. If a frequency histogram of this distribution is plotted, it reveals at a glance that it is other than normal. It might be a binomial distribution. Whether it is can only be established by applying an appropriate mathematical technique. It is, however, quite possible that a particular activity does not follow any known frequency distribution and, consequently, any statistical treatment of such data must be incomplete at best.

In analyzing the available data with respect to the duration of individual communications, it is seen that 166

individual communications have a 1 to 4 minute duration. Coincidentally, the same number of communications fall into the 5 and 9 minute interval. Further breakdown reveals that 13.6% of all communications are of 1 or 2 minute duration, 12% of 3 or 4 minutes and 19.3% last 5, 6 or 7 minutes. A tabulation of 98.2% of all communications is shown in Table XXI.

TABLE XXI

DURATION OF 642 REPORTED COMMUNICATIONS

Duration Minutes	Communications		Cumulative	
	Number	%	Number	%
1 - 4	166	25.8	166	
5 - 9	166	25.8	332	51.6
10 - 14	103	16.0	435	67.6
15 - 19	73	11.4	508	79.0
20 - 24	37	5.7	545	84.7
25 - 29	31	4.4	576	89.1
30 - 34	36	5.6	612	94.7
35 - 39	13	2.0	625	96.7
40 - 44	3	0.5	628	97.2
45 - 49	2	0.3	630	97.5
50 - 54	3	0.5	633	98.0
55 - 59	1	0.2	634	98.2

The basic difference of interpretation of Table XXI and Table XIX is very important. In Table XXI, there is an actual record of past performance of eleven successful executives with respect to the time they spent in communications of particular time duration. It is a historic record and nothing more.

Table XIX, on the other hand, is a prediction which has an 80% probability and refers only to daily means of the duration of communications.

Both tables are derived from the same information, i. e., the classification schedule.

In Table XXI, the information was used directly and a historic record is all that can be obtained.

In Table XIX, the macroanalytic concept of the MCP was first obtained as previously discussed and because this concept has a normal distribution, a probability statement rather than a historic record is possible.

Projections and Ramifications

Among other things, the present dissertation sets up a structure for further investigations of various facets of managerial work. These investigations may have the following objectives:

1. To strive for a tool whereby the worth of a manager can be predicted on the basis of an examination and analysis of his activities.
2. To strive for a tool whereby a manager can

examine his own activities and thereby be aided in improving his performance.

In either case, it is necessary that the various activities, which a manager normally performs, be separated from each other and identified. This can be accomplished by the classification system, which was proposed in this study. Once the activities are identified, they can be grouped so as to represent particular characteristics of the manager who performed them. This, however, is difficult to do. It is difficult because the classified activities by themselves or in various groupings are not necessarily unique indicators of a particular characteristic of a manager.

There is, however, evidence that some relationships between different activities and their associated time or frequency elements are consistent for the same manager or for groups of managers. A few of these relationships are presented in this dissertation. They have been named "Macroanalytic Concepts". Additional relationships are certain to be developed.

This study appears to justify the projection of macroanalytic concepts as a basis for the self evaluation or the prediction of the worth of a manager's performance. Each such concept is characteristic of a certain trait. What these traits are has been discussed in the body of this dissertation.

Another projection of the previously developed tech-

nique is feasible. Let it be required to prove the general belief that a good manager communicates more concisely than a poor one.

In this case, the characteristic trait to be evaluated is concision. The macroanalytic concept associated with concision of communication is the Mean Communication Period, i. e., the average duration of communications.

Thus, in order to prove or disprove the truth of this statement, it is only necessary to evaluate a few MCPs for a group of persons who are individually (and independent of their communication habits) recognized to range from good to poor managers.

The next step is to perform an analysis of variance of the MCPs. If it should reveal no significant differences between the group of managers, then obviously the statement is not true. If, on the other hand, the analysis of variance reveals significant differences between individual managers, the statement may be true. Whether or not it is true can be determined by a multiple range test. Accordingly, the statement is true if the managers, who are known to be good, fall into the low MCP subgroup. Otherwise, the statement is not true.

Another aspect into which the present study may be projected, involves the so-called specialization of managers.

A vast array of specialists in different areas is filling the ranks of managerial positions today. Some of

these are finance, advertising, engineering, business administration, industrial psychology and sociology and many others. All of them have made valuable and significant contributions to their respective organizations.

On the other hand, there is a group of people, without specialized training, who are known simply for their knack of "getting things done". According to the classical concepts of management science, specialists are usually employed in staff positions whereas "generalists" are generally line personnel. Observation and experience tend to refute this view. An ever-increasing number of specialists is successfully occupying line positions all the way from president to foreman. One reason for this is obviously the increasing complexity of modern technology. There may be other reasons. If there are, they should become apparent by a comparison of macronalytic concepts.

One might assume that the specialist will be concerned with detail to a larger extent than the non-specialist. Thus, his communications about acts ("A" ratio) might be expected to be high. This, however, is purely supposition and there is little, if any, evidence to date which would bear out this or any other similar assumption.

Other differences in the characteristic behavior pattern might be projected for different occupational or functional positions. As an example, one might examine the variations of the macroanalytic concepts for individuals with conflicting interests such as production and sales

or production and expediting, and so on.

The above examples are intended to suggest general areas in which the application of the previously developed technique may prove to be of value.

CHAPTER V

SUMMARY AND CONCLUSIONS

This dissertation is concerned with two related problems, both of which are involved in the study and understanding of the management process.

The first problem is one of classification of managerial work.

The second problem involves the establishment of a procedure by which the performance of different managers can be factually compared.

The classification system, which is proposed in connection with the first problem, represents the basis for the analysis involved in the second problem.

Both the classification, as well as the comparison procedure of managerial performance, were tested in an actual case study. The sample size, which was used in the case study, appears adequate to suggest the feasibility of the classification as well as the mechanism for the quantification of various characteristics by which managers can be compared.

The results of the statistical analysis are subject to comparatively low probabilities. It is emphasized, however, that the objectives of this study relate to the

mechanics of an analysis rather than to the precision of numerical results. The latter can be improved by increasing the sample size in subsequent analyses.

In the Introduction, Chapter I, the methodologies by which a body of knowledge is assembled, are briefly described. The limitations of the so-called "model approach" are presented and contrasted to the technique of measurement based on observation of natural phenomena or carefully designed experiments. An outline of the essential components of the Lohmann concept of organization and management is presented in summary form. It was found to be based on the observational technique rather than the model approach and includes a frame of reference within which experience may be converted into knowledge.

In Chapter II, a division and classification of managerial activities is presented. It was hypothesized that the proposed classification system is both possible and useful in the study, understanding and instruction of managerial work. Thus, the hypothesis involves two criteria. The first is absolute; the second is obviously a relative statement which needs careful definition. The first part of the hypothesis was accepted on the basis that 1,236 separate activities, as reported by eleven successful executives, were classifiable according to rules imposed by formal logics. This was demonstrated by the case study reported in Chapter IV. The actual mechanics of classfying is, however, a highly skilled task. The classifier must be

an individual thoroughly familiar with the concepts which form the basis of the classification system. Also, inference based on judgment of the classifier is often necessary. This is not due to any limitations of the system but is caused by the fact that activities, as reported on the activity logs, are frequently incomplete in terms of the requirements of the classification system.

Usefulness was defined to imply one of two things:

1. The classification system is useful if it permits a comparison of the work pattern of different managers.

or

2. The classification system is useful if it permits prediction of managerial work patterns.

Based on this definition, the case study reported in Chapter IV reveals that the second part of the hypothesis is entirely acceptable. Thus, the hypothesis as stated, may be accepted.

There are, however, intermediate stages between the classification of activities and the prediction or comparison of managerial behavior patterns. It is obvious that this must be true because no classification system as such can include predictive features within its classes. The classification system does permit an analysis of activities which, when completed, will represent a record of actual events. Several such analyses can be performed for the

same individual on several occasions, or for several individuals on one or more occasions, or for particular groups displaying certain key characteristics. The latter is known as a criterion group. In every case, the results of the classification can be compared to each other.

This method of comparing historical records has rather significant limitations. The most important of these is that no mechanism is available to effectively quantify the differences which the historical records of activities reveal.

The simplest method to overcome this limitation is to establish a frequency score for each classified activity. These scores can then be compared on a numerical basis and similarities or differences, as they exist in particular cases can be quantified. This procedure was investigated and after careful consideration, it was rejected. There were two reasons which prompted the rejection of this technique. The first was that the significance of the differences in the various frequency scores could not readily be evaluated in cases where their distribution was other than a normal distribution. The second reason for the rejection of this technique was that the frequency scores did not usually tend to be normally distributed.

It was at once obvious that criteria which tend to have normal distributions should be used for the comparison analysis. Hence, the classification system of managerial activities was used to establish mean daily quantities

which reflect, on a numerical basis, the extent of each classified activity. These quantities have been designated as macroanalytic concepts.

This procedure has several advantages. First, as has already been mentioned, it yields mean values which can be treated statistically in accordance with the laws governing normal distributions. Second, in comparing a specific macroanalytic concept of a group of executives, one can readily determine whether or not the group displays significant differences with respect to the particular macroanalytic concept. Third, if a specific criterion group is selected and one of its macroanalytic concepts is found to be not significantly different, then a prediction is possible. This prediction is in effect a statistical estimate of the probable range of the average of the same macroanalytic concept of a large number of executives who might have been included in the criterion group.

Thus, there are two stages between classification of managerial activities and the comparison or prediction of a pattern of managerial work as follows:

1. Evaluation of macroanalytic concepts as defined in Chapter III and evaluated in Chapter IV.
2. Statistical analysis of macroanalytic concepts as presented in Chapter IV.

The statistical analysis is presented in Chapter IV in connection with an actual case study. It involves only elementary statistics and can be reduced to a routine proce-

dure. Thus, operators of relatively low skill can be utilized. This, it will be remembered, is distinctly in contrast to the skill and experience requirements of the classifier of managerial activities. Consequently, a two-person team with appropriate levels of accomplishment should be used for the classification and evaluation of managerial work patterns.

In the case study, which was conducted as part of this dissertation, a criterion group of eleven successful executives was used. In other words, the group was homogeneous with respect to their success in a managerial career.

The analysis revealed that there are no significant differences within this group with respect to their "A" ratios, i. e., the time spent in communications about acts as a percentage of total time in communication as well as with respect to their mean communication period, i. e., the average duration of their managerial communications.

On the basis of these findings, it is possible to predict the order of magnitude of the average of these two macroanalytic concepts of successful executives. It is interesting to note that half of all mean "A" ratios can be expected to be between 32.08 and 45.92% and MCPs between 11.4 and 14.6 minutes per communication. The corresponding spread for a larger percentage of group means is, however, much greater. Thus, 95% of all mean "A" ratios of successful managers will be between 18.80 and 59.20% and their MCPs between 8.2 and 17.8 minutes per communication.

With respect to all other macronalytic concepts, significant differences have been found to exist within the criterion group. The statistical treatment permits a subgrouping of the criterion group into three subgroups, which have non-significant differences. This grouping is based on the relative magnitude of the mean of any particular macroanalytic concept and includes a high, intermediate and low subgroup. A convenient comparison diagram, as presented in Chapter IV, readily permits the visual segregation of individual executives into these subgroups.

These comparison diagrams are useful as visual aids in the presentation of facts. In particular, the facts which are presented in these diagrams are relative value comparisons. A different diagram is of course necessary for each macroanalytic concept in which significant differences between the members of the criterion group have been found.

The diagram tells at a glance which individuals are significantly different with respect to each other and which are not. In the case of those who are different, it tells which are high, low or intermediate.

This diagram does not, however, give any reasons why differences exist, nor does it suggest any ramifications of the differences within the criterion group. The present analysis has been limited to establishing a rational basis on which differences within a criterion group can be detected, if they exist.

In this dissertation, there are several suggestions

for the investigation of related topics which have presented themselves, but which could not be included in this study.

It is hoped that others may find adequate motivation to pursue companion or continuation investigations based on these suggestions.

BIBLIOGRAPHY

Barnard, C. I. The Functions of the Executive. Cambridge, Massachusetts: Harvard University Press, 1951.

Bowker, Albert H., and Gerald J. Lieberman. Engineering Statistics. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1959, p. 560.

Cohen, M. R., and E. Nagel. An Introduction to Logic and Scientific Method. New York, N. Y.: Harcourt, Brace and Company, 1934, pp. 241-243.

Dale, Ernest. Planning and Developing the Company Organization Structure. New York, N. Y.: American Management Association, 1952, p. 60.

Duncan, David B. "Multiple Range and Multiple F Tests," Biometrics, Volumne XI, No. 1, (March, 1955), pp. 1-42.

Fromm, Joseph. "How the British Conservatives Did It," U. S. News and World Report, (October 26, 1959), p. 72.

Lohmann, M. R. A Concept of Organization and Management. University of Iowa, 1954.

Shannon, E. C., and Warren Weaver. The Mathematical Theory of Communication. Urbana, Illinois: University of Illinois Press, 1949.

Snedecor, G. W. Statistical Methods. Ames, Iowa: Iowa State College Press, p. 270.

Strong, Lydia. "Of Time of Top Management," The Management Review, Vol. XLV, No. 6, (June 6, 1956), pp. 486-493.

APPENDIX

HOW TO PREPARE AN EXECUTIVE'S DAILY ACTIVITY RECORD

Equipment needed:

1. Dictaphone
2. Clock or watch

Note: Turn dictaphone on and leave in "ON" position. This will avoid warm-up delay.

1. State the time of arrival at the office (by hour and minute).
2. After completing the first activity of the day, describe it briefly on dictaphone; read the time and record it. This time represents the end of the first activity, and, simultaneously, it is of course the time of starting of the second activity. Repeat for all activities of the day which occur during working hours.
3. Conversations and contacts, other than those of a personal nature, outside the office, e.g., coffee breaks, luncheons, service clubs, Chamber of Commerce, church activities, etc., may be an important part of an executive's daily activities; thus, they should be included in this record.
4. Reference to mail, memos, correspondence, etc., should include a note as to their nature, e.g., replied to job applicant; offered him a position;

read production report; directed to Chief Engineer, etc.

5. In contacts with people, in or out of your own organization, it is important to indicate <u>their relationship to you or your organization</u>, e.g., position and department, or a subordinate of yours; or program chairman, Rotary Club, or supplier's salesman; customer's attorney, etc.

6. To be useful, the record must be kept continuously for 3 or more representative work days. Activities relating to your business and conducted outside of regular office hours should be included in summary form.

<u>EXAMPLE</u>:

NAME ..... POSITION .....

DATE .....

Arrived at office	9:05
Read company weekly newspaper	9:11
Telephoned Jones (Chief Accountant) congratulating him on his son's commission in the Navy	9:13
Conference with Smith (Production Manager) and Davis (Quality Control Engineer) about a production problem in foundry	9:45
Interrupted by long distance telephone call from Personnel Manager at Uniontown Plant concerning a crisis in labor negotiations	9:51

Continue and conclude conference with Smith and Davis; there is a need for better sampling by inspection dept.	10:10
Dictated a memo to Wilson (Chief Inspector) explaining difficulty and asking him to collaborate with Davis on new sampling procedure.	10:15
Telephoned McWilliams (President) informing him about labor problem at Uniontown. He asked me to his office at 1:30 P. M.	10:17
Review records and transcripts in preparation for conference with McWilliams.	10:39
Telephone call from Program Chairman, Rotary Club, inviting me to be speaker next Thursday - I accepted.	10:41
Telephoned my wife asking her to plan for dinner party with two visiting company executives and their wives next Tuesday.	10:45
Read and directed mail, including a report from Consulting Engineer on a proposed plant addition, three items from employees' suggestion box relating to production methods, two resumes of applicants for positions, several items of advertising material and a letter from a former associate requesting a personnel reference.	11:19
Dictated personnel reference.	11:23

Leave the office to have hair cut, shoeshine, and luncheon with Brown, Sales Manager of the White Office Equipment Company, ... discussed business trends.	
Return to my office.	1:17
Instructions to Miss Blue, Secretary, about vacation plans of three office people. - etc., etc.	1:25

TABLE I

SAMPLE ACTIVITY LOG

NAME: John Doe POSITION: Administrator

DATE: January, 1960 COMPANY: Petroleum Industry

7:55 Arrived at work.

7:58 Set up tape recorder and explained procedure to secretary.

8:03 Reviewed reading file.

8:07 Talked to ----- about sending enrollment cards for the new Life Insurance Plan to District Office.

8:09 Signed employee time sheets for last week.

8:11 Signed change of status and requisition papers, which were processed Friday.

8:15 Discussed distribution of enrollment cards for the new Life Insurance Program with ------.

8:20 Dictated personal letter to ------ Public Health Association.

8:24 Dictated letter for -------'s signature, transmitting information with respect to the Company's benefit plans to a consulting firm which had requested copies of same.

8:30 Discussed with ---- the new form required for payroll authorization in connection with group insurance plans. The old form has to be revised, because of the new Medical Insurance Plan to be installed on October 1.

8:40 Going through incoming mail box, sorting and distributing some of the material.

8:48 Instructions to secretary with respect to tabulation of cost data we need for speech making purposes in selling the new Group Medical Insurance Plan.

8:52 Finished discussing with ----- some questions he had about plans for the meeting tomorrow to indoctrinate persons in other departments who will be helping us to present the new group insurance plan to employees next week.

TABLE I (Continued)

8:55	Filled out deposit slip, addressed envelope, etc., for depositing my pay check (by mail).
8:57	Wrote check to ----- covering parking space for month, handed to secretary to forward to garage.
9:05	Talked to ---- at ----- Printing Company to give him some information about the new insurance certificate to be printed and to find out how he was coming along on employee booklets covering the new insurance plan.
9:09	Talked to ----- about -----'s operation to see how he was getting along.
9:12	Asked secretary to pick out some appropriate comical card today that I can send ------.
9:14	Talked to -------'s secretary to get my name on the list to see him regarding plans for presenting the new group insurance program in the Production divisions.
9:17	Went through incoming mail box to review mail that had just come in - all junk - threw in waste basket.
9:25	Checked weight of new employee booklet to see if a thousand or fifteen hundred would be too heavy for carrying on Company plane next week to the various division locations - while I was in the file room weighing these, I discussed the matter with ------, who will be with ------ making the Marketing Divisions while I am making Production and Exploration Offices.
9:28	I got a drink of water.
9:32	Dropped by -------'s office to talk to ------ and ------- about plans for meeting in the morning and also plans for meetings to be held with employees in the Production and Exploration Divisions next week.
9:35	Asked ----- about time Production Department has set up for us to discuss with their Division Office Managers, who will be in here at a meeting Wednesday; the time I am set up to talk to them briefly about new insurance program.

TABLE I (Continued)

9:40 Discussed with ---- plans for handling employee insurance enrollment cards when they start coming in next week.

9:45 Read College newspaper; put my feet on the desk and relaxed.

9:53 Discussed with ----- question of whether or not mentally retarded children (treatments) and physiotherapy had been covered under our previous plan.

9:54 Discussion with ---- interrupted by a phone call from ----- advising that ------ ---------- would see me right after lunch.

10:20 Discussed further those various questionable cases that might arise with ------.

10:25 Talked to ------- Company to verify what ----- and I concluded should be covered under new plan. ----- Company advised it would be covered. Also, discussed arrangements for two ---- Company men to be present at meetings.

10:29 Finished the discussion with ------ also, about one minute ago. -------- dropped in and interrupted our discussion to ask about ordering of a couple of file drawers for filing IBM cards we will use in enrollment of employees in this new Medical Insurance Program. (That took about one minute between 10:27 and 10:28.)

10:33 Got Coca-Cola.

10:35 Talked to ------ to see if he had completed arrangements for meeting in morning.

10:37 Talked to ---- to tell him about arrangements with insurance company about a man from that company to accompany him to ----- next week.

10:39 Talked to ---- to advise him that arrangements had been made with insurance company for a man to be present at the ------- Refinery meetings next Tuesday.

10:44 Talked to ----- to obtain some background information on an employee who had requested information about Company's early retirement plan.

TABLE I (Continued)

10:49 Answered question of secretary with respect to table she is making up covering cost to employees of group medical insurance in other companies.

10:53 Telephone call from ------- asking for copy of personnel statistical tab runs on each of the Marketing Divisions under his supervision.

10:54 Called ------ in; asked that he see that ---- got a copy of the tab run.

10:55 Signed correspondence dictated earlier and handed to secretary.

11:12 Discussion with -------- and ------- about suggested claim forms ------- drafted up.

11:15 Answered --------'s question about salary administration policy.

11:44 Completed discussion with ------ and ------- regarding plans for the claim forms to be used in the new insurance program.

11:50 Talked to wife to get neighborhood gossip, to see if we had gotten any mail yet - which we had not - and told her I would call her later to check on the mail.

12:34 Lunch (returned from)

12:40 Reviewed table prepared by --------; it was o.k. and gave her instructions regarding distribution of the table (that table dealt with cost of insurance - medical - company cost and employee cost in 6 other companies).

12:50 Dictating letter in response to an employee's question, "Do you anticipate any changes in the early retirement program that may make it more enticing to employees?"

Interrupted at 12:50 by ------ to look over samples of suggested gifts to give to retired employees (for about 3 minutes) followed by a 10-minute bull session on various and sundry items not related to company. ------- left at 1:04.

1:31 Completed dictation to -------- of the letter replying to the question of early retirement benefits.

TABLE I (Continued)

This letter is to be prepared for -------'s signature.

1:36 Called home again; mail had come, but it was not interesting.

1:42 Read some material --------- and -------- had given me to look over pertaining to Accounting and Auditing Departments (the respective functions of those two departments). Returned the material to ------.

1:46 Reviewed minutes of the last Salary Administration Committee meeting.

1:50 Called ------ to see if ------- had been invited to attend the supervisor's and employee's meeting this week to discuss the new insurance program; he advised that they had been notified, but he did not know if they would handle it in that way or not.

1:55 Talked to ---------, Vice President of ------- with respect to his plans about presenting the new group insurance program to ------ (This was a telephone conversation).

1:58 Went to --------'s office and told him that ----- had not received a copy of the announcement of the employee meetings and supervisor's meetings to be held Thursday and Friday, and asked if he would mind sending a couple of copies to ---------, special delivery, at this time. He said he would.

2:03 Just received a call from ---------'s secretary - on my way up to discuss plans for division meetings next week.

Between the last comment and this comment, i. e., up until 2:03, I had started reviewing a proposed publicity release for the September-October issue of the ------- ---------- pertaining to our new Medical Insurance Plan, but had not completed it when I got the call from -------.

2:30 Talking to ------ in his office, he O.K.'d our plan for handling division meetings to discuss the insurance program. ------- also suggested that ------ make arrangements in all divisions to try to hold meetings in the outlying areas at dates that would coincide with the safety meetings regularly scheduled to reduce the expense of travel, taking people away from their jobs, etc.

TABLE I (Continued)

2:38 Discussed final plans with ---------, ------- and -------- relative to the indoctrination meeting to be held in the morning with approximately 20 supervisors present who will present the group insurance program. Told ------, -------- and --------- about --------'s O. K. and his opinions with respect to the way meetings should be handled in the production operations.

2:42 Talked to ------- to arrange private dining room for twenty people tomorrow in -------'s name.

2:45 Called ------, Production Department Training Representative. He was out, left word for him to call me.

2:55 Took a little time off to kid --------, ---------'s secretary and ----- about how pretty they looked today and about -------'s color of hair this week. Told them the story I read in this morning's paper in the Today's Chuckle column, about the pretty little blond who turned to her escort as she was unlocking the door to her apartment and said, "Its been a wonderful evening, dear, don't spoil it by asking me to go out again."

3:16 -------- brought in draft of the letter I dictated with respect to the employee's question about early retirement. I marked up the draft and returned it to her for retyping - did not like some of my language in it.

3:31 -------- came in and discussed a personnel problem he had (had not only to do with a personnel problem, but also with the Salary Administration policies). Talked it over with him and answered his question about the Salary Administration policy; also talked with him briefly about the kick-off for the new insurance policy.

3:35 ------- brought in exempt employees monthly report of absences she had completed for me to sign for my own job, signed it and handed it back to her. Also, during this past 5-minute period, I passed on to ------- a tabulation that he would need in connection with his presentation of the new insurance program. (This tabulation, we just got back from the reproduction section).

TABLE I (Continued)

3:40 Called ------, ------'s secretary, to give him the passenger list for Company plane we reserved for the Tuesday after Labor Day to make the trip to the Production Divisions for presenting the insurance program.

3:46 Worked some more on this proposed news release ---- had sent down from the Public Relations Department. At 3:46, I was interrupted by --------; he had some more questions about the plans for insurance presentation. We talked that over until 3:56.

4:05 Telephone conversation with ------ relative to meeting of Production Division Office Managers day after tomorrow to tell him about arrangements ------- had made for him (-------) to talk to the group for 30 minutes or an hour about some matters he wanted to bring up, following which I will talk to them about new insurance program. I told him also that ------ would go into a rather long meeting to sort of indoctrinate the new Division Office Managers who have heretofore not been exposed to the details of job evaluation or salary administration. -------- will indoctrinate them in methods and procedures to help smooth out some problems we ran into under this decentralization program that was put into effect in the Production Department in July.

4:15 Returned to my review (which was started earlier) of the draft of the news release ------ had sent down. Finished my work on it; wrote a note to ---- giving him my comments, and transmitted the suggested release to him for his O. K. before returning it to Public Relations Department.

4:20 Call from ------, Production Department, to discuss plans for meetings next week.

4:25 ------- brought in the final polished letter I had written in connection with early retirement. I reviewed the letter and laid it on the Boss' desk for his signature.

4:28 -------- brought in change of status forms and requisitions that had come in the mail today, which she had processed and stamped. I signed the forms and passed them on to ------- for distribution.

4:32 Shot the bull with people who were leaving to go home, bid everybody good-bye, straightened up my desk.

TABLE I (Continued)

4:45	Saw ------. He had been tied up all day long on some other matters. I briefed him on the events of the day and status of plans for presenting the insurance program, etc.
4:45	Locked up, shut down, went home.

TABLE II

SAMPLE CLASSIFICATION SCHEDULE

ECUTIVE: John Doe

SITION: Administrator

DUSTRY: Petroleum DATE: January, 1960

1	2	3	4	5	6	7	8	9	10	11	12
EM	TIME	MINUTES							CODE		
	From								Organi-	Unit	Type of
o.	To	R	I	A	P	O	NR	NA	zation	Organization	Activity
0	7:55										
1	7:58			3					a	1	PC
2	8:03				5				a	-	RWM
3	8:07			4					a	2	PC
4	8:09					2			a	-	OWM
5	8:11					2			a	-	OWM
6	8:15			4					a	2	PC
7	8:20						5		b	-	OWM
8	8:24					4			a	-	OWM
9	8:30	3		3					a	2	PC
10	8:40				10				a	-	RWM
11	8:48			8					a	1	PC
12	8:52			4					a	3	PC
13	8:55						3		-	-	PER
14	8:56					1			a	-	OWM
15	8:57	1							a	1	PC
16	9:05			4		4			a	4	TC
17	9:09		4						a	5	PC
18	9:12			3					a	1	PC

TABLE II (Continued)

1	2	3	4	5	6	7	8	9	10	11	12
9	9:14			2					a	6	PC
0	9:17				3				a	-	RWM
1	9:25					8			a	-	MT
2	9:28						3		-	-	PER
3	9:32			4					a	3,7	PC
4	9:35				3				a	8	PC
5	9:40	5							a	9	PC
6	9:45						5		a	-	PER
7	9:53				8				a	10	PC
8	9:54					1			a	6	TC
9	10:20				26				a	10	PC
0	10:25			5					a	11	TC
1	10:27			2					a	10	PC
2	10:28			1					a	1	PC
3	10:29			1					a	10	PC
4	10:33						4		-	-	-
5	10:35				2				a	12	PC
6	10:37			2					a	13	PC
7	10:39			2					a	14	PC
8	10:44					5			a	3	PC
9	10:49			5					a	1	PC
0	10:53					4			a	15	TC
1	10:54	1							a	16	PC
2	10:55					1			a	-	OWM

TABLE II (Continued)

	2	3	4	5	6	7	8	9	10	11	12
3	11:12			17					a	2,11	PC
4	11:15	3							a	17	TC
5	11:44			29					a	2,11	PC
6	11:50						6		c	18	TC
7	12:34										TO
8	12:40			6					a	1	PC
9	12:50	10							a	-	OWM
0	12:53	3							a	7	PC
1	1:04						11		a	7	PC
2	1:31			27					a	1	OWM
3	1:36						5		a	18	TC
4	1:42					6			a	-	RWM
5	1:46					4			a	-	RWM
6	1:50	4							a	7	TC
7	1:55	5							a	19	TC
8	1:58			3					a	7	PC
9	2:03				5				a	-	OWM
0	2:30					27			a	20	PC
2	2:38			8					a	12,13, 14	PC
2	2:42			4					a	5	PC
3	2:45			3					a	21	TC
4	2:55						10		a	1,5	PC
5	3:16				21				a	-	OWM
6	3:31			15					a	12	PC

TABLE II (Continued)

.	2	3	4	5	6	7	8	9	10	11	12
'	3:35			4					a	1	PC
3	3:40	5							a	22	TC
)	3:46				6				a	-	OWM
)	3:56			10					a	1	PC
L	4:05			9					a	12	TC
2	4:15	5		5					a	-	OWM
3	4:20			5					a	21	TC
4	4:24				4				a	-	RWM
5	4:25					1			a	-	MT
6	4:28	3							a	-	OWM
7	4:32						4		a	-	-
8	4:45	5		8					a	23	PC
TAL	486	53	4	210	93	70	56	0	3	27	
AS A %		11	1	43	19	14	12	0	TOTAL	100%	

TABLE III

SAMPLE LIST OF ORGANIZATIONS

NAME: John Doe POSITION: Administrator

DATE: January 2, 1960 COMPANY: Petroleum Industry

CODE[1]	ORGANIZATION
a	Employer
b	County Public Health Agency
c	Family

[1] To conform to Column 10, Table II.

TABLE IV

SAMPLE LIST OF UNIT ORGANIZATIONS

NAME: John Doe POSITION: Administrator

DATE: January, 1960 COMPANY: Petroleum Industry

Code[1]	Unit Organization [2]
1	Secretary - Subordinate
2	Supervisor, Employee Benefits - Subordinate
3	Field Personnel Representative - Not Subordinate
4	Printing Contractor
5	Secretary, Public Relations - Not Subordinate
6	Secretary - Not Subordinate
7	Supervisor, Personnel Training - Not Subordinate
8	Supervisor, Wages and Salary - Subordinate
9	Associate - Not Subordinate
10	Group Insurance Claims Clerk - Subordinate
11	Insurance Company Representative
12	Supervisor, Personnel Records - Not Subordinate
13	Labor Relations Advisor - Not Subordinate

(1) As in Table II, Column 11.

(2) Employer's organization unless otherwise designated by code letter of Table III, immediately following the unit organization.

TABLE IV (Continued)

Code	Unit Organization
14	Refinery Personnel Coordinator - Not Subordinate
15	General Manager, Retail Sales - Not Subordinate
16	Subordinate
17	Controller - Not Subordinate
18	Wife (C)
19	Vice President, Affiliate Company - Not Subordinate
20	Associate - Not Subordinate
21	Training Representative, Production Department - Not Subordinate
22	Secretary - Not Subordinate
23	Department Manager - Superior

TABLE V

SUMMARY OF CLASSIFICATION SCHEDULES(1)

1	2	3	4	5	6	7	8	9	10	11	12
entifica-tion of xecutive	% of Time in Activity							Number of		Time in Mins.	Number of Activities
	R	I	A	P	O	NR	NA	Org.	U. Org.		
. 1	11	1	43	19	14	12	0	3	27	486	79
	22	2	28	3	32	13	0	1	16	535	23
. 2	24	8	23	23	15	7	0	2	12	223	22
	11	23	9	53	1	2	1	2	11	492	34
	12	0	23	29	11	19	1	2	8	462	25
. 3	14	17	15	12	0	39	4	3	17	486	38
	26	8	7	7	9	33	9	5	18	435	38
	12	4	9	4	9	40	21	1	16	536	33
. 4	27	8	22	12	14	15	2	4	17	615	25
	29	0	17	33	9	8	4	3	11	585	17
	19	2	24	29	17	9	0	2	14	575	21
. 5	30	0	16	11	17	6	20	2	17	400	33
	17	0	23	17	27	1	15	1	9	495	24
	48	0	7	11	6	3	24	1	18	430	33
. 6	21	7	24	20	20	4	4	4	13	566	33
	28	15	15	24	4	8	6	2	14	538	25
	17	19	0	7	57	0	0	4	8	185	12
	14	11	23	13	26	5	9	4	22	580	43
	48	7	14	2	20	3	7	3	16	517	29
	54	10	9	1	6	12	8	1	18	417	20
	33	0	18	2	30	17	0	1	7	295	12
	12	0	38	0	50	0	0	2	5	141	10

(1)For explanation of this Table, see page 72.

TABLE V (Continued)

1	2	3	4	5	6	7	8	9	10	11	12
	R	I	A	P	O	NR	NA	Org.	U. Org.		
7	24	0	20	16	21	14	5	2	18	435	53
	13	0	18	21	27	7	14	2	19	527	33
	9	2	17	21	18	21	11	1	13	310	24
	3	2	6	45	10	31	3	3	17	495	45
	37	0	21	11	19	6	6	3	18	412	30
8	20	0	12	33	12	23	0	1	17	530	33
	11	0	17	14	27	17	13	1	19	559	40
	15	0	7	9	21	26	22	1	12	525	29
	27	0	10	28	15	19	0	1	12	455	32
	18	0	5	25	31	20	1	1	11	505	33
9	20	0	23	12	34	11	0	1	14	580	33
	19	5	24	17	24	1	9	1	13	570	31
	26	3	10	21	28	10	2	1	19	535	36
10	22	0	7	14	45	8	4	2	10	503	19
	30	0	24	21	22	4	0	4	14	495	25
	19	0	16	43	12	10	0	2	12	487	22
11	31	0	7	28	9	6	19	2	20	517	32
	28	6	4	13	11	19	19	2	15	535	29
	21	6	4	10	42	17	0	3	16	457	28

TABLE VI

SUMMARY OF MACROANALYTIC CONCEPTS

1	2	3	4	5	6	7
Identification of Executive	TAR	MCR	R	I	A	MCP
			Ratios			
No. 1	6.2	55	20	2	78	5.8
	23.3	52	42	4	54	14.5
No. 2	10.1	55	44	15	42	11.2
	14.5	43	26	53	21	14.3
	18.5	41	29	0	71	18.7
No. 3	12.8	46	30	37	33	9.5
	11.4	41	63	20	17	7.8
	16.2	25	48	16	36	7.5
No. 4	24.6	57	47	14	39	19.4
	34.4	46	63	0	37	20.6
	27.4	45	42	4	54	14.4
No. 5	12.1	46	65	0	35	10.0
	20.6	40	43	0	57	16.6
	13.0	55	87	0	13	15.7
No. 6	17.2	52	40	14	46	15.3
	21.5	58	48	26	26	18.0
	15.4	36	47	53	0	9.6
	13.5	48	29	23	48	11.5
	17.8	69(x)	70(x)	10(x)	20(x)	20.8
	20.8	73(x)	74(x)	14(x)	12(x)	15.2
	24.6	51	65	0	35	25.2

TABLE VI (Continued)

1	2	3	4	5	6	7
Identification of Executive	TAR	MCR	R	I	A	MCP
			Ratios			
	14.1	50	24	0	76	8.7
No. 7	8.2	44	55	0	45	8.4
	16.0	31	42	0	58	12.5
	12.9	28	32	7	61	6.8
	11.0	11(x)	27(x)	18(x)	55(x)	4.6
	13.7	58	64	0	36	15.0
No. 8	16.0	32	62	0	38	10.0
	14.0	28	39	0	61	7.9
	18.1	22	68	0	32	19.7
	14.2	37	73	0	27	14.0
	15.3	23	78	0	22	13.0
No. 9	17.6	43	46	0	54	12.5
	18.4	48	40	10	50	11.4
	14.9	39	66	8	26	9.5
No. 10	26.5	29	76	0	24	13.3
	19.8	54	56	0	44	14.7
	22.1	35	54	0	46	14.1
No. 11	16.2	38	82	0	18	11.6
	18.4	38	74	16	10	14.6
	16.3	31	68	19	13	9.4

(x) Omitted from subsequent analysis because variations are due to assignable causes.

VITA

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