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A Descriptive Study of Organizational Structure and Its Relationship to Employee Utilization in the Electric Utility Industry

Frederick M. Keaton
Western Michigan University

A DESCRIPTIVE STUDY OF ORGANIZATIONAL STRUCTURE AND ITS RELATIONSHIP TO EMPLOYEE UTILIZATION IN THE ELECTRIC UTILITY INDUSTRY

by

Frederick M. Keaton

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A DESCRIPTIVE STUDY OF ORGANIZATIONAL STRUCTURE AND ITS RELATIONSHIP TO EMPLOYEE UTILIZATION IN THE ELECTRIC UTILITY INDUSTRY

Frederick M. Keaton, Ed.D.

Western Michigan University, 1983

The purpose of this study was to examine the effects that six structural variables had upon the utilization of employees within an electric utility. Specifically the objectives were:

1. To investigate the relationship between the organizational level within an organization and work force utilization.

2. To determine whether a relationship exists between span of control and work force utilization.

3. To determine whether a relationship exists between line versus staff positions and work force utilization.

4. To investigate the relationship between organizational subunit size and work force utilization.

5. To investigate the relationship between centralized versus decentralized organizations and work force utilization.

6. To determine whether a relationship exists between blue-collar versus white-collar workers and work force utilization.

Work force utilization percentages were determined through the Industrial Engineering Technique of work sampling. Over 200,000 work sampling observations were taken of the personnel of 17 departments during a 12-month time period. Organizational structure data were determined through the use of corporate and departmental

organizational charts.

Some of the findings of the study were: (a) no relationship was found to exist between work force utilization and the structural variables of organizational level, line versus staff, blue-collar versus white-collar, and centralized versus decentralized employees; and (b) a relationship was found to exist between work force utilization and the structural variables of span of control and subunit size.

In some instances, the data supported the majority of research conducted in this area; and in some instances, the data did not support previous studies. Based on the findings of the study, recommendations for future research and management practice were suggested.

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Frederick M. Keaton

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CHAPTER I

INTRODUCTION

Porter and Lawler (1965) stated that:

> All organizations are structured, in the sense of having positions and parts which are systematically related to other positions and parts. Since organizations vary in their structure, it is appropriate to examine the question of whether differences in the structure of organizations are related to differences in the attitudes and behavior of their members. (p. 23)

There is hardly an aspect of an individual's life that is not affected by a formal or informal organization. Hicks and Gullett (1976) stated that the family constitutes an organization which we are introduced to at birth, and we continue to join structured organizations for the rest of our lives.

Conversely, since the beginning of mankind, with its participation in organizations, mankind has always searched for a better way to do things. One such method which has been used is the "scientific management" approach developed by Frederick W. Taylor in the 19th century. Scientific management is defined as management based on measurement plus control (Nance & Nolan, 1971). Taylor, Gantt, the Gilbreths, and others who followed the scientific approach, introduced and developed many new management principles and techniques which were designed to systematize and standardize the planning, measurement, and control of industry.

In order to have effective controls they found it necessary to establish a systematic method of effective measurement. The

technique developed was the use of work standards. Nance and Nolan (1971) defined a work standard as "any established criterion, rule or model against which comparisons are made--that which is set up and established by authority for the measure of quantity, weight, extent, value or quality" (p. 17). Karger and Bayha (1977) related the importance of standards to control as "Control is simply comparing some performance or condition (machine, human, environmental, etc.) against a standard and exerting corrective action when deviation from the standard occurs" (p. 4).

One such method of setting standards is that of work sampling which was developed by L. H. Tippett in 1934 and has been commonly used as a work measurement tool by various industries since that time. Hansen (1960) has stated that work sampling is an effective method of developing standards. In addition to this application, Hansen (1960), Coombe and Densmore (1982), and Benes (1981) have referred to work sampling as an effective tool for determining employee utilization. For the purposes of this paper, work sampling was used to determine employee utilization.

Scope of Study

This study was designed to assess the relationship between work force utilization and organizational structure. The interest in employee utilization was born during the Industrial Revolution. There was a resurgence at the start of the 20th century in the form of scientific management. Recently it has been revived with the state of the economy.

Concurrently, there has long been an emphasis placed on organizational structure. The classical theorists, Fayol (1977), Urwick (1974), and Taylor (1947) placed heavy emphasis on chain of command, span of control, and specialization of function, which were all related to organizational structure and efficiency. Hollander and Hunt (1967) stated that although organizational policies and structures may be elaborated separately from their membership, people populate and work them, and the interplay of people and structures define the phenomena of organization. Drucker (1974) stated that structure is the vehicle managers use to obtain the goals and objectives of their organization.

The modern theorists were interested in the behavioral aspects of the organization without regard to the structural aspects. Bennis (1959) stated that classical theorists talked about organizations without people, while modern theorists talk about people without organizations.

Background of the Problem

Increased productivity and work force utilization are primary goals of business organizations. Most of us would agree that without satisfactory levels of productivity profit-oriented organizations could not survive. However, this premise applies to non-profit making organizations as well. Non-profit making organizations are also interested in achieving greater output without a proportionate increase in equipment, money, or employee hours, which can be classified as inputs.

Productivity has already become the byword of the 1980's. It is considered the single most important issue affecting the economic well-being of the United States and touches all of us through inflation, high interest rates, and unemployment. Buehler and Shetty (1981) stated that the slackening of productivity in the United States is one of the most alarming trends that has emerged in the past few years. From the end of World War II through the 1960's, U.S. productivity had increased an average of just over 3% per year. Productivity in the 1970's rose at just over 1% per year. With that decline in productivity came a decline in work force utilization.

Stiff, foreign competition has forced the automobile, steel, and other industries into crash programs of effective employee utilization. Adverse economic conditions, leading to tougher regulatory stances, has done the same to much of the utility industry.

Concern for public utility performance has become of increasing concern to utility management, regulatory agencies, and academicians. This concern has spread to the general public through the attention given by the press to power blackouts, pollution issues, conservation, and numerous investigations of the Federal Communication Commission and the Federal Power Commission (Iulo, 1968).

The utility industry has a distinctive economic role to all of us in American society. Phillips (1969) stated that a modern, complex society is completely dependent upon utility service. Electricity, natural gas, water, and the telephone are so much a part of our society that we could not function effectively without them. Utilities pay large amounts of taxes (Glaeser, 1957). In addition,

utilities are large users of new capital. Public utilities account for large percentages of all new securities issued by corporations (Garfield & Lovejoy, 1964).

The public mood as it relates to utilities is not good. Besides unemployment, inflation, and high interest rates, the increasing burden of property taxes and rising utility rates are certain to pressure the state and federal legislators into even tougher spending and regulatory policies.

It is inconceivable that the electric utility industry can continue to receive favorable rate decisions, regardless of how well justified they may be. The industry will have to clearly demonstrate that it is doing everything within its power to control costs and improve employee utilization. Even this may not be convincing enough. Much of the increasing costs of doing business will have to be overcome by their own productivity efforts.

The task of providing effective productivity measures for the utility industry has not been an easy one. The reasons for this are the multiplicity of elements in utility performance, the problem of weighing these elements, scarcity of data, and the problem of determining the cause and effect of performance differences. Furthermore, the process of assigning the credit or blame for performance differences is difficult. Regulatory commissions, research groups, suppliers, and the utilities themselves have historically attributed good performance to their own influence.

One such approach to effectively measuring the performance of utilities has been suggested by Dodge (1968). Dodge feels the

industrial organization approach is an effective method of judging performance. The industrial approach involves an inspection of the market structure, conduct, and performance of an industry. This approach involves the setting of standards and goals for the organization and adjustments in the structure of the organization or the conduct of the organization to meet these goals. Optimum performance is the goal; structure and conduct are the means of reaching the goal.

Coombe and Densmore (1982), Benes (1981), and Naisbitt and Hallett (1980) have mentioned the effective use and the need for the industrial organization approach within the electric utility industry.

The industrial organization approach relates to the use of work measurement techniques. The use of the work measurement technique of work sampling was used in this paper.

Numerous studies have been written concerning the relationship between organizational structure and job behavior. However, little has been written concerning the relationship between organizational structure and employee utilization, which is the focus of this paper.

Purpose of Study

The purpose of this study was to examine the effects that six structural variables had upon the utilization of employees within an electric utility in the Midwest United States. Specifically, the objectives were:

1. To investigate the relationship between the level of an individual within an organization and work force utilization.

2. To determine whether a relationship exists between span of control and work force utilization.

3. To determine whether a relationship exists between line versus staff positions and work force utilization.

4. To investigate the relationship between organizational sub-unit size and work force utilization.

5. To investigate the relationship between centralized versus decentralized organizations and work force utilization.

6. To determine whether a relationship exists between blue-collar versus white-collar workers and work force utilization.

Definitions

Organizational Structure

Khandwalla (1977) described organizational structure as:

> Structure is the more or less permanent arrangement of the parts of a whole. Organization structure is the network of durable and formally sanctioned organizational arrangements and relationships. . . . What writers on bureaucracy such as Weber call the hierarchy of authority, formal intermember communications, specialization of functions, and specification of rules and procedures are elements of organizational structure. What students of classical management theory such as Urwick call the organization chart, forms of departmentalization, and the span of control are also elements of organization structure. What administrative decision-making theorists such as Simon call performance programs are also elements of structure. In every case, however, the element of structure is a formally sanctioned relationship. It is, or intended to be, durable. And it is, or intended to be, an appropriate administrative means by which the

> organization goes about achieving the purposes for which it is set up. (pp. 482-483)

Ghiselli and Siegel (1972) referred to structure as:

> The structure of an organization refers to the nature of the distribution of the units and positions within it, and to the nature of the relationships among those units and positions. The dimensions of structure upon which organizations can be differentiated are people (size), groups (functional divisions, line or staff), levels of management and shape (centralization-decentralization, tall vs. flat). (p. 617)

Structure, as used in this study, will refer to the relationships of organizational levels, span of control, line and staff, size, and shape of the organization.

Organizational Level

Historically, most of the research into organizational level has followed the road paved by the Hawthorne investigations which highlighted the distinction between managers and nonmanagers and between various levels of management (Porter & Lawler, 1965). Berger and Cummings (1978) referred to organizational level as "the individual's position in the vertical hierarchy of authority and ranges from the non-supervisory workers at the lower end of the scale to the chief executive at the upper extreme" (p. 3).

For purposes of this paper, organizational level will refer to an individual's position in the organization with each employee being classified as a manager or nonmanager.

Line and Staff

According to Filley, House, and Kerr (1976), line functions refer to activities of work which contribute directly to the primary service objective of the organization. Staff functions are supportive functions which contribute to the efficiency and the maintenance of the organization. For purposes of this paper, the distinction made by L. Allen (1958) will be used to distinguish between line and staff. Line units are defined as those which directly relate to the major objective of the organization, and the function is located within the direct chain of command of the organization. Staff units are involved indirectly with the major objectives of the organization. They are concerned with performing service activities for the line such as counseling, guidance or planning activities, recruiting line personnel, and interpreting policy matters.

Organizational Size

Organizational size for purposes of this paper will refer to subunits within the total organization. Porter and Lawler (1965) referred to subunits as primary work groups, departments, and factories. This definition fits the criteria of this paper.

Span of Control

Since the early days of organizational theory, writers have questioned and prescribed an effective span of control. The desired width of the span is a major determinant in the structure of an

organization. For purposes of this paper, the definition described by Ouchi and Dowling (1974) will be used. They described span of control as the total number of employees over whom the supervision has some authority, responsibility, or control.

Shape of the Organization

The shape of an organization for purposes of this paper will be defined in terms of centralization versus decentralization. Centralization patterns will be based upon geographic location (Pfiffner & Sherwood, 1960; Porter & Lawler, 1965; Smith, 1958).

A centralized department is defined as an organization located with all supervision within one industrial complex. A decentralized department is one located within various geographical locations with supervisors or managers located in all of these locations.

Work Sampling

The definition used by Karger and Bayha (1977) will be used in this paper. They defined work sampling as:

> The application of statistical sampling theory and techniques to the study of work systems in order to estimate universe parameters from sample data. It is commonly used to improve the work measurement and methods engineering area to produce statistically sound estimates of the percentages of time that a work system is in any of a variety of states of work activity. With appropriate procedures, work sampling can produce information from which time standards might be determined. Syn: Activity Sampling, Frequency Study, Ratio Delay Study. (p. 271)

Work Force Utilization Ratio

The formula used by Hansen (1960) will be used to compute the work force utilization ratio. The formula is:

$$\text{True Utilization Ratio} = \frac{\text{Number of Utilization Minutes}}{\text{Total Number of Minutes}}$$

Work force utilization is defined as the percentage of time of an 8-hour day that an employee spends on productive work activities. Productive work activities are those activities defined in an individual's job description as contributing to a measurable or unmeasurable end product of that individual's department.

Limitations

The first limitation is that the work sampling utilization ratio should not be misinterpreted as a productivity measurement tool. Work sampling does not measure one's output. Work sampling only tells the observer what percentage of the time period selected for measurement that an individual is working or not working. The quality of the output must be determined by the supervisor, and the quantity of output must be determined by other work measurement tools. The advantage of work sampling is that it allows for comparisons of dissimilar organizations and departments.

Another limitation of the study was that the population consisted of the members of a large corporation. The results may not apply to individuals in small firms.

The third limitation of the study was that the effects of the variables were not studied on a multiple or combination basis.

Summary

This study examined the relationship between work force utilization and organizational structure. The interest in employee utilization and organizational structure are entrenched in classical American Management Theory.

With the current state of the American economy, there has been a resurgence in the study of productivity and work force utilization in industry, on a national and an international level. One industry that has felt the "wrath" of the public, because of increasing size of their bills to the public, has been the utility industry. If the utility industry expects to receive favorable rate decisions, they must demonstrate to the public that they are doing everything in their power to improve productivity.

One such successful method of measuring performance in the industry is the technique of work sampling which gives a work force utilization percentage (the percentage of time of an 8-hour day an employee spends on productive activities).

For the purposes of this study, the structural variables of levels within an organization, span of control, line or staff positions, organizational size, organizational shape, and blue-collar versus white-collar workers were analyzed in their relationship to work force utilization.

Report Preview

The remainder of this report will consist of four chapters. Chapter II deals with the review of the literature concerning the relationship between organizational structural variables and work force utilization. The review will specifically examine the research evidence concerning the relationship between work force utilization and organizational shape, blue-collar versus white-collar workers, organizational size, line or staff positions, span of control, and number of levels within an organization.

Chapter III will discuss the methodology used during this research effort. This chapter will explain how the research sample was selected, and will explain the technique of work sampling. It will present the variables under investigation, the method of data collection, and will review the statistical techniques used in the analysis.

Chapter IV will consist of a discussion of the results and a presentation of the findings of the research effort.

Chapter V will be a summary chapter and will discuss the conclusions and implications of the study.

CHAPTER II

REVIEW OF THE LITERATURE

The investigation into the relationship between various structural factors and employee utilization has produced a considerable amount of research concerning the various effects of these variables. Specifically, the review of literature will be concerned with the structural variables of organizational level, line and staff, organizational size, span of control, centralization versus decentralization, and blue-collar versus white-collar worker.

Organizational Levels

The research which related the relationship between an employee's level within the organization and his behavior has been historically divided into two basic areas. In the 1940's many writers were influenced by the Hawthorne studies, which concentrated on the plight of the industrial worker as related to managers. The social, physical, and psychological conditions which they had to endure, as compared to management were highlighted. Argyris (1957), Likert (1960), and Leavitt (1958) continued with this relationship of managers to nonmanagers throughout the late 1950's and early 1960's. The second area relates to the relationship of job satisfaction of various levels of management personnel to organizational behavior. Pfiffner and Sherwood (1960) stated "differentiation of task between echelons is of more significance to the selection and training of

leaders at the several levels than may be indicated by the attention accorded it in the past" (p. 139).

However, there had been relatively few articles published on behavior as relating to the various levels of management. Porter and Lawler (1965) stated:

> This relative lack of attention to the effects of differentiation among levels of management is somewhat surprising when one considers the amount of interest that industrial psychologists and sociologists have shown in the effects of division of labor. Almost always however, division of labor has been studied as it occurs along a horizontal dimension of the rank and file worker level. (p. 25)

During the late 1950's various authors concentrated on the hierarchy of need satisfaction (Maslow, 1954) as it relates to the industrial organization. Argyris (1957), R. Davis (1951), Haire (1956), Leavitt (1958), and Viteles (1953) published articles on this relationship. These articles generally agree that organizations pay the worker in physical or security need satisfaction areas, rather than in higher order areas, such as, social, esteem, or self-actualization. Argyris (1957) and Haire (1956) stated this situation of mass production workers is often mentioned as a prime illustration of this need satisfaction pattern in large organizations. Porter (1961) stated "this motivational reward system has been thought of as especially true for nonmanagement production workers, but little attention has been directed towards the appropriateness of this picture for the management part of the organization" (p. 1). Haire (1956) agreed with this in stating that most studies have emphasized the social and egotistic need satisfactions of the hourly

paid worker. Argyris (1957) believed that these types of need satisfactions apply to all individuals with the organization. He believed the higher the individual in the organization the more able he is to satisfy his needs. Therefore, he is stating that there exists a difference in opportunity within management to satisfy different types of needs.

During the 1960's there was substantial research into organizational behavior at the various managerial levels. Generally, the results have been consistent with those studies comparing non-managerial workers to their supervisors. The studies conclude that job satisfaction increases with increasing levels of management. Porter and Lawler (1965) stated that "recent studies, plus one appearing prior to the Herzberg review, seem to be nearly unanimous in concluding that job satisfaction or morale does increase monumentally with increasing levels of management" (p. 27). The studies which Porter and Lawler reviewed were Browne and Neitzel (1952); Rosen (1961); Porter (1961); Porter (1962); Opinion Research Corporation (1962); and Haire, Ghiselli, and Porter (1963).

Browne and Neitzel (1952) conducted studies to determine the communication, supervision, and morale of three supervisory levels of women employees in the utility industry. They concluded "morale scores were found to be positively related to the echelon level of the supervisors, the inner level of supervisors generally having the highest scores" (p. 90).

Rosen (1961) conducted a study to determine whether differences exist among three levels of management within a single plant. Rosen

used four desirable conditions of work which were originally mentioned by Rosen and Weaver (1960). The areas were:

1. Relations with superiors.
2. Relations with the company.
3. Relations with peers.
4. Decision making and implementation.

They concluded that "there was some evidence suggesting that richness of the job environment in terms of desirable conditions of work was related positively to increased status in the hierarchy" (p. 160).

Porter (1961) studied two levels of management, first line supervisors and lower middle management, within three companies. Porter concluded:

> Lower level management positions were more likely to produce deficiencies in fulfillment of psychological needs than were middle level positions. This suggests that there exists a differential opportunity within management to satisfy various motivational needs. (p. 8)

Porter (1962) sampled over 1,000 managers from various companies. Porter employed a questionnaire using Maslow type categories to determine how managers in business and industry feel about their jobs. The results were generally in agreement with the Rosen (1961) study. Porter (1961) concluded that the most satisfied managers cluster at the highest management levels, and that satisfaction tends to decrease at each successive lower level of management.

Haire et al. (1963), through the study of managerial levels in over 14 countries, concluded that job satisfaction is related to the managerial level.

Since 1965 numerous studies have been conducted which related organizational behavior to the organizational level. During the late 1960's various studies were conducted which related job satisfaction to performance. Katz and Kahn (1966) stated in relating job involvement to satisfaction, that job involvement is a necessary condition if an individual is to fully accept the organizational demands placed upon him. They stated that the degree of job involvement is related to the level of aspiration and to the degree of internalization of organizational goals is often related to your level within the organization, which leads to more job satisfaction. Bass (1965) viewed job involvement as representative of the ego of the employee within his job and thus related it to performance. Bass (1965) stated that the following conditions lead to the strengthening of job involvement: opportunity to make more job-related decisions, the feeling that one is significantly contributing to the company, recognition, achievement, self-determination, and the freedom to set one's own work pace. All of these variables are related to one's level within the organization.

Lawler and Porter (1967) concluded that there exists a relationship between an employee's belief about the probability that rewards depend upon their job behavior, and their actual job performance. The more managers believe that rewards such as pay, promotions, and respect stem from good performance, the more likely they will be rated as good performers. Georgopoulos, Mahoney, and Jones (1957); Galbraith and Cummings (1967); and Porter and Lawler (1968) have reported similar findings. The variables such as pay,

promotions, and respect will vary according to one's level within the organization.

Miller (1966) conducted a study which examined the behavior of a randomly selected group of 171 national union officials. The researcher concluded that the higher level union officials were more satisfied than the lower level officials. However, when the data were further segmented by craft versus industrial unions, the data from the industrial unions only barely supported the findings. This study was significant because previous studies lumped all the respondents together into one population and assumed the overall results were applicable to all the subgroups within the population.

Porter and Mitchell (1967) studied 1,297 noncommissioned and commissioned officers of the United States Air Force. The results indicated that within the two groups, satisfaction increased as the rank increased. Johnson and Marcrum (1968) reported similar results in a study involving 504 officers in the United States Army.

Rhinehart, Barrell, DeWolfe, Griffin, and Spaner (1969) conducted a study of 2,026 managers in the veterans administration. They concluded that "Managers from government, and managers from business both show positive relationships between vertical locations in the management hierarchy and need satisfaction, with satisfaction decreasing as the management scale is decreasing" (p. 233).

Herman and Hulin (1973) attempted to reproduce much of the earlier research dealing with job satisfaction and organizational levels. In the study consisting of four levels of supervisors in a manufacturing plant, the authors received mixed results. This led

the authors to cast doubt on previous studies which had been conducted in this area.

Hamner and Tosi (1974) concluded that the ambiguity of one's role in an organization is related to job satisfaction and organizational level. They referred to this as role conflict. They stated that at the higher management positions, this problem may not arise so much from conflicting demands, but from a lack of job clarity and ill defined expectations. At the lower managerial levels the jobs are usually well defined.

Szilagyi, Sims, and Keller (1976) conducted a study of 931 hospital employees in five occupational levels, and another study of 174 employees in three occupational levels. They concluded that one's occupational level was positively correlated with one's job satisfaction.

The conclusions drawn from the research concerning one's level within the organization and job satisfaction are not clear. While most of the research indicated that a positive relation exists between job satisfaction and organizational level, there were numerous studies that disagreed with this conclusion. These inconsistencies would indicate that future research is necessary.

Line Versus Staff

Browne and Golembiewski (1974) stated that "perhaps no area in organization theory stands more in need of clarification than the line-staff concept" (p. 406). Many writers are ready to abandon the concept, and others have invented new but similar terms of their

own. Koontz and O'Donnell (1968) concluded, "There probably is no area of management which in practice causes more difficulty, more friction and more loss of time and effectiveness" (p. 29).

One of the earliest studies to compare the attitudes of line and staff personnel was conducted by Dalton (1950). Dalton defined the staff organization as the functions which were research and advisory, and the line organization as the function which has exclusive authority over the production processes. Dalton noted distinct differences in the personalities between the two groups. He noted that staff members were generally younger and came from a different social background than the line personnel. Staff personnel were better educated and had different educational preferences. Dalton discovered the turnover rate of staff managers to be two to four times that of the line managers.

K. Davis (1953) conducted a study concerning the communication patterns between line and staff personnel. K. Davis concluded that staff managers were better informed than the line managers. K. Davis attributed this to the greater mobility on the part of the staff managers. K. Davis (1953) stated:

> Staff executives in such areas as personnel and control found that their duties both required and allowed them to walk through other departments without someone wondering whether they were "not working" to get away for coffee, and so on--all of which meant they heard more news from the other executives they talked with. (p. 47)

Burns (1954), in his study in a British engineering firm, agreed with the idea of greater flexibility in communication for the managers in the staff positions.

Goldner (1957), through the interviewing of 125 faculty members of a small liberal arts college, utilized cosmopolitans which can be applied to staff personnel and locals which can be applied to line personnel. Goldner stated that:

1. Cosmopolitans (cosmos) placed more emphasis on research as a source of satisfaction on their jobs.

2. Cosmos were better educated than locals.

3. Cosmos were less loyal to the organization.

4. Cosmos were less happy with their salary than locals.

5. Cosmos were less rule-oriented.

6. Cosmos participated less in organizational activities.

This type of distinction has also been made by Reissman (1949) for managers within the government and Kover (1963) for employees in a research organization.

Porter (1963), in a study conducted on a nationwide sample of 1,802 managers from various companies, concluded that:

1. Line managers perceived their needs to be better fulfilled than staff managers.

2. There was no difference in the importance that line and staff managers attached to the various types of needs, except for autonomy, which the staff managers attached more importance.

Rosen and Weaver (1960), in a study dealing with four levels of management, utilized a questionnaire listing 24 desirable conditions of work. They concluded that there were no significant differences in the ratings of line and staff of the importance of these characteristics. Porter and Henry (1964), in a study of the personality

traits of line and staff managers, asked each set of managers to rank a set of personality traits which they felt were important to the success of their jobs. The personality traits consisted of inner-directed personality traits and other-directed traits. The traits utilized were:

Inner Traits	Other Traits
Forceful	Cooperative
Imaginative	Adaptable
Independent	Cautious
Self-Confident	Agreeable
Decisive	Tactful

The results indicated that the staff managers felt that more of the other-directed behavior had to be demonstrated to succeed in their job than the line managers indicated.

Zojonc and Wolfe (1966) conducted a study of the communication contacts of line and staff personnel. They concluded that:

1. Staff employees have wider formal communication contacts than the line employees.

2. Within each function the higher levels in the hierarchy have wider formal communication contacts than the lower levels.

3. On the whole, there was no difference in the informal communication between the line and staff functions. However, the supervisors of the staff functions report the greatest amount of informal communication, and the lower levels of staff employees reported the least amount of informal communication. There were no differences in the informal communication by hierarchial level in

the line employees.

4. Staff organizations demonstrated more complex, more differentiated, less segmented, and more highly organized structures than line employees.

5. Staff employees seemed to identify with the company more than the line employees. Among the line employees, the supervisors showed the greatest amount of identification; among staff employees the lowest levels showed the greatest identification.

Belasco and Alutto (1969) disagreed with many of the previous studies. They stated "It has been implicitly assumed that the roots of such controversies lie in discrepancies between the perceptions or expectations held by staff role performers and relevant managerial (line) role definers" (p. 2). Belasco and Alutto stated that there have been few empirical studies which have explored and proved the differences of perceptions between line and staff members.

Browne and Golembiewski (1974) conducted a study to investigate the interunit perceptions which exist in the line and staff subunits. The members of operating units perceived their units to be important, powerful, and having outward orientations and producing positive feelings. The members of the staff units perceived their own organizations as being unimportant, impotent, and producing positive feelings.

Concurrent with the studies on the conflict between the line and staff personnel have been attempts to relive the differences in the satisfaction between the two groups. The concept is that of the dual ladder. Goldner and Ritti (1967) referred to the dual ladder

concept as:

> The side by side existence of the usual ladder of hierarchial position leading to authority over greater and greater numbers of employees (line personnel) and another ladder consisting of titles carrying successive higher salaries, higher status, and sometimes greater autonomy or more responsible assignments (staff personnel). (p. 491)

Schonner and Harrell (1965) stated that "the dual ladder has failed in its aim of conferring equal prestige and equal compensation for managers and technical personnel, at least in the eyes of the two groups concerned" (p. 57). Ritti (1971) stated that instead of permitting the staff to maintain their commitment to the organization, it actually serves to formalize the powerlessness of the staff personnel. Schriescheim, Von Glinow, & Kerr (1975) mentioned the following problems with the dual ladder:

1. Lack of equity between the two ladders.

2. Lack of power. The staff members are removed from the sources of managerial responsibilities which would interfere with their technical and professional responsibilities.

3. The professional ladder is often viewed as a face-saving device for individual failure.

4. There is not an adequate number of staff positions.

5. The evaluative criteria of staff personnel are not always equitable; line personnel are often used to evaluate line personnel.

While most of the data indicate that there is a difference in the behavior of line and staff personnel, the inconsistencies indicated that future research is needed.

Organizational Subunit Size

Porter and Lawler (1965) defined subunit as "any grouping of the members of a business organization that systematically excludes part of the membership of that organization" (p. 34). They stated that work groups, departments, and factories have been studied frequently as organizational subunits. Previous studies have indicated that the relationship between subunit size within organizations and job attitudes and performance have concluded that small subunits perform better in all of these areas. Porter and Lawler (1965) cite Strauss and Sayles (1960), and Viteles (1953).

One of the first writers who commented on the effects of organizational size on the behavior of its members was Simmel (1902). Simmel stated that as group size increases, certain structural effects are imposed on that group.

One of the first questions which was related to organizational size was its relation to productivity. Marriott (1949), in a study of two automobile factories, found in a study ranging from very small groups to large groups of 200 individuals, that "low but significant correlations were obtained which demonstrate an inverse relationship between output and size, the small sized groups showing consistently larger output in each factory" (p. 56). However, all of the studies in this area have not proved to be consistent in their results. South (1927), previously to the Marriott study, concluded that the effect of size upon productivity was situational. He concluded that smaller groups were faster than larger groups in

solving concrete problems and slower in solving abstract problems. Benge (1944), in a study which utilized a sample taken from various companies and included rank and file workers, concluded that the attitude of employees toward their boss was significantly better in smaller organizations rather than large organizations. Kelley and Thibaut (1954) reported that the effects of size is situational.

Herbst (1957) and Revans (1958) reported on a curvilinear relationship between unit size and output. Herbst (1957), in a study concerning the output of various retail shops, concluded that middle size units performed the best. Revans (1958), in a study relating performance to coal outputs, concluded that the output of coal per man year reaches a maximum in the size range of 1,500-2,000 men and then it begins to decline. Revans also concluded in a study of retail shops similar to the Herbst study that sales rates reach a maximum in medium size units and then they began to decline.

Balderston, Brecht, Karabasz, and Riddle (1949) related size and the scale of production to the scale of administration. They defined the scale administration as the number of people to be coordinated into the system. Balderston et al. (1949) related this concept to industrial plants. In industrial plants the scale of administration is usually small and the scale of production is large; therefore, any determination of effective organizational size should be considered in respect to this relationship.

Argyle, Gardner, and Cioffi (1958) stated that larger groups have higher productivity rates than smaller groups. Indik and Seashore (1961), in a study between automobile dealers, found no

significant relationships between size and performance.

In addition to levels of productivity, there are other factors which influence employee utilization. One of those factors is that of absenteeism which has been related to subunit size. One of the first studies which concentrated on the relationship between size and absence rates was a study by the Action Society Trust (1953). They reported a correlation of .45 between the size of the factory within a given company and absence rates. Revans (1958) quoted the Annual Report of the Chief Inspector of Factories, and stated that in British industry the compensable accident rate rose steadily as the size of factories increased. Revans (1958) reported in a study of five randomly chosen gas works ranging in size from 67 to 3,430 that the correlation between the size of the plant and the average duration of absences was .91. Revans reported a .62 correlation between absence rates due to sickness and unit size. Baumgartel and Sobol (1959) conducted a study of work locations in the airline industry and found a correlation between absenteeism and work location. These findings have been agreed upon by Hewitt and Parfitt (1953) and Indik and Seashore (1961), who have stated that larger departments of a company have higher absenteeism rates than smaller departments. All studies have not agreed with the results. Meltzer and Mann (1953), in a study of the absence rates of white-collar workers, did not find a significant relationship between absenteeism and subunit size. Argyle et al. (1958) found a curvilinear relationship between absenteeism and subunit size, with the lowest absence rates in the middle size groups.

Other studies in the area of subunit size which relate to employee utilization have been studied. Revans (1958), reporting on data collected in the British coal mines, relating unit size to strikes and the severity of the strikes. Revans stated that the tonnage lost per man increases as the size of organization increases. Worthy (1950) related this to employee morale. He stated that the size of the unit is related to the morale level of the unit, with the morale level in the smaller units being higher. Katz (1949) agreed with this idea that employees of smaller units are more satisfied than employees of large work units. Kerr, Koppelmeier, and Sullivan (1951), in a study of 894 workers in 29 departments in two electronic plants, related organizational subunit size to employee satisfaction. They discovered an inverse relationship between size and job satisfaction. H. Campbell (1952) related organizational size to incentive pay plans and job satisfaction. He concluded that workers in the smaller groups felt they had a better knowledge of how their pay plan worked which increased their satisfaction. Worthy (1950) stated "Our researches demonstrate that mere size is unquestionably one of the most important factors in determining the quality of employee relationships: the smaller the unit the higher the morale and vice versa" (pp. 172-173). Indik and Seashore (1961), in a study in the automobile industry, Indik (1965), and Thomas and Fink (1969) have also indicated that subordinate satisfaction decreases with unit size.

All studies have not agreed with the relationship between organizational size and job satisfaction. Meltzer and Salter (1962)

reported on questionnaires which were completed by 75% of all the physiological scientists working within the United States. They concluded that "there is no relationship between size and productivity and curvilinear relationship between size and satisfaction" (p. 360). Brayfield and Crockett (1955) suggested that dissatisfaction on the part of employees leads to high turnover and absenteeism.

In addition to studies on organizational subunit size, there have been studies conducted on total organizational size which have some relevance to explaining the relationship between organizational size and employee utilization. Porter and Lawler (1965) conducted a review on two studies which dealt with total organizational size and employee attitudes. The first study mentioned was by Benge (1944). His findings were based on the study of rank and file workers. He concluded that the morale in smaller companies is better than the morale in larger companies. Porter and Lawler (1965) stated that "those results are extremely difficult to evaluate, however since neither the number or type of respondents nor the number of companies on which the results were based was specified in the article" (p. 41). Another study mentioned by Porter and Lawler is a study conducted by Tallacchi (1960) which was concerned with the relationship between individual attitudes and behavior. Tallacchi's study was described as consisting of 93 organizations; however, investigation determined that 45 of these organizations were actually plants that comprised parts of only 5 different companies. Despite this mixing of organizations and subunits, there seems to be sufficient evidence to support Tallacchi's conclusion that a negative

correlation exists between employee satisfaction and organizational size at the rank and file level.

Strawser, Ivancevich, and Lyon (1969) conducted a study concerning the job satisfaction of 269 accountants in large and small CPA firms. They concluded "in each case where statistically significant differences were found, accountants in small firms reported less perceived need satisfaction than CPA's employed by large firms" (pp. 342-343).

All the studies have not agreed with the previous results. Ingham (1970) concluded on data collected concerning employee satisfaction that there was no significant difference in the satisfaction of employees within large and small organizations. Cummings and El Salmi (1970) agreed with this conclusion in their survey of 456 managers. They concluded that company size was not related to the managers' job satisfaction.

There have been two studies which disagree with the previous points of view on overall organizational size. Parr (1973), in a study dealing with the agribusiness, found an inverse relationship between size and job satisfaction. These findings were agreed upon by Osborn and Hunt (1975) in the study of an undergraduate business fraternity, where they found that size was positively related to satisfaction with work.

Based upon the information collected concerning the relationship between unit size and job satisfaction, several conclusions can be drawn. It can be concluded that there is a direct relationship between satisfaction and unit size, or it can be concluded that

there is a negative relationship, or it can be concluded that no relationship exists. From the inconsistencies of the data, it is indicated that further research is needed.

Span of Control

Span of control is defined as the number of subordinates who directly report to a supervisor. Pfiffner and Sherwood (1960) stated:

> Much blood has been let to reduce to executives' span with inconsequential results to administrative performance. Yet span of control sails merrily on. There is much written about it. Most consultants tab this as an essential in reform proposals. Students sweat over its definition, mainly because they assume the concept should be more complicated than it really is. Thus, regardless of what its merits may be, span of control is so entrenched in the administration culture that it must be accorded a prominent place in any book on organization. (pp. 155-156)

Traditional Viewpoint

Entwisle and Walton (1961) stated that the idea of span of control is an ancient theory of management, dating as far back as there are records; military organizations have utilized this concept. Originally theories concerning span of control were based upon casual observation and the deductive reasoning of these observations. Entwisle and Walton (1961) and Urwick (1974) mentioned that General Sir Ian Hamilton in a book entitled the Soul and Body of an Arm in 1921 is credited with bringing attention to the principle of span of control. Urwick (1974) presented Hamilton's principles as:

Any military reorganization should conform to certain set principles: (a) power must go with responsibility; (b) the average human brain finds its effective scope in handling from three to six other brains.

Henri Fayol, who Filipetti (1932) mentioned as one of the major contributors to the field of management and administration, had a theory concerning span of control. Fayol (1977) stated that regardless of his rank, an ideal span of control is a number less than six, except for a foreman who is dealing with a simple operation and is dealing with 20-30 individuals.

The classical writers do not confine their concepts of span of control to the same number of levels. For example, Urwick (1956) stated that the ideal span of control for top management is four, but that at supervisory levels the number may range from eight to 12. Urwick emphasized that this principle applies only to subordinates doing work which is interrelated; therefore, the degree of interrelationships must be taken into account. Urwick stated that if the work of two units is so close that what one of the units does directly affects the results achieved by the other, there must be a constant coordination of their activities by the supervisor. On the other hand, if the relationship between the two is only intermittent, the supervisor only needs to give it his or her occasional attention.

Urwick (1974) demonstrated the theory of Graicunas who demonstrated mathematically that increases in the number of subordinates which report directly to a manager are accompanied by geometric

increases in the number of personal relationships within that work area. The formula is expressed mathematically as:

$$C = N(2^n/2 + N - 1)$$

where:

C = Total possible contacts

N = Number of subordinates reporting directly to manager

Koontz and O'Donnell (1972) represented the principle numerically as:

Number of subordinates	Number of relationships
1	1
2	6
3	18
4	44
5	100
6	222
7	490
8	1,080
9	2,376
10	5,210
11	11,374
12	24,708
18	2,359,602

The significance of this formula is that if an executive adds to his number of subordinates the help that he receives increases arithmetically; however, the relationships that he creates between employees increases geometrically. Therefore, an executive must think twice before he decides to add an employee.

In addition, Urwick and Graicunas collaborated in 1929 to formulate theories concerning span of control. Urwick (1974) reinstated the principles that he and Graicunas formulated originally. The

principle was "no executive should attempt to supervise directly the work of more than five, or at the most six, direct subordinates whose work interlocks" (p. 351). Urwick (1938) stated that this principle has been criticized and misunderstood numerous times. Urwick (1938) stated that the principle was not meant to apply at the lower levels of supervision where the work of subordinates is not interrelated.

Bossard (1945) calculated that with each additional employee, the number of interpersonal relationships increase exponentially, as given in the formula $X = (N^2 - N)/2$. Gillmore (1948) stated that "it is generally agreed that if the functions that are to be coordinated are interdependent and dissimilar, the span of control should not exceed five" (p. 12).

In general, these classical theorists have assumed that a small span of control is the ideal situation for most organizations. Most of the classical theorists recommend spans of control between three and six.

Current Research

One of the first theorists to disagree with the classical theorists' approach was Worthy (1950). Worthy, in his studies at Sears, Roebuck and Company concerning organizational structure, stated:

> Over complexity of organizational structure is one of the most important and fundamental causes of poor management employee relationships in our modern economic system, and that until this problem is found and corrected, no

> substantial improvement in these relationships is possible. (p. 174)

Furthermore, Worthy suggested that a large span of control is good since it provides for better communication on the part of the employees and better initiative and room for growth. This view has not been shared by all researchers, which has caused a controversy concerning this management principle.

Dale (1952), in a survey which he conducted for the American Management Association, recommended an ideal span of control as being between three to six. However, he stated that the number of subordinates in successful companies often exceeds the optimum spans suggested by classical theorists.

Suojanen (1955) stated that the idea of there being an optimum or "correct" span of control is meaningless and that this principle has become a management fable.

R. Davis (1951) distinguished between two types of spans of control. The first type was the executive span of control which applied to the middle and upper organizational levels. He stated that this executive span should be between three and nine, depending on the type of work the company performs and their rate of growth. The second type of span of control which he identified is the operative span of control which applies to the lower organizational levels. For these levels, R. Davis suggests an acceptable span of control as high as 29-30 subordinates.

Urwick (1956) defended his classical position which was refuted by Dale (1952). Urwick pointed out that Dale's measure included all

the subordinates that had access to the supervisor, not just those reporting directly to the supervisor in the chain of command. Urwick felt this was an invalid measure of determining the responsibility of immediate supervision.

Porter and Lawler (1965) mentioned that most of the research that had been performed up until that time was concerned with determining variables that were related to the size of the span of control in existing organizations. Pfiffner and Sherwood (1960) stated that there had been relatively little empirical research on the study of span of control.

Woodward (1958) conducted a study of 100 industrial firms in southern England, and discovered a relationship between the size of the span of control of first line supervisors and company performance. The pattern of span of control was compared to various measures such as profit figures. The companies were divided into three groups based upon the type of manufacturing technologies. The three categories were: (1) job order, (2) mass production, and (3) continuous processing. The findings revealed that successful firms in the job order and continuous processing areas tended to have wider spans of control. Successful firms in the mass production area were found to have narrow spans. These findings suggest that there is no one ideal approach to determining a proper span of control size; certain types of technologies perform better with certain structures. Woodward's study did point out that large spans of control can produce high performance.

Entwisle and Walton (1961) presented data concerning span of control compiled from a study of colleges and universities. They stated spans of control were related to the size of the organization. Entwisle and Walton stated "sheer size rather than functional orientation may be the predominant function in determining the size of the span" (p. 528). They stated that span of control was based upon:

Span of attention--a person is psychologically incapable of attending to more than seven items at once.

Group combinations--the larger the span the more possibilities there are for forming subgroups.

Cliques--as span increases, more and more possibilities increase for splinter groups based upon mutual attraction.

During the 1960's, the Lockheed Missile and Space Company (Stieglitz, 1962) successfully applied the classical theory in establishing their managerial spans. In an attempt to quantify factors which influence the span of control, Stieglitz defined seven factors which he considered to affect optimal span of control. The factors were: (1) similarity of function, (2) geographic proximity, (3) complexity of functions, (4) direction and control, (5) coordination, (6) planning, and (7) organizational assistance.

Each of these factors was weighted to reflect degrees of supervisory burden. The index was used to assist in planning and organizational design of the Lockheed units. These studies resulted in reductions in managerial personnel on the supervisory payroll.

Udell (1967) expanded on the research conducted at Lockheed. In a study conducted on executives of 67 Illinois and Wisconsin manufacturing companies, he attempted to determine whether the variables utilized at Lockheed applied to these executives. Udell concluded that span of control increases with the amount of supervision received by others in the organization. This was consistent with classical theory. Additionally, he concluded that professional employee standards make it possible for supervisors to maintain a large span of control. Finally, he concluded that geographical separation of subordinates will result in smaller spans because of the difficulty and time consumed in supervision.

Research was carried out in the 1960's which related effective spans of control with competence of the employees and the complexity of the job. Blau (1968) conducted a study of 254 finance departments of state and local governments. Blau stated "the span of control of first line supervisors is on the average somewhat narrow if the staff has superior qualifications than if it doesn't" (p. 460). In addition, Blau stated that expert training makes a man more independent in performing his duties and the individual becomes more aware of the broad aspects of his job and he is able to detect operating problems and solve them. This view is shared by Meyers (1968) and Bell (1967). Bell (1967), in interviews conducted with supervisors and managers in a community hospital, suggested that when subordinates have highly complex jobs, their span of control is decreased. Additionally, the more complex a superior's job, the lower his span of control.

House and Miner (1969) conducted studies concerning the size of effective spans of control relating to industry. They concluded that the size of effective span of control is dependent on an organization's technology. Furthermore, they concluded that when determining an effective span of control, one must consider such factors as the demands of the task, desirability of group cohesiveness, the members' needs for satisfaction, and the leadership skills available in the organization.

Ouchi and Dowling (1974) pointed out a problem associated with defining span of control. They stated that the term span of control is usually regarded as a measure of the limits of hierarchial authority exercised by a single manager. That interpretation is appropriate for some research questions but not for others.

There were so many conclusions drawn by the various authors in the research concerning span of control that it is reasonable to expect that there is no one ideal span of control for all organizations. Future research can only add to the understanding of this facet of organizational structure.

Centralization Versus Decentralization

Pfiffner and Sherwood (1960) stated that the trend in large scale organizations is toward decentralization; however, decentralization has several meanings. It can be viewed in terms of decision making or geographical dispersion.

Fayol (1977), in his general principles of management, in relating to centralization or decentralization, stated:

> Like division of work, centralization belongs to the national order, this turns on the fact that in every organism, animal or social, sensations converge towards the brain or directive part and from the brain or directive part orders are sent out which set all parts of the organism in movement. (p. 114)

Fayol stated that the question of centralization or decentralization is a question of proportion, it is just a matter of finding the optimum degree for the particular organization.

The individual who is credited with the transformation of American industry to the concept of decentralization in the 1920's was Alfred P. Sloan, Jr., of General Motors. Sloan (1964) felt the greatest purpose of decentralization was to attain a greater measure of control. Sloan stated that without control from the central offices, the divisions would get out of hand and fail to follow the procedures set by corporation management. Some of the advantages are the economies of specialization and the need upon all levels of management to sell their ideas rather than simply giving orders.

Most of the early research into centralization versus decentralization was conducted after World War II. Three of the most significant research findings in this area were conducted in the form of case studies (e.g., Drucker, 1946; Givens, 1949; and Selznick, 1949). Drucker (1946) conducted an 18-month study of the General Motors Corporation from the standpoint of an outside consultant to report on its managerial policies and organization. Drucker concluded that a decentralized organization is not always the best type to have. He stated "decentralization while applicable in most situations, is not universally valid as the most efficient form of industrial

organization" (p. 121). Drucker concluded:

> Fisher body is a conspicuously efficient producer. Its efficiency and performance account in large part for General Motors' rise to first place in the automobile business. While the internal figures of the corporation are available, there is little doubt that the rate of return on which Fisher operates compares favorably with that of decentralized divisions. What advantage in efficiency could Fisher derive from being decentralized? What disadvantage is entailed in its centralization? (p. 121)

Selznick (1949) conducted a study of the Tennessee Valley Authority. He commented on the advantages of having decentralized federal agencies. Selznick stated "an excessive centralized government is inherently disqualified at least in the United States, from fully promoting the welfare of its citizens" (p. 24). He stated that the Tennessee Valley Authority served as an example of the decentralization of federal functions and was the boldest and most far-reaching effort of his time to decentralize the administration of federal functions. Selznick mentioned three essential goals of this decentralized federal agency.

1. The responsible agency must be permitted the freedom to make some of its own significant decisions.

2. The decentralized agency must be given a key role in coordinating the work of federal, state, and local programs.

3. There must be active participation by the people themselves in the program.

Givens (1949) stated that there are two extreme forms of management. One form was top-down management which was dictatorial, and the other was management from bottom-up, where upper management

tries to encourage the initiative of all those down the line. Givens stated that bottom-up management is not the usual concept of decentralization. Givens stated that it is carrying decentralization a step further. He calls it progressive decentralization. It spreads from one part to others. It includes not only subsidiary presidents and department heads, but it gives foremen, superintendents, and all people along the management line freedom to take calculative risks and try new ideas. Givens (1949) stated "progressive decentralization takes a certain percentage of mistakes for granted and in review finds them less frequent and less costly than the results under the czarist type of management" (p. 7).

Ginzberg and Reilley (1957) reported on the effect of decentralization in the armed forces, with the establishment of the Army Service Forces which reversed the flow of paperwork away from Washington and into the field.

Baker and France (1954) conducted a study which compared the behavior of managers in centralized and decentralized industrial relations departments. They concluded that there was no substantial difference in the attitudes of the individuals in centralized departments and those within the decentralized departments.

Tannenbaum and Massarik (1950) stated that an effective decentralized organization is situational. They stated that a decentralized organization is appropriate when the organization has significant time to implement the model, when the members of the organization are competent to make their own decisions, and when the managers are willing to make any decision the group makes.

Dale (1952) commented on the criteria which determine to what degree an organization is decentralized. He stated that decentralization of authority increases with:

1. The number of decisions made in the lower levels of management.

2. The importance of the decisions made in the lower levels of management.

3. The less checking on the decisions by higher management.

4. The increase in the functions affected by the decisions made at the lower levels.

E. Weiss (1957), through the use of a 22-item questionnaire, studied 34 corporations. He found no significant differences between the centralized organizations and the decentralized organizations, with respect to the following variables: absenteeism, turnover rates, grievances, accident severity, and the age of the managers.

Marschak (1959) stated that the effects of centralization or decentralization on an organization was situational. He stated that the efficiency of the two depended upon the type of business which was involved. Litzinger (1963) conducted a study of the effects of centralization or decentralization upon bank managers. He concluded that there was no significant difference in the attitudes of the two groups.

Sloan (1964) conducted a study which yielded similar results to the study of Marschak (1959). Sloan also stated that the effects of centralization or decentralization upon a company was situational.

Sloan stated that for companies where there is a great deal of independence of action between the members, such as a retail store, that increased decentralization is desirable. However, in a company where the members' actions are complimentary, such as the railroad industry, a high degree of centralization is crucial.

Porter and Lawler (1965), in summarizing various studies concerning decentralization, concluded that the previous studies show no clear cut support on the advantages of decentralization. They stated: "Perhaps the chief obstacle to research in this area, though is the lack of an adequate method for measuring the degree of decentralization. Until such a measure is developed the research evidence gathered will undoubtedly remain difficult to interpret" (p. 48).

In the late 1960's research was extended into the relationship between productivity and decentralization. Hage (1965), in his axiomatic theory of organization, contended that greater formulation and centralization contributes to greater efficiency and productivity, due to the fact that this type of structure reduces uncertainty in decision making. Price (1968) reported on similar findings of Hage. Holland (1973) conducted a study of the organizational structure of an institution for the mentally retarded. His objective was to test whether decentralization facilitated the individualization of resident care. Holland stated that "decentralization can be seen as prompting markedly greater participation and involvement of direct care staff in individualizing and personalizing their care of residents" (p. 242). Mott (1972) conducted a study of federal

agencies. Mott suggested there were serious problems with centralized organizations. He stated that centralization had a serious impact on production. He stated "the usual reason given for lower production in centralized organizations is that this model of decision-making is repugnant to the personalities and values of most Americans, particularly professional workers" (p. 85).

Molnar and Rogers (1976) reported on data collected from a sample of 110 public agencies in Iowa. They reported that the more formalized and centralized agencies receive and supply more resources than those which are less formalized, and therefore, they have higher levels of output. Whetten (1978), in a study of the central administrators of manpower programs, agreed with Molnar and Rogers (1976) that centralization is positively related to higher levels of output. Whetton (1978) also concluded that while centralization facilitates productivity, it can also produce a dissatisfied staff which can cause problems in reaching organizational goals.

Gibson, Ivancevich, and Donnelly (1973) reported on the merits of decentralization versus centralization. They concluded that the advantages of decentralization were:

1. Decentralization aids in the development of more highly skilled managers.

2. Decentralization leads to a healthy competitive climate within the organization.

3. Decentralization leads to a more equitable performance appraisal system: managers can be compared with their peers.

4. Decentralization leads to greater management job satisfaction, due to their greater participation in management decisions.

In addition, Gibson et al. (1973) summarized some of the disadvantages of decentralization:

1. Since most managers are familiar with centralized authority, it may be difficult for them to change their attitudes and delegate authority.

2. Increasing the responsibilities of the managers may require additional training programs to increase their skills.

3. Alterations of current administrative operations of the organization, such as performance appraisals and accounting systems, may be required.

The conclusions concerning the advantages of centralized versus decentralized organizations are not clear. Though most of the studies indicated that a decentralized organization was preferable, the data were inconclusive. Therefore, this would seem to indicate that further research is needed to help resolve the inconsistency of the literature.

White-Collar Versus Blue-Collar Worker

Herzberg, Mausner, Peterson, and Capwell (1957) summarized the literature through the early 1950's which associated organizational levels. They stated that "one unequivocal fact emerges from the studies of job satisfaction: the higher the level of occupation, the higher the morale" (p. 20). The studies reviewed by Herzberg et al. were Ash (1954), Browne and Neitzel (1952), J. Campbell

(1948), Hull and Kolstad (1942), and Kolstad (1944). Ash (1954), through the use of Science Research Associates Employee Inventory, tested 184 employees of a steel plant, and concluded "management supervisory and union estimates of employee morale as reflected in the kinds of items in the inventory did not closely agree with inventory scores based on employee response" (p. 337). Specifically, he concluded:

1. Department foremen usually estimated employee attitudes to be more favorable than it was.

2. The unions underestimated favorableness.

3. Union representatives were more accurate than foremen.

4. Agreement between union and foreman was usually negligible.

In a study which was not reported in the Herzberg et al. (1957) review, Morse (1953) compared the levels of satisfaction of 61 supervisor workers with some 600 hourly workers and concluded:

> The supervisors are considerably more satisfied with their jobs and with the company as a place to work. They are somewhat less satisfied than the employees with their salaries and are about equal in satisfaction with the employees regarding the advancement they have received in the company. (p. 93)

Morse's conclusion generally agreed with the studies mentioned in the Herzberg et al. (1957) review. However, she added that some levels of satisfaction for supervisors may not be higher than those of rank-file workers, specifically the area of wages.

Support for Morse's (1953) conclusions were provided by Handyside (1961) who studied 30 managers and 467 production workers in nine factories. An extensive questionnaire of over 200 questions

and a follow-up interview made 6 months later was used to reach the conclusion that job satisfaction was higher for managerial personnel than it was for production workers.

Friedlander (1965) conducted a study which compared white- and blue-collar employees in the U.S. Government. He concluded that the white-collar workers rated factors, such as security and co-workers, significantly lower than the blue-collar workers, and intrinsic factors, such as achievement and the use of abilities, as higher than the blue-collar workers.

Centers and Bugental (1966) conducted a study which obtained results which were similar to Friedlander (1965). The individuals tested were asked to rate six factors in terms of their importance to them on the job. They concluded that white-collar workers usually ranked work interests and other intrinsic factors among their top three factors more than the blue-collar workers, and that they were less likely to rate pay and security among their top three factors than the blue-collar workers.

Meyers (1964) conducted a study of white- and blue-collar workers, using a blue-collar sample of female assemblers. He concluded that there were no significant differences between the groups' responses on the factors of achievement and pay. However, the blue-collar workers, unlike the white-collar workers, did not mention advancement or responsibility as sources of satisfaction or dissatisfaction.

Armstrong (1971) conducted a study of engineers and assemblers at Texas Instruments. They concluded that the engineers ranked job

content factors such as recognition and achievement higher than the assemblers, and factors such as salary and working conditions lower than the assemblers. Armstrong's results were substantiated by Gluskinos and Kestelman (1971), who obtained similar results.

Schneider and Locke (1971) disagreed with the classification system of Herzberg et al. (1957) and found results which were similar to Herzberg et al. in one sample of employees, but not in the other sample. They concluded that Herzberg confused the events of what happened and what made it happen.

In 1974, Locke and Whitting compared the job satisfaction of white- and blue-collar workers of 911 employees of the solid waste management industry. The study concluded that the white-collar workers were more satisfied with their job than the blue-collar workers. The authors stated:

> These white-collar-blue-collar differences should not necessarily be interpreted as indicating that the two groups of employees have (on the average) different value system. It is equally plausible to assume that the two groups have simply had different work experiences. (p. 154)

Rizzo, House, and Lirtzman (1970) conducted a study of managerial and technical employees of a manufacturing research division, relating job satisfaction to one's position in the organization. They concluded that there was a relationship between role ambiguity and job satisfaction. Hamner and Tosi (1974) concluded that for lower level employees the effects of multiple authority patterns are important determinants of job satisfaction. Shuler and Shaller (1974) concluded that the relationship between role conflict,

satisfaction, and performance are related to one's position in the organization.

Although most of the research indicated that there was a relationship between job satisfaction and whether one is a blue-collar or white-collar worker, the data were inconclusive as to which workers were the most satisfied. Some studies indicated that there was no relationship; therefore, it is difficult to draw definite conclusions without further research.

Job Satisfaction Related to Job Performance

The research reviewed in this paper has examined various structure variables to job satisfaction. Therefore, the next logical step in relating satisfaction to employee utilization is to review the research which has been conducted concerning job performance and job satisfaction.

Concurrent with the research concerning organizational levels related to job satisfaction, there had been attempts made to relate job satisfaction to job performance. Previous research had proved to be inconsistent in proving a significant correlation between the two variables. March and Simon (1958), Morse (1953), and Brayfield and Crockett (1955) have attempted to distinguish additional variables which influence this relationship such as motivations, expectations, and aspirations of the workers and the rewards obtainable by them. Herzberg et al. (1957) have even found some inverse relationships between the two variables. Katzell, Barrett, and Parker (1961), in a study conducted in an industrial company containing 72

warehousing divisions, concluded "job satisfactions were positively associated, beyond chance expectancy, with two aspects of performance, quantity and profitability. There was no relationship between job satisfaction and either quality of turnover" (p. 68). Lawler and Porter (1967) reported that expectancy attitudes are positively related to performance. Porter and Lawler (1968) again pointed out that the expectancy attitudes caused the performance. Their research indicates that performance leads to rewards, which in turn leads to satisfaction. They contended that satisfaction rather than causing performance is caused by it. Slocum (1971) in a study which compared the need satisfaction of first line supervisors with top and middle managers and related need satisfaction to job performance, concluded in a study using Maslow's (1943) hierarchy of needs, that: Overall there existed a relationship between the higher order need satisfaction and performance. However, the data also indicated that the satisfaction of lower order needs were not correlated with performance of first line supervisors.

Lichtman (1970) reported on a study involving 95 employees of the Internal Revenue Office. Lichtman divided the employees up into three groups: managers, supervisors, and workers. He concluded that there was a positive relationship between one's level in the organization and productivity and that job satisfaction increased with one's level within the organization.

As with the other literature reviewed in this chapter, the contradictions prove the data to be inconclusive. Therefore, further research is needed in this area.

Conclusions Based Upon the Review of the Literature

The studies reviewed in this chapter indicate that there is sufficient evidence to justify further research in the relationship between organizational structure, satisfaction, performance, and employee utilization. The literature presents numerous contradictions in dealing with the six variables reviewed. Further research can only improve the understanding of these contradictions.

Statement of the Hypotheses

As a result of the literature review presented in Chapter II, the following general hypotheses were tested:

1. There is a relationship between one's level in the organization and work force utilization.

2. There is a relationship between work force utilization and whether an employee is a line or staff worker.

3. There is a relationship between organizational subunit size and work force utilization.

4. There is a relationship between work force utilization and span of control.

5. There is a relationship between work force utilization and centralized versus decentralized departments.

6. There is a relationship between work force utilization and whether an employee is a white-collar or blue-collar worker.

CHAPTER III

DESIGN AND METHODOLOGY

This chapter will describe the design of the study. The type of research design utilized in this study will be detailed, and the rationale for the design choice will be explained. The population which was chosen for the study will be identified. The technique of work sampling will be explained. The validity and reliability of work sampling will be defended. Finally, the statistical techniques utilized in this study will be discussed.

Subjects

The population of this study consisted of 11,537 employees of a major U.S. electric utility. The company services over 1.7 million customers and has a service area of over 7,600 square miles. The company is set up organizationally like many major corporations. The president of the corporation reports to the chairman of the board. Under the president of the company are eight vice-presidents with 50 departments reporting to them. Because of the aforementioned structure, it is concluded that much of the data developed in this study can be applied to other large corporate organizations.

In order to compare organizational structure with work sampling levels, the following corporate departments, which were active in the corporate work measurement program from July 1981 through June 1982, were studied:

Marketing--Responsibility for marketing policy and customer relations.

Employee relations--Responsibility for policies and practices dealing with human resources.

Purchasing--Responsibility for the procurement of equipment, materials, and contract services.

Administrative services--Responsibility for fuel supply, information systems, and general services.

Computer services--Responsibility for research, design, and application for computer programming.

Auditing--Responsibility for making internal audits and independent appraisals of operations, finances, and accounting of the company.

Accounts payable--Responsibility for the formation of budgets and payment of accounts.

Plant accounting--Responsibility for the issuance of financial statements and compliance of accounting requirements to state agencies.

Systems engineering--Responsibility for the operation and maintenance of power plants.

Stores and transportation--Responsibility for warehousing, distribution, and salvage of all material and equipment.

Security--Responsibility for protection of buildings, property, and operations of the corporation.

Real estate and rights of way--Responsibility for the purchase and lease of property needed for the corporation.

Electrical systems--Functional responsibility for the maintenance and operations of the electrical system and interconnection operations.

Production--Responsibility for the operation and maintenance of fossil-fuel and nuclear power plants.

Engineering and construction--Overall responsibility for the engineering of electrical and generating facilites, and the construction of power plants and transmission lines.

Food services--Responsibility for preparation and planning of personnel cafeterias.

Division organization--Responsibility for providing customer services, implementing marketing plans, collecting activity, and the meter reading activity.

Measures

Percentages of work force utilization were determined by using a random work sampling plan. Work sampling (Brisley, 1971) consisted of random observations to determine the ratio of working and non-working categories. Correll and Barnes (1950) stated that one of the primary uses of work sampling was to determine the percentage of the day that a person is working and the percentage that the person is not working.

Work sampling, which was introduced in England by L. H. Tippett in 1934 (Barnes, 1957), is based upon the laws of probability. It works because a smaller number of chance occurrences tend to follow the same distribution pattern that a larger number produces (Brisley,

1971). In order for work sampling to be accurate, it is required that there be no bias in the sampling. Each part of the population must have as much chance of being drawn as any other (R. Davis, 1951). Work sampling studies have an advantage over other performance measures in that it can be used to measure almost any type of job. Work sampling studies have been made successfully of supervisors, engineers, draftsmen, and other technical personnel.

Work sampling shows a clear picture of how time is being allocated among whatever kinds of activities one wishes to study (Hinrichs, 1976).

Kulonda (1981) concluded that work sampling is an ideal method for determining work force utilization and productivity levels in situations whose products or services are not predictable. D. Allen (1978) stated that work sampling is a method which is generally used to estimate the portion of time an activity occurs, and is also effective for determining employee and equipment utilization as well as productivity. Gregerman (1981) mentioned that although several techniques do exist for measuring construction-site labor utilization, work sampling is increasingly being applied and accepted.

Work sampling is not a perfect work measurement tool. It is not advisable to use it in all cases. Barnes (1957) offered the following advantages and disadvantages of work sampling in comparison to other work measurement techniques such as continuous time studies.

Advantages

1. A simultaneous work sampling study of several operators or machines may be made by a single observer.

2. With work sampling the analyst makes an instantaneous observation of the operator at random intervals during the working day, thus making prolonged time studies unnecessary.

3. It is not necessary to use trained time study analysts as observers for work sampling studies unless performance sampling is required. Then an experienced time study analyst must be used.

4. Many operations or activities which are impractical or costly to measure by time study can readily be measured by work sampling.

5. It usually requires fewer manhours and costs less to make a work sampling study than it does to make a continuous time study. The cost may be as little as 5% to 50% of the cost of a continuous time study.

6. There is less chance of obtaining misleading results, as the operators are not under close observation for long periods of time. When a worker is observed continuously for an entire day, it is unlikely that he will follow his usual routine exactly.

7. Observations may be taken over a period of days or weeks, thus decreasing the chance of day-to-day or week-to-week variations affecting the results.

8. A work sampling study may be interrupted at any time without affecting the results.

9. Work sampling studies are less fatiguing and less tedious to make on the part of the observer.

10. Work sampling studies are preferred to continuous time studies by the operators being studied. Some people do not like to be observed continuously for long periods of time.

11. Work sampling measurements may be made with a preassigned degree of reliability. Thus, the results are more meaningful to those not conversant with the methods used in collecting the information.

12. No stopwatch or other timing device is needed for work sampling studies.

Disadvantages

1. There is a tendency on the part of some observers to minimize the importance of following the fundamental principles of work sampling, such as, the proper sample size for a given degree of accuracy, randomness in making the observations, an instantaneous observation at the preassigned location, and carefully defining the elements or subdivisions of work or delay before the study is started.

2. Ordinarily work sampling is not economical for studying a single machine operator or for studying operators or machines located over wide areas. The observer spends too great a proportion of his time walking to and from the work place or walking from one work place to another.

3. Time study permits a finer breakdown of activities and delays than is possible with work sampling.

4. The operator may change his work pattern upon seeing the observer. If this occurs, the results of such a work sampling study may be of little value.

5. A work sampling study made of a group obviously presents average results, and there is no information as to individual differences.

6. Management and workers may not understand statistical work sampling as readily as they do time study.

Work Sampling Procedures

The following technique was used to work sample the personnel (W. Weiss, 1980):

1. Predetermine the areas to be studied.

2. Prepare a tally sheet listing the categories of work and nonwork (see Appendix A).

3. Determine the random tour times (see Appendices B and C).

4. Determine the number of observations required for an absolute accuracy of 5% or less at a 95% confidence level (see Appendix D).

5. Record first impressions.

6. Calculate the percentages of work and nonwork.

7. Summarize the results.

The following categories were used to summarize the data:

1. Working. This category covers all elements of productive work. The act of baking is a "working" category.

2. Waiting. This category covers the act of waiting in all aspects (i.e., waiting on materials, equipment, etc.). It is used when the "work" category cannot be completed, or engaged, due to a lack of something else (materials, etc.), and is not counted idle.

3. Idle. Used when there is work to be done, but employee is not accomplishing it and is not on an excused break.

4. Receiving instructions. Used when the employee is receiving instructions which are necessary to accomplish the assigned work.

5. Personal. When using the category "personal," the general rule is that this category is intended to be used for those times that are either set out by company rules or regulations (breaks, lunch, etc.), or are for the personal comfort of the person being observed, such as going to the restroom, getting water, or being treated by a company nurse or doctor for sickness or injury.

6. Traveling. This category denotes the fact that the employee was required to travel to some other point away from the normal work station to obtain necessary material, instructions, or any other item necessary to accomplish the assigned work.

7. Nonproductive working. Many times there will be occasions when one or more of the people in the observation study will be required to attend a company required safety meeting. During this time, the observer will use the "nonproductive work" category to

designate the activity. Thus, the activity will not be counted as "idle" or "personal" time, but in a special category of "work." In analyzing the results of the study it may be of interest to determine what percentage of the total time is spent in meetings of various types.

8. Unobserved. Another useful category is "unobserved." When the people to be observed are in different locations, or separated from the observation area, it must be an accepted fact that we may not observe a particular person on a particular round of observations. The person to be observed may be temporarily in another area of the building at the time the observer makes the tour, or he may be in a restroom, or he could be deliberately "hiding" from the observer after having seen the observer on the start of the tour in another area.

Validity of Work Sampling

Gay (1981) defined validity as "the degree to which a test measures what it is supposed to measure" (p. 110). Tuckman (1972) agreed with this definition in stating that validity is concerned with the degree to which the test measures the characteristic that it is to measure.

The types of validity utilized in this research is content validity. Kerlinger (1973) defined content validity as:

> The representativeness or sampling adequacy of the content--the substance, the matter, the topics--of a measuring instrument. Content validation is guided by the question: Is the substance or content of this measure

> representative of the content or the universe of content of the property being measured? (p. 458)

Gay (1981) stated that content validity requires item validity which is concerned with whether or not the test represents measurement in the intended content area. It also requires sampling validity which deals with how well the test samples the total content area.

The work sampling program utilized in this research fulfills the two criteria of content validity. The criteria of item validity is met through the use of observational research. Gay (1981) defined data from an observational study as being determined by observing but not by asking. Kerlinger (1973) agreed with this definition, and Tuckman (1972) stated that an observation refers to what is. In order to insure that the observer is truly determined what is, the observers are made up of supervisors and other senior individuals within the department who are familiar with the jobs being studied. Trial observation tours are taken with department management to insure the accuracy of the observers. The criteria of sampling validity is met through two methods. One method is through the taking of random samples which insure that the observers will study all days of the week and hours of the day. The individuals being studied cannot predict the time of the observation tours and thereby alter their work patterns. The other insurance of sampling validity is the procedure of taking enough observations to insure an absolute accuracy of plus and minus 5% at the 95% confidence level.

Reliability of Work Sampling

Gay (1981) defined reliability as "the degree to which a test consistently measures whatever it measures" (p. 116). Tuckman (1972) defined reliability simply as a test being consistent.

Kerlinger (1973), in referring to the reliability of behavioral observations, stated:

> The reliability of behavioral observation measures is a simpler matter, though by no means an easy one. It is usually defined as the agreement among observers. . . . Practically speaking, then, the reliability of observations can be estimated by correlating the observations of two or more observers. (p. 540)

The work sampling program periodically utilizes different observers for each department. If there are unexplainable differences in the results obtained, the differences are resolved by department management in order to insure consistency of future tests. Another method of insuring reliability is the method of "test-retest reliability." Gay (1971) defined test-retest reliability as the degree to which the data are consistent over time. All of the departments were studied on a monthly basis. The scores for each month were compared to one another, and significant differences in the data were explained.

Data Collection

From the period of July 1981 through June 1982, over 200,000 work sampling observations were taken of these personnel, and the working and non-working categories were determined. The data were submitted to the industrial engineering department where it was

analyzed for possible improvements and summarized as a corporate report. Data were utilized from the entire population.

Data Analysis Procedures

The statistical analysis package of the Statistical Analysis System computer language developed by the SAS Institute was used to analyze the data (Helwig & Council, 1979).

The data base utilized in this study was analyzed through two statistical techniques. The first technique utilized the Pearson Product-Moment Correlation Coefficient. This statistical technique is used to determine a correlation coefficient between data in which both the independent variable and the dependent variable contain data on an interval or ratio scale. The following research hypothesis was tested through the use of the Pearson Product-Moment Correlation: There exists a relationship between organizational subunit size and work force utilization.

The other statistical method used in this paper was the utilization of a t test to determine the difference between the independent population means. The following hypotheses were tested utilizing this technique.

1. There exists a difference between the work force utilization means of management employees versus nonmanagement employees.

2. There exists a difference between the work force utilization means of line employees versus staff employees.

3. There exists a difference between the work force utilization means of employees in a department with a large span of control

versus the employees in a department with a small span of control.

4. There exists a difference between the work force utilization means of employees in centralized departments versus employees in decentralized departments.

5. There exists a difference between the work force utilization means of blue-collar employees versus white-collar employees.

The t test will be used at the .05 level of significance. This is referred to as the alpha level of a Type I error. This test of significance will be used to decide whether we can reject or accept the null hypothesis. If the null hypothesis is rejected at the .05 level, it would infer that there are five chances out of 100 of making a wrong decision.

Classifications of Departments

Line Versus Staff

The departments were categorized through the use of the corporate organizational chart. Line (operational) units were those which worked under the Vice-Presidents of Operations, Engineering, Construction, and the Divisions. Staff units were those which worked under the Vice-Presidents of Administration, Marketing, Finance, Planning, and Employee Relations. An example of a line organization which relates to the major objective of the organization would be the Production Department. An example of a staff organization would be the Auditing Department, which is involved with interpreting policy matters and is not related to the major

objective of the organization.

Centralized Versus Decentralized

Departments were characterized as centralized versus decentralized based on geographic location. The company is divided into six geographic locations. Departments which had personnel with supervisors in two or more locations were classified as decentralized. An example of a centralized department would be Accounts Payable, which is located totally in one location. An example of a decentralized department would be the Division Organization, which has offices in the six geographical areas.

Subunit Size

The number of personnel within a department was obtained from corporate financial and personnel data.

Span of Control

A determination of the number of employees controlled by a manager or supervisor was determined through department organizational charts and interviews. Control of an employee was determined as the supervisor or manager writing the performance review and determining eligibility for pay raises. Departments classified as having small spans of control had 10 or less employees per supervisor while those classified as having large spans of control had 11 or more employees.

Management Versus Nonmanagement

This determination was made through the use of department personnel records. The corporation has four classes of personnel:

M--Management personnel

A--Management trainee

O--Hourly clerical

T--Hourly manual

Those individuals who were designated as M grades were considered as management, and all other personnel were considered as nonmanagement.

White-Collar Versus Blue-Collar

This determination was made through the use of department personnel records. Employees classified as M grades and A grades were considered as white-collar employees, and employees classified as O grades and T grades were classified as blue-collar employees.

Summary

This study utilized data collected from 17 departments of a major public utility. The Industrial Engineering technique of work sampling was used to determine the work force utilization percentage of each of the departments. From July 1981 through June 1982, over 200,000 work sampling observations were taken of these personnel. The structural variables of size, span of control, employee level, blue-collar versus white-collar, centralized versus decentralized, and line versus staff were determined through the use of corporate

and department organization charts.

The Pearson Product-Moment Correlation Coefficient and the Student _t_ test were used to test the hypotheses.

In Chapter IV, which follows, the results of the testing of the hypotheses are presented.

CHAPTER IV

RESULTS

Introduction

As was stated in Chapter I, the purpose of this study was to determine the relationship between employee utilization and selected variables of organizational structure--level within the organization, span of control, line or staff position, organizational size, organizational shape, and blue-collar versus white-collar workers.

The data utilized in this study were collected over a 12-month period, from July 1981 through June 1982. Table 1 contains the monthly results of the work sampling data presented by department. The means and standard deviations were calculated for each department.

In analyzing the data from the various departments, it was determined that the means by department varied from a work force utilization value of 51.3 to a utilization value of 72.8, which implies there are meaningful differences in the work force utilization of the various departments.

Presentation and Analysis of Data

Organization Level

The *t* test for independent means was used to determine whether differences exist between the work force utilization means of the

Table 1

Summary Analysis of Means and Standard Deviations of Work Force Utilization Percentages[a]

Department	Mean	Standard deviation
A	66.7	5.67
B	60.1	3.07
C	65.4	4.54
D	63.2	3.80
E	54.7	5.59
F	62.4	2.74
G	72.1	4.90
H	61.2	3.10
I	69.0	5.23
J	60.6	3.18
K	51.3	3.00
L	60.3	2.76
M	68.5	4.32
N	68.6	4.14
O	72.8	3.37
P	70.9	2.94
Q	63.4	3.00

[a]This table is scrambled to insure the confidentiality of the departments involved in this study.

managers versus nonmanagers. The probability of committing a Type I error was .05.

The results presented in Table 2 indicated that differences in means for the work force utilization between the management level personnel and the nonmanagement personnel were not found.

Table 2

Results of the t Test Between the Work Force Utilization of Management and Nonmanagement Employees

Level	n	Mean	SD	t	df	p*
Management level	6	67.42	4.70			
				1.76	15	.094
Nonmanagement level	11	62.43	5.99			

*$p < .05$.

Line Versus Staff

The t test was used to determine whether differences exist between the work force utilization means of the line versus staff employees. The test was based on a t ratio at the .05 alpha level. The results presented in Table 3 indicated differences between the means for work force utilization for the staff personnel and the line personnel were not found.

Table 3

Summary t Analysis Data for the Difference Between Work Force Utilization of Line and Staff Personnel

Level	n	Mean	SD	t	df	p*
Staff	9	66.28	4.45	1.61	15	.128
Line	8	61.80	6.80			

*p < .05.

Blue-Collar Employees Versus White-Collar

The method used to determine whether significant differences exist between the work force utilization means of the white-collar and blue-collar workers was the t test at the .05 alpha level. The results presented in Table 4 indicated there were no differences between the means for work force utilization for the white-collar and blue-collar employees.

Table 4

Results of the t Test Between Work Force Utilization of White-Collar and Blue-Collar Workers

Level	n	Mean	SD	t	df	p*
White-collar	11	65.41	4.44	1.16	15	.256
Blue-collar	6	61.95	8.02			

*p < .05.

Centralized Versus Decentralized

The t test was used to determine whether differences exist between the means of the centralized versus decentralized employees. The probability of committing a Type I error was .05.

The results presented in Table 5 indicated that differences in means for work force utilization between centralized employees and decentralized employees were not found.

Table 5

Results of the t Test Between Work Force Utilization of Centralized and Decentralized Workers

Level	n	Mean	SD	t	df	p*
Centralized	9	65.80	4.63	1.20	15	.248
Decentralized	8	62.38	7.01			

*p < .05.

Span of Control

The method used to determine whether significant differences exist between the means of the groups with a large span of control and those with a small span of control was the t test at the .05 alpha level.

The results presented in Table 6 indicated that there were differences in the data found in the means for work force utilization between individuals in departments with a large span of control and departments with a small span of control.

Table 6

Results of the t Test Between the Work Force Utilization of Small Span of Control Employees and Large Span of Control Employees

	Level	n	Mean	SD	t	df	p*
1-15 employees	Small span	11	67.26	4.09			
					4.04	15	.002
16-38 employees	Large span	6	58.56	4.55			

*$p < .05$.

Subunit Size

The method used to determine whether there was a relationship between subunit size and work force utilization was the Pearson product-moment correlation coefficient "r." A correlation coefficient was calculated between the independent variable of subunit size, and the dependent variable of work force utilization (Table 7).

Findings indicated there is a linear relationship between the two variables. The correlation coefficient "r" which indicates the extent to which sets of data are related was -.80. The coefficient of determination "r^2" was .64. This indicated that 64% of the variance in the work force utilization percentage was associated with variance in subunit size.

A t test was conducted to test the null hypothesis $\rho = 0$ against $\rho > 0$ (Hinkle, Wiersma, & Jurs, 1979). The probability for committing a Type I error was .05. The critical values for 15

Table 7

Pearson Product-Moment Correlation Coefficient Between Organizational Size and Work Force Utilization

Department	Work force utilization %	Organization size
A	66.7	78
B	60.1	184
C	65.4	133
D	63.2	165
E	60.3	264
F	68.5	42
G	68.6	43
H	72.8	12
I	70.9	52
J	61.2	574
K	69.0	101
L	60.6	708
M	51.3	2,701
N	54.7	1,260
O	72.1	80
P	63.4	391
Q	62.4	195
Number:	17	17
Minimum:	51.3	12
Maximum:	72.8	2,701
Mean:	64.19	410.76
Variance:	33.26	424,346
Standard deviation:	5.77	651.42
Correlation coefficient:	-803	

degrees of freedom at the .05 level were ±1.753. Since the value of the test statistic, -2.23, exceeds the critical value, the null hypothesis was rejected. It is indicated that there is a significant relationship between subunit size and work force utilization.

Summary

The current study examined the relationship between six structural variables and work force utilization. The analysis of the data did not substantiate a relationship between work force utilization and the structural variables of organizational level, staff versus line, blue-collar versus white-collar, and centralization versus decentralization. The analysis of the data substantiates a relationship to exist between work force utilization and structural variables of span of control and subunit size.

In Chapter V, a summary, conclusions, and implications indicated by the results of the analysis reported in this chapter are presented.

CHAPTER V

CONCLUSIONS, RECOMMENDATIONS, AND SUMMARY

Chapter V presents conclusions, usages, and recommendations for future research.

Conclusions

The major purpose of this study was to determine the relationship between work force utilization and the six organizational structural variables: levels within a department, span of control, line or staff position, subunit size, shape of the department, and white-collar versus blue-collar employees. In the following sections conclusions concerning each of these areas is presented.

Organizational Level

Hypothesis 1 stated there is a difference in the work force utilization of management and nonmanagement employees. The analysis of data presented in Chapter IV did not support this hypothesis. Therefore, no conclusion can be drawn about the relationship between the type of position of an employee and work force utilization. The results of this study point out the continuing need for research in this area.

Line Versus Staff

Hypothesis 2 stated there is a difference in the work force utilization means of line versus staff employees. The data presented in Chapter IV did not support this hypothesis. The staff personnel were not observed working more than the line personnel. The results of this study were in agreement with Rosen and Weaver (1960), who concluded there were no differences in line and staff personnel. Belasco and Alutto (1969) agreed with Rosen and Weaver, in concluding that there have been few empirical studies which have proven there is a difference between the groups.

Span of Control

Hypothesis 3 stated there is a difference in the work force utilization means of departments with a large span of control versus those with a small span of control. The results of the analysis of the data presented in Chapter IV support this hypothesis. The departments with a small span of control were observed as working more than the departments with a large span of control. The results of this study disagreed with Worthy (1950), who concluded that a large span of control is the best method, and the results of the research disagreed with Suojanen (1955), who concluded that the theory of there being a "correct" span of control is meaningless. The results of this study agreed with the classical theory of Fayol (1977) and Urwick (1956), who stated that smaller spans of control are more effective.

Centralized Versus Decentralized

Hypothesis 4 stated there is a difference in the work force utilization means of centralized departments versus decentralized departments. The results of the analysis presented in Chapter IV did not support this hypothesis. The results of this research did not support the conclusions drawn by theorists such as Fayol (1977), who stated that centralization is the most efficient type of organization, and this research disagrees with Sloan (1964), who commented on the efficiency of decentralization. However, this research corresponded to the studies conducted in this area in the late 1950's and early 1960's. The researchers of this period stated that the effects of decentralization are situational. Litzinger (1963), in his study of bank managers, found no differences in the effects of decentralization versus centralization. Porter and Lawler (1965), in summarizing various studies concerning decentralization, found no clear cut advantages to one method over the other.

Blue-Collar Employees Versus White-Collar

Hypothesis 5 stated there is a difference in the work force utilization means in blue-collar versus white-collar employees. The results of the data analysis did not support this hypothesis. The white-collar workers were not observed as working more than the blue-collar workers. The results of this study did not provide support for the majority of research conducted in this area.

Subunit Size

Hypothesis 6 stated there is a relationship between subunit size and work force utilization. The data in Chapter IV supported this hypothesis. The results of this study concluded there is an inverse relationship between the two variables. The departments with the smaller size were observed to be working more than those departments with a larger size. The results of this study disagreed with Argyle et al. (1958), who stated that larger groups have larger performance rates than smaller groups. However, the results are in agreement with Marriott (1949), who concluded there is an inverse relationship between performance and size. Porter and Lawler (1965) stated previous research in the area of subunit size has concluded that small units perform better than large units in all areas.

Uses by Public Utilities

With the continuous search by the public utilities for the meaningful productivity data, this study could have the following uses:

1. To provide research data concerning the conflicting research that exists on organizational structure and its effect upon the behavior of individuals within an organization.

2. To utilize work measurement techniques in assessing organizational behavior. Little research has been performed in the integration of these two techniques.

3. To provide information to the managers of public utilities and other large industrial organizations concerning the relationship between structural variables and employee utilization.

4. To provide information to the managers of public utilities, concerning the effective use of work sampling within the utility industry.

5. To provide historical work force utilization data to the electric industry which has suffered from the scarceness of work measurement data.

Recommendations for Future Research

The results of this study were in some instances contradictory to past writings. This may be a function of the work sampling method, or a function of the study being limited to the utility industry. The use of work sampling as it relates to structural variables is a new technique, and additional studies should be conducted to ascertain its assets and its liabilities in this type of research. The study being limited to the utility industry could cause some of the contradictions to past writings. Most of the research conducted on structural variables has concluded that their effects can be situational. The situations which apply to the utility industry may not apply to other industries or situations. However, as was mentioned in Chapter II, most of the research in this area is inconclusive.

It is hoped that this research study will result in additional analysis and study concerning organizational structure and its

relationship to work force utilization.

If future research is to be done, it is recommended, by this researcher, that work sampling should be studied as it relates to organizational structure in industries and organizations other than the utility industry. This would allow for a determination of the influence of situational factors on the variables.

It is also recommended that work sampling should be studied as it relates to organizational structure in small size organizations. The effect of total organizational size should be studied for its effects on the two variables.

It is recommended that future research should be conducted concerning work force utilization applying multiple correlational techniques of the various structural variables used in this paper. This would allow for studies on the effect of all these variables, working together, have on work force utilization.

Summary

This researcher has attempted to study the relationship between organizational structure and work force utilization. The sample consisted of the employees of a major public utility. Seventeen departments were studied. This offered a cross section of organizational structures. Work force utilization levels were determined through the use of a random work sampling plan. While work force utilization is not a productivity measure, it is an excellent measurement tool for comparing various departments which differ in their types of output.

The results of this research found relationships to exist between work force utilization and the structural variables of span of control and subunit size. This research did not find a relationship to exist between the work force utilization and the structural variables of organizational level, line versus staff, centralized versus decentralized employees, and blue-collar versus white-collar employees.

It is believed that this research can and will serve as a catalyst to initiate additional research in the uses of work sampling.

APPENDICES

Appendix A

Work Sampling Observation Tally Sheet

WORK SAMPLING — OBSERVATION TALLY — AU136

PAGE OF

DATE	TIME	DEPARTMENT

WORK AREA	ACTIVITY	MANPOWER	OBSERVER (S)	ACCOMPANIED BY

CATEGORY	TALLY	TOTAL TALLY
WORKING		
WAITING		
IDLE		
RECEIVING INSTRUCTIONS		
PERSONAL		
TRAVELING		
NON-PROD. WORKING		
UNOBSERVED		
	TOTAL	

OBSERVATION DETAILS:

WORKING		WAITING		TRAVELING		ADDITIONAL CATEGORY	
ELEMENT	MANPWR.	ELEMENT	MANPWR.	ELEMENT	MANPWR.	ELEMENT	MANPWR.

Appendix B

Random Selection of Tour Times

Random Selection of Tour Times

The times of individual tours are randomly determined by the coordinator and the observer using a random time table. They estimate how many tours will be made, obtain a starting point and select tour times within the time frame to be sampled from the Table of Random Times.

The Table of Random Times (page 9) lists in random sequence each five minute interval in a 24 hour day. It is important that the method used to select a starting point will yield different starting points. For this reason a method is provided.

Consider the Table of Random Times as consisting of 24 rows and 12 columns. From the Table of Random Numbers between 1 and 24 select a row number (between 1 and 24) and a column number (between 1 and 12). These numbers represent the coordinates of the starting point.

Example:

The day the sampling will occur is the 11th day of the 9th month. Starting in the 11th row of the Table of Random Numbers proceed horizontally until the first 9 is found. Then proceeding vertically down, select the first number between 1 and 12 as the column number and the next number as the row number. Having obtained the starting point (2, 1) proceed to the Table of Random Times and from the starting point proceeding horizontally select tour times. If 8 times are desired between 8:15 and 5:00, the times would be:

0945	1125
1115	1635
0845	1020
1625	1530

Other examples of selecting starting points.

Look at your watch, notice how many seconds past the minute (if more than 30 divide it in half) and proceed in the row corresponding to the number hour of the day. Then proceed horizontally selecting the first number as the row number and the next number between 1 and 12 as the column number thus selecting the coordinates of the starting point.

Other methods of selecting starting points which assures that different starting points will be selected are acceptable.

Appendix C

Table of Random Times

Table of Random Times

Row	Column 1	2	3	4	5	6	7	8	9	10	11	12
1)	2210	0225	2005	1345	1130	1505	0830	0240	0600	0040	1000	2045
2)	0900	1920	0915	1900	0230	1250	0610	1430	1615	0700	0210	0420
3)	1820	0945	0530	1540	0405	2020	0720	1915	1330	0440	2130	2155
4)	0335	0635	1545	0425	0100	1955	1805	0930	1515	1835	1435	1145
5)	1755	1115	0355	1055	0515	0025	0920	1535	0245	0310	2150	2330
6)	2315	0845	1610	0850	1240	1110	0415	0215	2105	0825	2230	1725
7)	0300	1625	1300	0015	1925	2055	1235	0715	1620	1905	1035	0805
8)	0710	0345	1810	1010	0035	1030	0905	0840	1350	0235	2110	1950
9)	1340	1125	0200	2250	2135	1400	2400	0155	0650	0835	1715	1105
10)	0750	2320	1520	2245	1550	0410	1705	1710	0120	1210	0005	1420
11)	1005	1635	1800	0645	2215	1940	0935	1445	1045	0520	2100	1910
12)	1735	2145	0550	0255	1720	1655	0625	1050	0435	0315	1205	0150
13)	0555	1020	2340	2355	0525	1415	2115	2030	1525	0445	2345	1640
14)	1850	0735	1600	1315	0940	1450	1750	0350	2255	0400	0925	2140
15)	1320	1530	2035	0340	1335	1230	2000	0500	0630	0815	1410	0745
16)	1325	0050	1505	2205	2325	0505	1220	0725	2025	1200	0810	1700
17)	0430	1745	2240	0640	2010	1935	2040	0730	1425	2200	2120	1225
18)	0955	1555	1440	2350	1825	2305	0455	1830	0115	0125	0140	0330
19)	2310	1845	2235	2015	1815	1455	1140	0325	0305	0220	1520	1405
20)	0450	1155	0205	1135	2050	0620	1500	0615	1100	1040	0655	2200
21)	1305	1650	0705	0320	0030	0800	1025	0545	1245	1120	0010	0910
22)	1630	1310	2125	2335	0245	0105	1930	0145	1730	0540	0535	1255
23)	0510	0135	0055	1645	1355	1945	2300	0130	1855	1150	0740	1015
24)	0950	0755	1840	1605	1740	0020	0045	1215	0820	2225	0855	0605

Appendix D

Required Number of Observations for Desired Absolute Accuracy at 95% Confidence Level

REQUIRED NUMBER OF OBSERVATIONS
FOR DESIRED ABSOLUTE ACCURACY AT 95% CONFIDENCE LEVEL

% Of Occurrence P	Absolute Accuracy ±1%	±2%	±3%	±4%	±5%
1/99	396	100	44	25	16
2/98	784	196	88	49	32
3/97	1,163	292	130	73	47
4/96	1,535	384	171	96	62
5/95	1,900	475	212	119	76
6/94	2,260	565	252	142	92
7/93	2,604	654	290	163	102
8/92	2,945	738	328	184	118
9/91	3,278	820	364	205	131
10/90	3,600	900	400	225	144
11/89	3,918	980	435	245	157
12/88	4,224	1,055	470	264	169
13/87	4,520	1,130	504	282	181
14/86	4,820	1,210	535	302	193
15/85	5,100	1,275	568	318	205
16/84	5,380	1,350	600	337	216
17/83	5,650	1,415	628	353	226
18/82	5,900	1,475	656	369	236
19/81	6,160	1,545	685	385	246
20/80	6,410	1,605	715	400	256
21/79	6,640	1,660	740	415	266
22/78	6,870	1,720	765	430	275
23/77	7,100	1,780	790	444	284
24/76	7,300	1,830	815	456	292
25/75	7,500	1,880	835	470	300
26/74	7,690	1,925	855	481	308
27/73	7,885	1,970	875	493	316
28/72	8,065	2,015	895	504	323
29/71	8,240	2,060	915	515	330
30/70	8,400	2,100	935	526	337
31/69	8,555	2,140	950	535	343
32/68	8,705	2,175	965	545	349
33/67	8,840	2,210	985	553	354
34/66	8,975	2,245	1,000	561	360
35/65	9,100	2,275	1,010	569	365
36/64	9,220	2,305	1,025	576	369
37/63	9,325	2,330	1,035	583	373
38/62	9,425	2,355	1,045	589	377
39/61	9,515	2,380	1,055	595	381
40/60	9,600	2,400	1,065	600	384
41/59	9,675	2,420	1,075	605	387
42/58	9,745	2,435	1,085	609	390
43/57	9,805	2,450	1,090	613	392
44/56	9,855	2,465	1,095	616	395
45/55	9,900	2,475	1,100	619	397
46/54	9,935	2,485	1,105	621	398
47/53	9,965	2,490	1,110	623	399
48/52	9,985	2,495	1,110	624	400
49/51	9,995	2,500	1,115	625	400
50	10,000	2,500	1,115	625	400

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