NON-STANDARD
WORKWEEK SCHEDULING TECHNIQUE
SELECTION

BY

JOHN ALEXANDER OAK

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ABSTRACT

This thesis presents a description of non-standard work scheduling techniques and a comparison method which enables decision-makers to differentiate between available work-scheduling alternatives with the purpose in mind of selecting the most appropriate and suitable arrangement. The method developed calls for the decision-maker to follow a five-step sequential process to obtain final results. The ingredients necessary to achieve such final results are obtained in a manner similar to that demanded by decision-making-under-uncertainty conditions commonly followed in actual industrial settings.

Since the primary objective of business management is the achievement of a profit through the manipulation of available resources, initial sections of the thesis define the term "profit" from both an economic and a social viewpoint. Further, the executive decision-maker is urged to look upon individual workers and the management of these worker's time as a vital resource factor playing a substantial role in the degree of ultimate profit generated. The presentation then leads to a discussion of forces involved in the maximized use of the time resource, and eventually to a thorough descriptive evaluation of available non-standard work scheduling

techniques which in turn provides the basis for the application of a detailed systematic evaluation procedure and method.

Those general concepts involved in the systematic analysis of presented alternatives would in most instances be applicable to general decision-making tasks where a number of different and distinct alternatives existed. This type of analysis technique was employed as it was found that the work-scheduling techniques explored were multivariable, i.e. they were not uniformly beneficial when applied under different criteria conditions potentially selectable by the decision-maker. In addition, this technique allows the decision-maker to incorporate personal knowledge and feelings systematically to reach a final decision.

Finally, the thesis guides the decision-maker by forthrightly stating that an appropriate decision-choice rule should be employed at the termination of the analysis procedure. As an aid in this regard, various possible decision-choice rules are presented for consideration.

Information on work scheduling alternatives was taken from current literature. This information was blended

with the author's general knowledge of business operations and management problem-solving methods, supported by Engineering Management reference texts, to form results which delineate a conclusive decision-making means for profitable work-schedule alternative selection.

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BY

JOHN ALEXANDER OAK

FOR

DEPARTMENT OF

INDUSTRIAL MANAGEMENT ENGINEERING

BY

FACULTY COMMITTEE

APPROVED: _____

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PREFACE

The amount of current literature devoted to the discussion of new non-standard work-scheduling techniques is both vast and conclusive. Vast in the sense that a thorough presentation of available techniques is presented, and conclusive in that topical features of discussion are thoroughly presented. However, the amount of current literature devoted to the discussion of the means by which the contemporary manager may select an appropriate work-scheduling technique is minute compared to the whole.

The writer has attempted to provide a prescribed method for the logical and analytical comparison of work-scheduling alternatives that will blend the knowledge of the decision-maker, with a rigourous systematic approach, to result in a conclusive answer as to which is the proper work-scheduling technique for an individual enterprise to use.

ACKNOWLEDGMENTS

I would like to thank each faculty member of the New Jersey Institute of Technology who taught those courses which I have completed. Although their words do not directly appear in this thesis, their ideas and philosophies most certainly do. Special gratitude in this regard is set aside for my advisor, Professor John Mihalasky, whose guidance and direction enabled this thesis to be written.

To my parents go special thanks for their encouragement, understanding and forebearance.

Lastly and most importantly, I express my sincere appreciation and thanks to Lucille whose perseverance, dedication, personal love, and understanding enabled this thesis to be written and typed, and without whom this thesis would never have been written.

John Alexander Oak

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CHAPTER I

INTRODUCTION AND BACKGROUND

Managerial successfulness is directly related to the ability of an individual or a group of individuals to "manage" people. The curriculum at most higher institutions of learning calls for training the young and potentially successful manager in such business related topics as accounting/economy, contemporary collective bargaining, marketing features, finance, etc. While completion of these academic subjects in a successful fashion will surely establish a firm foundation upon which future managers will undertake the operations of an enterprise, i.e., the handling of employees and related business functions, they do not specifically and directly educate candidates in the management of time.

Through reference to the general definition related to work, taken and developed in a business sense, employees are required to devote a portion of their personal hours to the business enterprise engaging them. In return for this devotion of personal time, the business enterprise regularly compensates employees according to the terms of a predetermined contract or understanding. The business acquires a resource, much in the sense that it would

acquire other resources such as raw materials, by offering remuneration in exchange. The resource purchased from laborers is called time.

It is established that employees exchange their time for compensation. But is it their best time? Does management recognize that this resource called time, which appears on corporate balance sheets under the heading of "salaries or wages paid," should be treated and handled in the same manner as other resources are--to maximize business results? All too often the answer to these two questions is "no."

The Problem and Involved Forces

Individual Work Characteristics

It is almost a universally accepted fact, and therefore, it can be safely assumed that no two workers have truly identical work characteristics. There are so-called "morning" people and there are so-called "night" people. For all that is known, there may also be "noon" and "afternoon" people. The point is that individual work characteristics differ. Because of these personal internal time clock differences, explained and accounted for somewhere within the field of bio-rhythm study, some people have a psychological antagonism toward time restrictions forced upon them by business enterprises. These restrictions

mandate employee presence daily at a designated work location at a predetermined time period with little deviation permitted.

Each worker functions independent of co-workers and also independent of regularly scheduled work periods. Should random chance result in matching workers of an equal tempo, harmony results. Likewise, should worker tempo match regularly scheduled work periods, again, harmony results. But some workers are notoriously slow starters. However, when "in-gear" these workers tend to out-produce the fast-starters. The converse is also true. Some workers start off at exceptionally high rates of speed only to "burn-out" at some point through the workday. In general, this is known to management, but while being known, is not usually acted upon to the benefit of the firm. In most instances there is relatively little correlation or match between the work schedule necessarily dictated by the corporation and the inherent work tempo of the individual worker. Because of this work tempo maladjustment, many workers become distracted, discontented, bored and at times, alienated. This maladjustment often results in the worker not coming to work at all. By remaining away from his designated work location, the worker trades the compensation normally forthcoming through work for an opportunity to readjust personal life-rhythms

and obligations. Workers therefore become victimized by the inflexibility of the available work schedule. At times, such victimization leads to extremes which may in turn lead to eventual dismissal of the worker. This existing managerial paradox blocks and diminishes the usefulness and proper utilization of one of the enterprise's most abundant and valuable resources, time.

Some managers reach quick and easy decisions when searching for reasons and solutions to worker job dissatisfaction, which often results in high absenteeism rates, increased turnover percentages, and the lack of worker motivation. Areas brought forward in explanation of these problems, most of the time center around the type of work performed; the scope of the job description, which is felt to restrict worker job related progress and development; the lack of a solid moral fibered background such as that which existed previously through adherence and conformation to Puritan work ethics; and the growth of unionism with its inherent work restrictions and constraints. These explanations appear to be more of a symptomatic nature than of a problematic nature. In treating these symptoms as problems and explanations of the cause of problems, management, in its seemingly infinite capacity to adjust, compromise and rearrange, has approached worker job dissatisfaction by developing such ideas and concepts as

job enrichment programs, shared Board of Directorship positions with labor representatives, the establishment of alternate communication channels, human resource development, etc. Some of the problem symptoms disappeared under this type of treatment, others persistently remained; but more importantly, and unfortunately, the degree of worker job dissatisfaction usually remained excessively high.

The Basic Problem

Since the inception of the classical Hawthorne Studies, undertaken nearly a half-century ago, findings of industrial psychologists, noteably Messrs. Maslow, Vroom, Stogdill and Herzberg, have brought new levels of intellectual competence to and managerial comprehension of the behavior patterns associated with factors relating to human work motivation.[1] Of particular conceptual interest in the field of work motivation are the postulates brought forward by Dr. Abraham H. Maslow. Dr. Maslow's theory, subsequently confirmed by the researchist Lyman W. Porter, in a series of five studies conducted at the University of California, encompassed what is referred to as a "hierarchy of needs." Crouched in a corner of these postulates is the supposition that should management be capable of

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[1]Blum, Milton L. and Naylor, James C., "Industrial Psychology," Revised Edition, New York: Harper and Row, Inc., 1968, p. 375.

dovetailing company goals and aspirations with individual self-realization concepts, the resulting product would be substantially increased productivity and a happier world for both.[2] Therein lies the basic problem confronting management.

In studying this basic problem of blending company goals and worker self-realization concepts, management has recently recognized the fact that a great deal of human behavior is motivated by the "attraction-antagonism" relationship an individual holds toward the pace of life enforced by institutional organizations upon the society group in which he is embedded. Recent proposals geared to accent the "attraction" relationship have dealt with variances to the standard work week. Such proposals have generated considerable managerial interest. Obviously, subjective proposals of this nature are wrought with explosive social consequences and require a high degree of careful assessment prior to formal acceptance. When considered by management, such proposals should not be casually treated as haphazard modernization attempts, but rather as a means to gain release from present and past dogmatic programs and policies which have lingered with time through assorted stages of developing managerial innovation

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[2] Ibid., p. 332.

in other areas. Necessary and essential in reaching for a solution to the problem of which work scheduling technique is appropriate for a particular enterprise to adopt calls for a systematic problem solving approach tempered by continuous on-going procedural adjustments and renovations.

The Alternatives

Within the last decade a number of different types of work scheduling techniques have been developed and have been presented to management for consideration. The common denominator of these techniques has been an alteration of the standard weekly work schedule either by compressing the work week length, or through altering presently accepted hours of daily work, or both. Among the most prominent innovations in this regard have been techniques such as flextime, or flexitime or gleitzeit or gliding hours; the four-day work-week with assorted combinations of total weekly hours; staggered work hour programs which principally involve positive or negative shifts of standard work hour schedules and, in some isolated cases with unique governing criteria, the three-day work-week.

The Particular Problem

The particular contemporary problem presented to management involves the selection or determination of a

proper and suitable work schedule that will paramountly maximize and harmonize organization results. This paramount, final or ultimate goal is easily determined. The particular problem, obtained by moving down the means-end chain, involves determining the proper direction in which to proceed, and in what associated strength and vigor, in order to obtain maximized results. Management must determine the impact of a myriad of forces both internal and external to the span of control of the individual enterprise faced with the problem situation.

External Forces Involved

When considering external forces impacting upon organization results, one normally considers as entries such items as social, ethical, demographic and cultural forces, along with aspects of the general economic environment and international conditions. With a slight degree of extension, it can certainly be seen in what ways the problem of work scheduling is influenced by those external forces named above. Such influence however, is not unidirectional in nature for the work-scheduling arrangement employed by the enterprise conversely alters, changes and transforms external forces; accentuating the magnitude of some, while at the same time diminishing others. For example, when considering model development for the potential undertaking of a work-schedule alteration,

it would be advisable to place special emphasis and weight on the impact and results of social forces, as opposed to let us say, placing an equal weighted value on a factor such as international conditions. This is not to say that international conditions should be ignored when the problem at hand is considered, it merely states that they should be considered in a lesser light.

Internal Forces Involved

Although external forces deserve a proper amount of due consideration and attention, internal forces which affect enterprise operations are characteristically of a more intimate and relatively more important nature and can usually be controlled to a far greater degree than can the various external forces mentioned. The problem at hand of selecting a suitable work schedule involves the consideration and study of many internal forces. For instance, the type of schedule chosen will, in most instances, affect such varied items as personnel needs, plant expansion, financial planning, budgetary operations, purchasing techniques, marketing and production programs and to some extent, technology developments and assorted competitive climate categories.

The key item in solving the problem of which work scheduling technique to select lies with determining

various cost-benefit ratios that would be experienced by a particular business enterprise should that enterprise adopt one of the new scheduling techniques available. It is a management problem but the choice of action involved in solving the problem also belongs to management.

Job Satisfaction and Society

The Change in Society

Management has long been concerned with the problem of instilling widespread worker job satisfaction. Solutions have attempted to produce satisfaction by modifying, adapting or altering the job or the work performed. A cornerstone of these solutions lies in the assumption that job dissatisfaction exists primarily because the job or the work itself has changed. But comparatively speaking, there have been steady and meaningful improvements in job working conditions. Increased mechanization has substantially reduced the amount of heavy manual burden associated with most jobs. Management has also humanized general job working atmospheres by philosophically and realistically recognizing the worker as a social being and not merely as an extension of machinery. Generally, it can be assumed and recognized that over the years job working conditions have improved substantially. Yet, the amount of job dissatisfaction has remained relatively high. The answer to

this paradoxical situation lies in the supposition that the job, the work itself, has not changed at all.

What has changed is society. Management in many instances has failed to realize and comprehend that all the job enrichment programs developed, that all the sharing of corporate decision making responsibilities granted, that all the alternate communication channels established while changing the work structure and organizational set up and while providing temporary relief from the problem of worker dissatisfaction, do not affect society nor change the impact that society has upon the worker.

In today's society, workers do not view work activities as essentially important and a means to provide basic survival elements such as food, clothing and shelter, even though that be the true case. What is seen as more important by the contemporary worker are factors such as meaningful self-expression, self-realization and basic personal fulfillment. There seems to be an innate dislike, disapproval and displeasure with work activities that seem to be impersonal, aloof and removed, and that deny a freedom of choice and a degree of responsibility. The modern worker contemplates and places a great deal of emphasis on planning the manner in which time available

away from the job will be spent. This characteristic differs greatly from antecedent worker counterparts of pre-1960 vintage who, for the most part, systematically contemplated the reverse. Expected from management and from the job, are both sensitivity to individual feelings and an understanding and temperance in treatment of personal problems and value systems. In addition, many workers see management as having a direct moral and ethical obligation to contribute toward the quality of life experienced not only on the job but off the job as well.

Worker Mores

Regardless of the social or political mores felt by modern workers, realistic, progressive management is beginning to recognize that its responsibility does not end with the conclusion of daily work activities, but carries further beyond. Management is beginning to realize that besides having a direct commitment to corporate responsibilities and duties, there should also be a commitment to social responsibilities. Enlightened management seeks to motivate employees through providing external-to-the-job features which bring satisfaction to internal job features. The key to providing such external features lies in establishing non-traditional work

scheduling procedures which permit flexibility, and remove or reduce worker time constraints and requirements. The gain is the ability and the responsibility of employees to govern their time. Self-expression, self-realization and basic personal fulfillment become more easily obtained. The dictates of management to the extent that "you must be here at this specific time" change to "you know we need you during the week, and we recognize your ability to schedule your time responsibly." A new work-style, tailored and adapted to suit a new societal life-style, is thus brought about.

The Behavioral Management Approach

Management thought has moved slowly from a purely mechanistic or scientific thought approach to an approach which embodies value and value judgments. This new philosophy toward management involves not only a concern for the problems of management as related to production and worker control, but places an emphasis on group dynamics and involved managerial obligations. By this behavioral approach, social ethics are melded with scientific principles.[3] Early managerial philosophers

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[3]George, Claude S., "The History of Management Thought," Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972, p. 132.

involved with the behavioral approach, such as Oliver Sheldon, believed the basic problem of industry was to determine and employ a proper balance between the "things of production" and the "humanity of production." Sheldon has stated,

> "Industry is not a mass of machines and technical processes; it is a body of men. It is not a complex of matter but a complex of humanity."[4]

Sheldon was not the only managerial philosopher that believed the worker to be a social individual and that management should not exclusively follow a strictly traditional scientific approach. Mary Parker Follett, as early as 1930, attempted to establish a management philosophy that believed the grounds for any productive society would necessarily have to be founded upon a recognition of the motivating desires of the individual and the group.[5] Miss Follett proposed that an individual should have authority over his own job area, and through further personal efforts, developed various principles of

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[4]Sheldon, Oliver, "The Philosophy of Management," New York, New York: Pitman Publishing Corp., 1966, pp. 14-15.

[5]George, Claude S., "The History of Management Thought," Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972, p. 138.

management which spanned the gap between the strictly scientific approach expounded by the followers of Frederick W. Taylor and the contemporary approach which emphasizes a more humanized approach.

Chester I. Barnard in 1938 emphasized that it was necessary to induce individual cooperation to achieve managerial success.[6] A cornerstone of Barnard's philosophy stated that individual acceptance of an idea or a concept lay with the individual believing that the idea itself was compatible with and in line with his own personal interests. The managerial function was seen as one of allocating "satisfactions" to gain and elicit desired individual behavior and performance.

Elton Mayo, father of the classical Hawthorne Studies, found that to be effective, management must recognize that work assignments issued to individuals must satisfy an individual's personal and subjective requirement of social satisfaction, as well as the company's requirement of productive output.[7] Mayo emphasized that in order to be

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[6] Ibid., p. 141.

[7] Ibid., p. 137.

successful, management must adopt a new philosophy in dealing with individual employees which encompassed a social order founded on the cooperative attitude of the individual and management's coordinative organization and communication.

Eventually the human relations concept became a firmly established managerial philosophy. Contemporary managers began to use and employ a scientifically humanized approach. This approach necessarily incorporated a goodly portion of scientific methodology but blended this scientific methodology with sociological and psychological findings. The modern manager evolved into a student of history and into a managerial theorist dealing with the generalities of the environment, in contrast to dealing primarily with specific facts about specific cases. With respect to the topic at hand, that of work time pattern alteration, the modern manager began questioning not so much prevailing patterns of work, but rather the rigidity of these concepts and whether they served both the interests of the firm and the interests of the worker. Also questioned was whether work time patterns with their rigidity can and should exist in a society whose work force is becoming increasingly more educated and experiences higher living standards than heretofore realized.

The Method of Approach

Approach Outline

It has been established that business activities directed to increasing worker job satisfaction must be concerned with the effects that the society external to the job impacts and imposes upon the satisfaction derived from the job. In addition, as mentioned, such activities should also be concerned with internal job satisfaction areas. In maintaining these business activities and in developing responsible and cohesive plans attacking the problem, management must initially define the vital factors and issues associated with the problem. As mentioned, frequently mistakes occur where symptoms, not problems, are treated. Care must be taken to determine the real issues so that the actual problem will be solved. A problem that is properly defined is essential. Called for is an in-depth situational analysis of the parameters associated with the situation. The solution obtained to the problem must be able to alter these parameters to such an extent that the problem itself ceases to exist on any large scale.

Once the vital factors and issues of the problem have been determined, the next step involves collecting all facts that are relevant to the situation to enable

efficient problem analyzation. The key word in this requirement is "relevant." Relevant does not refer to, nor call for, securing each and every fact associated with the situation. Such a task of gathering all facts would be a mamouth, if not an impossible undertaking. It would consume an unreasonable amount of time and effort, and would be prohibitive costwise. The theory of infinite search is not adhered to. In decision making executives frequently do not thoroughly explore all alternatives, nor is all information always available concerning every alternative. Information can and should be gathered so long as the marginal expected rate of return from the information secured exceeds the opportunity cost. With these guidelines in mind, and having mentioned what is not meant by relevant, let us define what is meant by relevant. Collecting relevant facts refers to collecting only essential facts and does not call for an investigation of the minutest of details.

The third step involves determining feasible alternatives. Again, as relevant was defined previously, feasible must be defined now. By feasible it is meant those alternatives or courses of action that can be undertaken by the enterprise within the constraining limits of available resources. Negatively speaking, it does not

involve determining all potential and possible alternatives as not all such possible alternatives lay within the constraints of available resources.

The fourth step calls for the analyzing and comparing of feasible alternatives. Factors to be taken into account in this regard are costs, resulting benefits, rates of return, etc. Called for is a careful appraisal of various alternatives and an estimation of what impact the selection of each alternative will have on the operations of the enterprise.[8] Useful approaches in simplifying the process of alternative comparison are: 1.) focusing on the difference existing between alternatives, 2.) concentrating on the crucial factors and issues distinctly presented by each alternative, and 3.) simplification of the projection of intangibles which are stubbornly difficult to decipher and sometimes are found to defy direct quantification.[9]

The remaining step involved in reaching a suitable decision deals with the selection of the most appropriate alternative to follow from among those alternatives that

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[8]Newman, William H., Summer, Charles E., and Warren, E. Kirby, "The Process of Management-Concepts, Behavior, and Practice," Third Edition, Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972, p. 290.

[9]Ibid., p. 294.

are available for consideration. The alternative ordernarily selected is the one thought to be most advantageous in maximizing long-range enterprise operations. In addition, the responsible manager must communicate the chosen alternative to pertinent members of the organization ensuring that each member is fully aware of the facets of the chosen path of action. Each pertinent member of the organization should be committed to working harmoniously together with other members in implementing the facets of the chosen alternative. In the long run, a policy of unilateral selection of an alternative and coercion on the part of the prime decision-maker, blended with suitable amounts of motivation, will probably bring a greater degree of compliance than will substantial amounts of group pressure.

Decision-Making Limitations

Certain limitations in the decision-making process exist and should be noted. These limitations are exemplified by constraints brought about by, among other things, the lack of sufficient operating capital, the existence of progressive competition and increased governmental regulations, and binding legal and union-contract requirements. In addition, the physical characteristic of the employee population and the organizational structure of

the firm involved, may come into play. These limiting barriers and constraints cannot be broken down simply by following the aforementioned procedure for reaching an alternative course of action. In addition, decision-makers necessarily require feedback concerning proposed actions and in a sense require a degree of intuitiveness to further ensure that the correct decision is being reached.

The Nature of the Work Schedule Decision

All decisions dealing with the activities of a single group are either of an economic or social nature, or as is the case when determining a suitable work schedule, a combination of the two. In order to properly reach acceptable conclusions, it is assumed that knowledge exists about the relevant aspects of the decision's governing environment. The type of decision involved, therefore, becomes a "closed" framework decision. Closed decision choice situations usually concern organizational decision making. The "closed" decision can be defined as existing where and when a decision-maker faces a known set of alternatives and selects one or several potential courses of action by a rational selection process.[10]

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[10]Gore, William J., and Dyson, J. W., "The Making of Decisions," London, Collier-Macmillan, Ltd., 1964, p. 180.

Frequently, the decision-maker, the individual or the group of individuals making the decision, is confronted with a situation of which there are a number of possible alternative courses of action open for consideration. The likelihood also exists that each alternative leads to an individual or separate consequence, or to several separate consequences clustered in a field of potential outcomes. In other words, each alternative course of action has a distinct resultant. If the area of possible consequences or outcomes could be imagined as a field or geometric plane, these consequences, the impact areas of alternatives followed through to an ultimate conclusion, could be described and defined by points or severely limited circles of limited area.

A rational closed decision adds to the definition of a closed decision as presented above, by incorporating an executive account of possible consequences; and in light of such knowledge, the choice of a course of action which, according to executive opinion, leads to the best or the most favorable consequence. The rational executive selects an alternative on the basis of many elements--namely 1.) a known set of relevant alternatives with corresponding outcomes, 2.) an established rule for ordering alternatives, and 3.) the maximization of decision parameters.[11]

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[11] Ibid., p. 294.

A rational business decision is one which effectively and efficiently assures the achievement of aims for which the means are selected.[12] It is the most appropriate and favorable selection of a vehicle to achieve outcomes from a system of values acceptable to the evaluator and by which the consequences of the decision can be measured. Each decision-making entity, be it an individual or a group of individuals, has a preconceived system of values and, generally speaking, has measures to determine how well those values are satisfied by explicit business decisions reached.

The Objective - Profit Maximization

The Economist's View or the Technical View

Most large enterprises have not a single objective but a group of objectives toward which to strive. Usually these multiple sets of objectives cover the gamut of the field of endeavor that the enterprise is engaged in. These multiple objectives, however, could be grouped under a general heading of profit maximization. There are few

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[12]Steiner, George A., "Top Management Planning," Toronto, Ontario, Canada: Collier-Macmillan, Ltd., 1969, p. 328.

businessmen and industrial leaders who do not consider the attainment of a maximized profit as their paramount and dominant aim and objective.

Profit maximization, however, is viewed differently by different individuals. Economists have a strict definition of the term and use it in relation to capital--capital expenditures, capital funds, capital recovery factors, capital budgeting, etc. The long-run profitability of the enterprise is seen by the economist as hinging upon the solution of two problems: the sourcing or acquisitioning of capital funds, and the rationing or investing of that capital. Further, the budgeting process is seen as absolutely necessary for successful business enterprise growth and continued existence.

Economists view profit maximization as the sole objective of particular business enterprises in terms of monetary value. It is viewed strictly in a theoretical sense, i.e., the difference between total cost and total revenue. The enterprise in the eyes of the economist is seen to prosper and prevail as long as greater income quantities are added to total revenues than are added to total costs. Profits are thought to be attained when

marginal revenues equal or surpass marginal costs. This, of course, cannot be quarreled with from a purely technical viewpoint.

The ownership of the enterprise, the stockholders, bondholders, etc., are seen by the economist as the managers of the enterprise. In turn, the managers of the enterprise or the firm itself are seen to be the employees of the firm. Decisions by the ownership and the management of the enterprise are viewed by the economist as only having one particular goal in mind, that of profit maximization in terms of dollars, that of maximizing of returns to stockholders.[13]

The viewpoint described above, quite fortunately, does not appear to be in vogue at the moment. Challenges to its philosophical existence and place as an integral part of executive decision-making have arisen. These challenges have arisen primarily as society has changed the value system and operating code by which the modern businessman must function. Business enterprises have recognized the rising importance of other objectives and

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[13]Steiner, George A., "Top Management Planning," Toronto, Ontario, Canada: Collier-Macmillan, Ltd., 1969, p. 169.

have moved from the concept that profit maximization, as interpreted by the economists, should be the sole aim of a business entity.

The Literary Management View

Contemporary managers are faced with conflicts in satisfying the objectives of assorted groups. Stockholders want higher dividends and clamor for management to strive for profit maximization in a technical sense. Wage earners demand higher wages, better working conditions and greater fringe benefits. The government pressures industry to hold down prices and to limit negotiated labor wage increases. Customers urge better service at a cheaper price with improved quality. Because of these conflicting objectives brought by various groups, businessmen do not wish to, and are probably unable to and incapable of following, a technical profit maximization goal. Instead, most business operations employ profit maximization in a literary sense.

Literary profit maximization entails the use of available enterprise resources to further business interests which may or may not satisfy stockholder interests. The concept recognizes that businesses do indeed have social responsibilities. These recognized social responsibilities, when appearing, replace technical economic motives on a

one-to-one basis. While social and economic responsibilities appear to be mutually exclusive, overlapping areas of application do exist.

Currently, the literary interpretation approach to profit maximization has gained respect and a moderate but increasing following. This, however, was not always the case. It was not until the late 1930's that the concept began to gain strength. For example, in 1937 Raymond Moley stated that management had a recognized responsibility as an agent of the investor or the stockholder, but there also existed a secondary responsibility to the public and to the employee. Moley saw this secondary responsibility as increasing.[14] Increased belief existed during the era that management's primary duty was to the public, to retained employees and to customers served.

As time progressed, management was called upon to conduct business affairs and relationships in such a manner so as to maintain "an equitable balance" among those interest groups upon which its operations impacted. The 1960's and early 1970's again brought changes in the

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[14]Moley, Raymond, "Industrial Leadership, 1937 Model," Vital Speeches of the Day, January 1, 1937, p. 186.

philosophy of management whereby the concept of good corporate citizenship became a common and standard trademark for many enterprises.[15] Such was exemplified by increased private business-federal government cooperation, action taken to resolve pressing unemployment problems through the formation of National Alliance of Businessmen and related programs, restraint and voluntary cooperation in the fight against inflation, and action taken to resolve critical pollution questions. Management began to recognize its "total" responsibility, and for that matter, is continuing to recognize such a responsibility.

The Current View

The issue today is how much social responsibility must a business concern assume, not should the business be concerned with social issues. Legally a corporation can use stockholder earnings for social purposes. This was established when the United States Supreme Court refused to review a decision handed down by the Supreme Court of the State of New Jersey.[16] The findings of the court in this matter are of interest.

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[15]George, Claude S., Jr., "The History of Management Thought," Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972, p. 187.

[16]A. P. Smith Manufacturing Company vs. Barlow et al., 26 N.J. Superior 106 (1953); 98 Atlantic 2nd 581; 346 U.S. 861 (1953).

> "It seems to us that just as the conditions prevailing when corporations were originally created required that they serve the public as well as private interests, modern conditions require that corporations acknowledge and discharge social as well as private responsibilities as members of the communities within which they operate. Within this broad concept there is no difficulty in sustaining, as incidental to their proper objects and in aid of the public welfare, the power of corporations to contribute corporate funds within reasonable limits in support of social institutions. Such expenditures may be justified as being for the benefit of the corporation; indeed, if need be, the matter may be viewed strictly in terms of actual survival of the corporation in a free enterprise system."[17]

The Congress of the United States has also recognized the social responsibilities of corporations. In laws directed to this point, corporations are permitted to deduct up to five percent of their total net income. In addition, many states have enacted similar types of legislation.

Henry Ford II, Chairman of the Board of the Ford Motor Company, has stated before the Annual Meeting of the Michigan State Chamber of Commerce that,

> "America wants business enterprises that are agressive, that are inventive, that are venturesome, that are profit-oriented and that are, therefore, increasingly efficient. America recognizes that business enterprises

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[17] Ibid.

> are essentially economic tools for achieving the broader objectives of society, and the sharper they are the better they will perform. But America also wants enterprises that are rational and responsible citizens, decent in their community relationships, humane in their treatment of people."[18]

David Rockefeller has underscored the fact that long-range corporate profits depend to a great extent on the understanding of and attention to social aspects. Mr. Rockefeller was quoted as saying:

> "Community problems will never be solved by experts alone, and the experts are the first to acknowledge this. They cannot, indeed, they should not be relegated exclusively to government. These are the problems calling for action on a broad front and for participation by the entire citizenry. Unless we in the business community are personally and passionately committed to a better life for all, we shall bear witness to a society which falls tragically short of its great promise."[19]

Table 1 details the opinion of a sampling of executives exploring the matter of where corporate social responsibilities should lie.

Table 2 adds further information to the discussion by detailing the opinion of managers with respect to the importance of corporate goals.

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[18]Steiner, George A., "Top Management Planning," Toronto, Ontario, Canada: Collier-Macmillan, Ltd., 1969, p. 176.

[19]Rockefeller, David, "Creative Management in Banking," New York, New York, McGraw-Hill Book Company, Inc., 1964, pp. 27-28.

TABLE 1

EXECUTIVE OPINION OF AREAS WHERE CORPORATE CHIEF RESPONSIBILITIES LIE (1967)

Area (Responsibility)	% Executives Surveyed Feeling Corporate Responsibility Lays in Area
Stockholders	84.2%
Customers	17.6%
Employees	11.3%
Creditors	11.3%
Society	2.4%

Source: Lorig, Arthur W., "Where Do Corporate Responsibilities Really Lie?," Business Horizons, Spring, 1967, pp. 51-54.

TABLE 2

MANAGER'S OPINION OF THE IMPORTANCE OF CORPORATE GOAL AREAS (1967)

Area of Importance	% Managers Feeling Area is of Importance to Corporate Goals
Organizational Efficiency	81%
High Productivity	80%
Profit Maximization	72%
Employee Welfare	65%
Organizational Growth	60%
Industrial Leadership	58%
Organizational Stability	58%
Social Welfare	16%

Source: England, George W., "Organizational Goals and Expected Behavior of American Managers," Journal of the Academy of Management, June, 1967, pp. 107-118.

There is no fixed formula detailing the degree of social involvement individual companies should become engaged in. It is recognized, however, that undertaken policies and programs should reflect a projection of business needs. Each issue should be undertaken in the light of the self-interests of the enterprise both in the long- and short-range. Involvement decisions must be based upon the collective value judgments of the principal decision-makers. One item is certain, the view that human needs must be submerged to serve organizational needs never will be acceptable. The ultimate balance between organizational needs and human needs, and the degree of corporate social responsibility, has not yet been achieved. However, current management thought is increasingly directed toward elevating the man over the organization. Where the pendulum of balance between corporate and social responsibility will ultimately rest is conjecture. It can be said that the variance will continue to change until more facts and knowledge are gained about such complex subjects as worker motivation, human needs and their change, leadership, organizational dynamics and assorted other management operating techniques.

Summary and Conclusion

This Chapter has presented an introduction and background to the general vital factors and issues associated with selecting an appropriate work-schedule technique. The problem has been addressed from a general and a particular standpoint by mentioning not only those internal and external forces involved in the problem, but also by discussing job satisfaction and its general relationship with society. Finally, the objective of profit maximization through social responsibility was explored with respect to the proper degree of attention management should properly direct to the subject.

CHAPTER II

WORK-SCHEDULE ALTERNATIVES

The trend toward development of non-standard workweeks is evident through review of the amount of literature devoted directly and indirectly to the subject. Directly, current periodicals are filled with references to such concepts as flextime; the four-day workweek, and in some instances, the three-day workweek; and staggered work hour programs. Indirectly, literature is concerned with topics such as job satisfaction, the changing work ethic, and the appropriate use of available human resources. The modern executive is certainly aware of these new developments and has probably kept abreast of current developments to an extent. This extent and degree of awareness, however, is probably of a limited degree due not so much to the lack of interest and/or concern with the area, but more to the lack of available time in which to study and potentially incorporate new routines, procedures and concepts. Certainly, time-pressed executives are, at the present, more earnestly concerned with problems resulting from the poor economic situation existing not only in the United States but generally felt throughout the Western business community.

It is the objective of this and succeeding Chapters to define and provide a detailed description of available work-schedule concepts through a thorough discussion of application areas, individual concept adoption and failure rates, legal constraints and restrictions, and international aspects. A discussion is presented of the results, benefits and disbenefits associated with the three major non-standard work-scheduling concepts namely flextime, the four-day workweek and the staggered work hours concept.

These Chapters do not attempt to provide a means by which the decision-maker would be able to differentiate between alternatives with the idea in mind of selecting one of the alternatives presented. Descriptions and facts are merely presented; being condensed from a large and substantial number of articles concerning the topic at hand to fill the knowledge gap on the subject experienced by executives.

Method of Approach

The analysis of work schedule alternatives involves a review of current literature devoted to the subject. Due to the great degree of information available and provided by current periodicals on the subject, it was possible to provide a substantial number of references and a comprehensive view of both the flextime and four-day workweek

concepts. The information provided for describing staggered work hour programs emanated primarily from a single source, the Port Authority of New York and New Jersey and affiliated organizations and associations established at the urging of the Port Authority; and was concerned with application to a specific geographical area, that of lower and mid-town Manhattan (New York City). Discussion of the three-day workweek was approached by providing a general scenario of the concept.

Definition of the Concepts Discussed

The Standard Workweek - The standard workweek refers to the traditional work-scheduling concept whereby workers are required to be at their respective work positions five days each week, Monday through Friday, at specific daily hours, usually 9:00 a.m. to 5:00 p.m. Actual starting and quitting times adhered to by respective organizations within a particular company or by the entire company itself sometimes vary.

The Four-Day Workweek - The four-day workweek is the transformation of the standard workweek into a four-day format. Most applications of this concept involve eliminating Friday as a workday although this arrangement is not universally followed. In addition to discarding the fifth workday, the total number of hours worked per day

increases in most instances by 25% equaling the 20% reduction in the number of days worked per week.

Flextime - The flextime concept involves establishing "windows" at the beginning and at the end of the workday during which employees may work but are not mandated to work. The program establishes a daily "core" period during which employees must work. The "windows" referred to above directly precede and follow the "core" period and usually are approximately two hours long although actual lengths can vary. Under this concept, employees are required to work a predetermined amount of hours during a given period lasting from a week to several weeks, established by management. Once determined however, these periods normally remain fixed. The total number of days worked per week under flextime programs does not vary from standard workweek requirements. However, the total number of hours worked per day may vary, depending on individual preference.

Staggered Work Hour Program - The staggered work hour program shifts key time points associated with the standard workday. The key points referred to are starting times, lunch periods and quitting times. Shifts must be at least one-half hour in length either positive, starting the

workday earlier; or negative, starting the workday later. The total number of hours worked per day, and the total number of days worked per week, do not vary from standard workweek requirements.

Particulars of Work

Work Time Pattern Alteration

Historically, long-term patterns of work time have tended to decrease the size and scope of the workweek. The number of hours worked per day, the number of days worked per week, the number of weeks worked per year and, finally, the number of years worked during a lifetime have all been reduced.[1]

In the middle ages, hours worked and workweek length were determined by governing Lords and Royalty. Vassals had little choice but to accept decrees which frequently meant working from sunrise to sunset. The introduction of the Industrial Revolution, with its accompanying increased utilization of machine-oriented and controlled production, did not aid the lot of workers. The object

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[1]Moore, Geoffrey H., and Hedges, Janice N., "Trends in Labor and Leisure," Monthly Labor Review, February, 1971, pp. 3-11.

of factory ownership was to optimize machinery dollar investment by running that machinery as much as possible. The advent of these factories, and the improvement of related physical support facilities, resulted not in the shortening of workday hours but rather in the maintenance of them, and in some instances, the lengthening of them. Managerial philosophers were not interested in a behavioral approach at this time, but devoted most of their efforts and studies toward the goal of optimizing the use and balance of men, materials, money and machinery according to scientific principles.[2]

Ultimately, direct government intervention brought the first decrease in the amount of daily hours worked. Legislation was enacted which limited the number of work hours. This legislation also placed restrictions on child labor and female employment.

The length of the workweek remained relatively unchanged until the period of the 1920's during which a new regulated concept, the forty-hour week, was introduced. Shortly thereafter, the depression of the 1930's and the

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[2]George, Claude S., "The History of Management Thought," Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972, p. 59.

resulting scarcity of jobs encouraged both management and labor to urge and sponsor the sharing of available work hours. It was this sharing concept which solidified the acceptance of the forty-hour week. Federal legislation in the area, such as the Walsh-Healey Public Contracts Act, instituted in 1936; the Fair Labor Standards Act of 1938, and the National Recovery Administration Codes further urged business acceptance of the forty-hour week by mandating premium pay schedules for many workers who labored more than forty hours per week. It became economically sensible for management to adopt the forty-hour work routine. World War II brought a slight perturbation in predominantly followed work schedules, but by the late 1940's, the forty-hour week concept was firmly entrenched as the standard workweek length, with a majority of firms also following a five-day format.

It was not until the late 1960's that alterations to the five-day, forty-hour format appeared. One format developed called for a four-day, forty-hour workweek. The concept was seen by many as directly leading to a thirty-two hour week which seemed to be the logical projection of developments in the area. The three-day-week concept also appeared. Although limited in areas of

application, the idea produced notable benefits when employed in a proper business environment. Perhaps the most popular and beneficial new alteration of the conventional work time pattern was the concept called flextime, which provided employee discretion in the establishment of daily work hours. The staggered work hour program concept, which has been primarily adapted to large urban area situations, was also usefully applied at this time.

Hours of Work and Production

Productivity cannot be increased simply by increasing the number of daily working hours, although many believe this to be the case. Conversely, during periods of unemployment, available work cannot be spread to encompass the entire workforce by merely truncating the total number of hours worked per week.[3] These statements appear to contradict common-sense reasoning, but nevertheless have proven their validity, and may eventually prove to be a prime advantage in discussions leading to implementation of the four-day-week work scheduling technique.

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[3]Blum, Milton L. and Naylor, James C., "Industrial Psychology," Revised Edition, New York: Harper and Row, Inc., 1968, p. 543.

The relationship described above exits due to the direct link between nominal and real hours of work. Nominal hours of work can be defined as those hours existing daily between regular starting and quitting time. Real hours are that portion of nominal hours during which true and meaningful work is performed. The difference between nominal and real hours is filled or occupied by unproductive work time consisting of "downtime" activities such as rest pauses, early work-stoppages, and changes in the general work pace.

The length of the working day has become a bargaining point problem which must be recognized when alterations to standard work schedules are considered. Problems exist due to the fact that workweek alterations are seen by management and labor to serve different ends. Management traditionally has viewed the length of the workday as the length of the production cycle. Labor has seen the potential shortening of the workday and the workweek as an indirect means by which to secure additional wages per input labor hour. The management view of relating workday length to the amount of production forthcoming is particularly difficult to understand and comprehend. Take for example the undertaking of overtime which usually results in inefficiency. Under the

management view, an equal amount of production per hour should be secured during the overtime hours, as was experienced during standard scheduled work hours. This, however, rarely proves to be the case. When considering that overtime usually is accompanied by premium pay scales ranging from one and one-half to two times regular pay scale rates, overtime becomes even less relatively productive. In addition, it has been established that overtime usually results in lower production both on the regular working day during which it is scheduled and the following day.[4]

The prime point to be considered when investigating work schedule alternatives deals with the number of hours individual laborers work in a given workday. Optimally, any decrease in the total number of hours worked per day should be accompanied by a like decrease in the difference between nominal and real hours worked. In most instances, this situation is very nearly approached.[5]

The Ultimate Workweek

Most experts in the field of work-schedule alteration feel that newly developed concepts presently gaining

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[4] Ibid., p. 546.

[5] Ibid., p. 544.

footholds in industry will eventually lead to widespread acceptance of a thirty-hour workweek. This thirty-hour week may well be the ultimate workweek. Present means of production aid in decreasing the amount of hours worked per standard week, and there is no reason to believe that further innovative developments in this and other associated areas will not lead eventually to a thirty-hour week. Hopefully, when the ultimate workweek does arrive, it will not have been preceded by an emotional battle between the traditional rivals, labor and management.

The Four-Day Workweek

The four-day workweek (or 4/40 or the rearranged workweek) has been called the most significant labor innovation of the 1970's, both for workers and employers.[6] In anticipation of the adoption of this new type of work schedule, it is essential that personalized analysis be made of an organization prior to reaching a go/no-go recommendation.[7]

The four-day week is unique in that it reverses a trend started nearly 25 years ago toward shorter workdays. The

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[6]Werther, William B. and Newstrom, John W., "Administrative Implications of the Four-Day Week," Administrative Management, December, 1972, pp. 18-19.

[7]Levy, R., "How's the Four-Day Week Working?," Dun's, July, 1972, pp. 52-54.

only other comparable schedule phenomenon of lengthening the workday occurred when government workers voluntarily accepted an increase from 39 to 40 hours of work per week in order to have a two (2) day weekend, some 25 years ago.[8]

Management, not labor, is responsible for introducing the 4/40 concept.[9] The first application occurred in non-unionized, small and medium sized companies in order to provide employees of these companies with a fringe benefit which was not to be found at that time in larger companies. The plan is difficult to apply to large, capital-intensive manufacturing companies, particularly those who operate around the clock in a three-shift operation.[10] However, some large firms have adopted the concept, with much satisfaction.

The four-day workweek contracts the number of days worked in a particular workweek from five to four, while leaving the number of total hours worked during the week

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[8]LaCapra, Louis J., "Trying Out The Four Day Work Week," Public Personnel Management, May, 1973, pp. 216-220.

[9]Gannon, Martin J., "Four Days, Forty Hours: A Case Study," California Management Review, Winter, 1974, pp. 74-81.

[10]Martin, Neil A., "Can the Four-Day Week Work?," Dun's, July, 1971, pp. 39-40, 45.

unchanged, or in some cases slightly diminished. This results in lengthing the average hours worked per day usually by 25%, and therein lies the major complaint against the plan.[11]

Adoption Rate

Figures detailing the adoption rate of the four-day work week conflict at times, but do nevertheless portray a definite trend. It has generally been agreed that the concept started in the United States in the early 1970's.[12] By mid-1971, there were some 200 to 400 firms which adopted the concept.[13,14] Reports substantiating these figures listed 600 firms employing four-day or 4½ day, nine- to ten-hour workday variations.[15] An AMA

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[11]Bulkeley, William, "For Some Companies the Four-Day Week Is a Four-Day Headache," The Wall Street Journal, April 30, 1973, pp. 1, 36.

[12]Hedges, Janice N., "How Many Days Make a Workweek?," Monthly Labor Review, April, 1975, pp. 29-36.

[13]LaCapra, Louis J., "Trying Out The Four Day Work Week," Public Personnel Management, May, 1973, pp. 216-220.

[14]"Thank God (Yawn) It's Thursday," Sales Management, August 15, 1971, pp. 24-25.

[15]Hedges, Janice N., "A Look at the 4-Day Workweek," Monthly Labor Review, October, 1971, pp. 33-37.

study conducted in 1972 estimated 700 to 1,000 organizations with 100,000 workers, were using the four-day week with variations of total weekly hours worked ranging anywhere from a high of 40 down to a low of 35.[16] This equated to involving one out of every 840 American workers in the concept. The growth trend continued through 1973, and by May of 1974 it was reported that over 650,000 full-time wage and salary employees worked on 4/40.[17]

Table 3 details the number of non-farm wage and salary workers employed on various work schedules during 1973 and 1974, as an illustration of the growth pattern. As shown, in 1973 3.4% of non-farm wage and salary workers worked less than a five-day week. This figure increased to 3.7% in 1974, a 10% overall change. In addition, in 1973, 81.0% worked a five-day week while 3.4% worked greater than five-days per week. Figures for 1974 detailed that 82.2% of those workers considered worked a five-day week and only 31.8% worked over five-days per week. The main point presented by Table 3 data is that the total number of days worked per week continued to decline and that the 4/40 concept continued to expand and grow through 1974.

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[16]Gannon, Martin J., "Four Days, Forty Hours: A Case Study," California Management Review, Winter, 1974, pp. 74-81.

[17]Hedges, Janice N., "How Many Days Make a Workweek?," Monthly Labor Review, April, 1975, pp. 29-36.

TABLE 3

NUMBER AND PER CENT DISTRIBUTION OF NON-FARM WAGE AND SALARY WORKERS WHO USUALLY WORK FULL-TIME, BY USUAL NUMBER OF DAYS WORKED PER WEEK, MAY, 1973 AND MAY, 1974

(Numbers In Thousands)

Days Worked	1973 Number	1973 Per Cent	1974 Number	1974 Per Cent
Total Reporting	58,923	100.0	59,442	100.0
3 to 4½	990	1.7	1,108	1.9
3	145	0.2	190	0.3
4	575	1.0	653	1.1
4½	271	0.5	265	0.4
5	47,754	81.0	48,891	82.2
5½ to 7	10,179	17.3	9,443	15.9
5½	2,768	4.7	2,559	4.3
6	6,231	10.6	5,751	9.7
7	1,180	2.0	1,133	1.9

Notes: Data applied to non-farm wage and salary workers excluding household workers.

Because of rounding, sums of individual items may not equal totals.

Source: Hedges, Janice Neipert, "How Many Days Make A Workweek?," Monthly Labor Review, April, 1975, Table 1, p. 31.

However, it was noted that the concept maintained a slower growth rate from 1973 to 1974 than was experienced from 1970-1973 contradicting the predictions of many notables of continued and expanded widespread growth.[18,19] This finding can possibly be related to general economic conditions experienced during the periods mentioned.

Areas of Application

Initial applications were mostly in small, mostly non-union, non-urban manufacturing, service and retail companies.[20] The idea soon expanded to include hospitals, insurance companies, retailing establishments, publishing companies, and architectural firms. The concept has been judged to be less successful with engineers, researchers, creative workers, and those types of workers whose workweek cannot be measured by the time clock or the calendar.[21] William F. Bavinger, Director of Industrial

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[18]Gannon, Martin J., "Four Days, Forty Hours: A Case Study," California Management Review, Winter, 1974, pp. 74-81.

[19]Levy, R., "How's the Four-Day Week Working?," Dun's, July, 1972, pp. 52-54.

[20]"Four-Day Work Week Gaining Acceptance Rapidly: Results to Date are Good, AMA Research Study Reports," Management Advisor, July, 1973, pp. 5-6.

[21]Cathey, Paul J., "Try 4/40, You'll Like It - Or Will You?," Iron Age, December 23, 1971, p. 35.

Relations of Chrysler Corporation, pointed out that the four-day week, with its expanded workday, could not be applied to three-shift operations.[22]

Municipal governments have tried 4/40 and have found it to be most accommodating and beneficial. For example, the City of Atlanta launched a program trying the shorter workweek for employees in various municipal services, and the City of Los Angeles recently extended the concept to over 2,000 parks and recreation employees and nearly 1,500 workers in other departments.[23] The San Diego County government enjoys 4/40, as does Minnetonka, Minnesota, a suburb of Minneapolis; Huntington Beach, California; the Oregon State personnel division; and the City of Long Beach, California.[24]

It is estimated that 75 different police departments across the country have adopted the concept. The Long Beach, California Police Department has tried the

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[22]"Short Workweek Has Short Life at Chrysler," Iron Age, December 23, 1971, p. 18.

[23]Werther, William B., "The Good News and Bad News of Flexible Hours," Administrative Management, November, 1973, pp. 78, 82, 96.

[24]"Is the Four-Day Week For You?," Nation's Business, January, 1974, pp. 49-51.

scheme with 250 officers, and reports overtime has been decreased by 17%, and annual savings have been accrued to approximately $12,000.[25]

Application, however, is not limited to municipal governments, as some large manufacturing companies have also joined the ranks of 4/40 participants. Included in this category are the Samsonite Corporation, Murfreesboro, Tennessee (870 employees); the Scovill Manufacturing Company's General Hose and Coupling Division (400 employees); American Cyanamid's Formica Division (Sierra Plant, 500 employees); and Eli Lilly's Indianapolis Pharmaceutical and Biological Plant (488 employees).[26] Pacific Southwest Airlines, with over 1,200 participating employees, tried 4/40 and found it to be most advantageous.[27]

Generally, custom-order orineted firms, or those firms operating with narrow inventory margins, are cautioned

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[25]"Employment: The Four-Day Week Gets More Pay," Business Week, July 17, 1971, p. 33.

[26]Levy, R., "How's the Four-Day Week Working?," Dun's, July, 1972, pp. 52-54.

[27]Parrish, Robert L., "PSA Thrives on Four-Day Week for Employees," Airline Management, July, 1971, pp. 32-34.

about converting to 4/40, as many such firms have found it necessary to modify their production lines, storage facilities, materials handling equipment, and shipping operations to accommodate 4/40, and that can be prohibitively expensive.[28] Few companies requiring heavy investment in capital equipment, or competing in world markets, or having contracts with locals of large national unions, have found a conversion to the 4/40 concept to be smooth and easy.[29]

Failure Rate

Prior to the recent adoptions by industry of the 4/40 concept, it was estimated that the failure rate would be somewhere between 10% and 15%. It has turned out that this figure was an overestimation, and that the true rate has proven to be close to 8%.[30] It should be noted, in this regard, that this 8% figure is very similar to the failure rate experienced by firms when the five-day week was introduced around 1935. Eleven out of twelve companies

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[28]Suchocki, Carl J., "Four-Day Week Needs Game Plan for Success," Iron Age, March 16, 1972, pp. 65-67.

[29]LaCapra, Louis J., "Trying Out The Four Day Work Week," Public Personnel Management, May, 1973, pp. 216-220.

[30]"Four-Day Work Week Gaining Acceptance Rapidly: Results to Date Are Good, AMA Research Study Reports," Management Advisor, July, 1973, pp. 5-6.

trying the 4/40 concept, liked the concept.[31] The failing 8% have been judged, for the most part, to have employed inadequate planning and poor management techniques.[32]

4/40 on the International Scene

The Organization for Economic Cooperation and Development (OECD) has indicated that European management community's concern with workweek scheduling concepts centers around obtaining more diversification and variability in the regulation and allocation of time for work, study and leisure, under the highest possible freedom of individual choice, than it does with the 4/40 concept itself.[33] The tendency in Europe has been to adopt flextime, a concept discussed later.[34] One reason may be the 44-hour week characteristic followed in many European countries, contrasted with the 40-hour week predominant in the United States (44-hour week France, Germany; 43-hour

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[31]McCorkel, Franklin M., "The Four-Day Work Week: Management Scores a Success," Administrative Management, September, 1973, pp. 63-64.

[32]Levy, R., "How's the Four-Day Week Working?," Dun's, July, 1972, pp. 52-54.

[33]Gordon, John M., and Elbing, Alvar O., "The Flexible Hours Work Week: European Trend is Growing," The Business Quarterly, Winter, 1971, pp. 66-70.

[34]Hedges, Janice N., "New Patterns for Working Time," Monthly Labor Review, February, 1973, pp. 3-8.

week Norway; 41-hour week Sweden). Most Canadian workers have expressed desires similar to their counterparts in Western Europe, by seeking a greater concentration of "time-off" during the workweek, rather than compression of the workweek. Interestingly, the Japanese government supports the five-day week and is pressing for a gradual acceptance of the concept.[35] Indications are, however, that once the five-day week is obtained that the next work schedule technique tried will be flextime, not the compressed workweek.

The Feelings of Big Labor

Rudy Oswald, Chief Economist for the AFL-CIO, in testimony before the Department of Labor, has labeled the four-day week as a management "ploy."[36] I. W. Abel, President of the Steelworker's Union, has stated, "...the way some of these "benefactors" maneuver, we have to be careful they don't offer us a two-day week with two 24-hour days, of course."[37]

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[35]"Europe Likes Flexi-Time Work," Business Week, October 7, 1972, pp. 80-82.

[36]Levy, R., "How's the Four-Day Week Working?," Dun's, July, 1972, pp. 52-54.

[37]"Is the Four-Day Week For You?," Nation's Business, January, 1974, pp. 49-51.

Union officials for the most part, seem to favor, or at least tolerate, the 4/40 concept in hope that it will eventually lead to a 32-hour week. However, Frank Polara, Assistant Director of the AFL-CIO's Research Department in Washington, has stated that, "the union's goal is not necessarily the 32-hour week, but a shortened number of hours worked per year."[38] The Executive Council of the AFL-CIO is on record as favoring collective bargaining efforts to reduce working hours, and to reschedule workweek arrangements to the mutual satisfaction of unions and management.[39]

Results of a Current Population Survey (CPS) conducted by the Bureau of the Census for the Bureau of Labor Statistics, concluded that most labor officials oppose four-day workweeks, but that union members, the rank and file, are as likely as non-union members to be working under such schedules.[40] In addition, many saw 4/40 as an obstacle in the path of securing a 32-hour workweek.

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[38]"The Great Four-Day Week Race," Industry Week, September 6, 1971, pp. 34-39.

[39]Hedges, Janice N., "A Look at the 4-Day Workweek," Monthly Labor Review, October, 1971, pp. 33-37.

[40]Hedges, Janice N., "How Many Days Make a Workweek?," Monthly Labor Review, April, 1975, pp. 29-36.

Besides being suspicious of management's intentions, and seeing 4/40 as an obstacle to 4/32, unions have concerns that possible legislation may be sponsored by management that would allow workdays of over eight hours without associated overtime pay. Labor organizations generally oppose such legislation, and are concerned with the physical strain involved in working a 10-hour day.[41] They are strong in their belief that time and a half for time worked over eight hours per day, must be retained.

In general, labor looks upon the 4/40 with a jaundiced eye. However, Leonard Woodcock, United Auto Worker's President, states that the 4/40 is "...indeed noteworthy and a possible answer to growing problems of absenteeism." In addition, the concept has been tried in large union plants such as Kraftco's Sealtest Plant in Omaha, and Samsonite's plant in Murfreesboro, Tennessee, and it appears that the rank and file are in favor of the concept even at straight time.

Family Reaction

The CPS survey referred to above confirmed that family reaction to the four-day workweek was indeed relevant

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[41]Hedges, Janice N., "New Patterns for Working Time," Monthly Labor Review, February, 1973, pp. 3-8.

inasmuch as three-fourths of the men, and three-fifths of the women, on 4/40 were married.[42] The survey notes some negative reaction from non-working wives of working 4/40 husbands. Wives commonly complained that there was a disruption of their work routines, and that more money was spent than could be afforded, during the wage earners extra day off.[43]

On the other side of the coin, concern has been expressed by both management and labor that four-day schedules will be particularly hard on women 4/40 workers with families. Surveys of employees who have worked such schedules, however, seem to indicate that the majority of married women workers on 4/40 prefer the idea. The traditional fifth day worked becomes a day set aside for housework which, in turn, makes Saturday's home work schedule less cramped and congested.

Although both positive and negative effects resulted from application of the 4/40 concept to one or both family

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[42]"Flexible Working Hours Find Favor in Europe," The Office, March, 1975, p. 66.

[43]"Designers Give 4 Day Week Mixed Reviews," Engineering News-Record, January 31, 1974, p. 57.

wage earners, these effects were found to be dependent upon how the family, as a unit, used leisure hours before and after the schedule change.[44]

In most firms, the reaction of employees to the 4/40 concept was the main consideration in reaching a go/no-go recommendation. Normally, it was announced by management that the concept was to be tried for a short period, after which employee reaction would be tested. Should that tested reaction be negative, management was fully prepared to withdraw the idea from further consideration. Ways differed in which employee reaction was ascertained. Some firms used formal voting methods, while others used opinion sampling and survey techniques. The one-man, one-vote concept was not always employed, as a number of firms weighed factors such as seniority and shift assignment more heavily than the individual vote.

The Oregon state government, prior to instituting 4/40, took a computer initiated random opinion sampling of 10% of its employees making sure, however, that each autonomous division was adequately represented.[45] In all,

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[44]Hedges, Janice N., "New Patterns for Working Time," Monthly Labor Review, February, 1973, pp. 3-8.

[45]Kenny, Martin T., "Public Employee Attitude Toward the Four-Day Work Week," Public Personnel Management, May, 1974, pp. 159-161.

2,325 questionnaires were distributed with 1,744 being returned, a 75% response rate. Results showed 68% favored 4/40 with the provision that either Monday or Friday were the off days. 75% were opposed to the idea if a three-day weekend was not provided. Employees over the age of 60 years of age, and domestic workers as a whole, disliked the arrangement. The 25-29 year old age group favored it by 82%. More males than females thought it was better. Fatigue, and conflicts with evening, family and child-related activities were the major reasons mentioned for opposition. Other relevant survey data on the subject is detailed by Table 4.

Legal Constraints

The initial legal constraint associated with implementing the four-day workweek is no longer applicable. In early 1971, a wage freeze enforced by the Cost of Living Council prohibited any increase in hourly wage rates.[46] It was interpreted that a revised work schedule, calling for a slight decrease in the total number of hours worked, which is sometimes a management desire when

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[46]LaCapra, Louis J., "Trying Out The Four Day Work Week," Public Personnel Management, May, 1973, pp. 216-220.

TABLE 4

SURVEY OF OREGON STATE GOVERNMENT EMPLOYEE REACTION TO THE FOUR-DAY WORKWEEK (1974)

	Yes		No	
	Per Cent	Number	Per Cent	Number
1. Option A - In favor of 4-day week 10-hour day with Monday or Friday as the day off	68	1200	32	544
2. Option B - In favor of 4-day week with day off during week	24	416	76	1307
The following refer to Option A only:				
3. By Sex - Males	74	613	26	217
- Females	64	599	36	312
4. By Age - 0-19	72	13	28	5
20-24	79	166	21	45
25-29	82	197	18	44
30-34	71	106	29	45
35-39	78	105	22	30
40-44	66	131	34	65
45-49	64	123	36	69
50-54	63	158	37	93
55-59	64	128	36	72
60-64	49	65	51	68
Over 65	33	3	66	6
5. Reason For Opposition -				
Fatiguing			34	185
Too Boring			4	22
Conflict with Evening Activities			22	120
Conflict with Family Activities			22	118
Problems with Child Activities			18	98

Source: Kenny, Martin T., "Public Employee Attitudes Toward The Four-Day Work Week," Public Personnel Management, May, 1974, Table 1, p. 160.

implementing 4/40, would have to be accomplished by an accompanying proportional decrease in the total amount of wages paid in order for the procedure to be legal.

Other legal constraints are more permanent and less recent. For example, the Walsh-Healey Public Contracts Act detailed by Public Law 74-846 was instituted in 1936. This Act required firms working on federal government contracts to pay workers time and a half for all time worked in excess of eight hours per day. The Contract Work Hours and Safety Standards Act (Public Law 87-581) initiated in 1962 likewise called for premium pay, and the Federal Pay Act detailed by Title 5-Chapter 6 of the U.S. Code applied segments of the aforementioned Acts to most federal government employees.

This is not to say all laws constraining 4/40 implementation are old. The Fair Labor Standards Act (Public Law 93-259) enacted on April 18, 1974, required that employees engaged in interstate commerce, and in public administration, receive overtime premiums should an excess of 40 hours be worked in any one given week. In addition, the Monday Holiday Law (Public Law 90-363) legislated five four-day weeks during the year (Washington's Birthday, Memorial Day, Labor Day, Columbus Day and Veteran's Day).[47]

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[47]"Characteristic of Agreements Covering 1,000 Workers or More," Bureau of Labor Statistics-Bulletin 1822, 1974.

Federal government restrictions on four-day week implementation are at times strengthened by individual state restrictions in such areas as the maximum daily hours permitted for female workers and night work restrictions placed on the same group.[48] Many of these restrictions are, however, weakening in the wake of the Civil Rights Act of 1964 and subsequent related federal court decisions.

Management has tried successfully and unsuccessfully to get relief from some of the legislation binding four-day week implementation. Department of Labor hearings, however, have indicated that the government has no intention of recommending any administrative action which might lead to modification of the above mentioned Acts, nor does it intend to grant any individual waivers or exceptions.[49] State governments, usually more easily controlled by big business interests, have recently allowed waivers with regard to female legal work restrictions and probably will be more obliging in this regard in the future.

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[48]Hedges, Janice N., "A Look at the 4-Day Workweek," Monthly Labor Review, October, 1971, pp. 33-37.

[49]Levy, R., "How's the Four-Day Week Working?," Dun's, July, 1972, pp. 52-54.

Various approaches by management have overcome some legal work restrictions without securing variances. For instance, one firm converted to a 37-hour, four-day week, but paid employees the same wages they received under the previously followed 40-hour format.[50] Another firm, most likely non-unionized, reduced the base salary of its employees to an extent that with time and a half paid for the extra two hours worked per day, the employee's weekly wages remained unchanged.

Results, Benefits and Disbenefits

Instituting the four-day week has had a profound effect upon the firm undertaking the action. Available literature on the subject has claimed a number of benefits and has recognized various disbenefits:

1.) Effect on Productivity and Related Performance Areas

Of 142 companies responding to an AMA study conducted in 1973, 62% reported an increase in productivity, while only 3% noted a decrease.[51]

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[50] Suchocki, Carl J., "Four-Day Week Needs Game Plan for Success," Iron Age, March 16, 1972, pp. 65-67.

[51] "Four-Day Work Week Gaining Acceptance Rapidly: Results to Date are Good, AMA Research Study Reports," Management Advisor, July, 1973, pp. 5-6.

The same study divulged that 66% experienced an increase in production and that 51% indicated profits were higher. A 71-company survey by the Bureau of National Affairs reported 60% of those companies reporting experienced productivity gains. The Aggregates Equipment Company experienced a 93% increase in sales volume with only a 62% employment increase when it adopted the four-day week concept. The Huntington Beach, California police department noted felony arrests increased by 126%, sick leave and overtime decreased by 10%, and a corresponding decrease of emergency calls by 15% was noted all while total operating expenses decreased by 38%.

Gains in productivity were attributed to the ability of participating firms to hold the experienced worker while being able to attract or recruit superior workers from other sources.[52] This advantage would obviously be lost should all companies adopt the 4/40 concept.

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[52]Hedges, Janice N., "A Look at the 4-Day Workweek," Monthly Labor Review, October, 1971, pp. 33-37.

Some concern exists here with regard to accepting the indicated productivity windfalls as being permanent. Industrial experience in matters such as this suggest that such gains will most likely fade in the long run.[53]

2.) Effect on Absenteeism

Absence rates generally declined for companies instituting the four-day week. The reason cited was that workers would find three free days a sufficient amount of time to handle their personal obligations and would be reluctant, because of pay procedures and to some extent ethical reasons, to take off a ten-hour day as opposed to an eight-hour day. However, Dr. Robert I. Dawson, Director of Research and Consulting for the Equitable Life Assurance Society, noted no change in absenteeism when a missed workday under 4/40 constituted 1.25 missed days under 5/40.[54]

3.) Increase in "Moonlighting"

It is estimated that between 4.5% and 5.7% of those workers employed on a five-day week

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[53]Gannon, Martin J., "Four Days, Forty Hours: A Case Study," California Management Review, Winter, 1974, pp. 74-81.

[54]"Shorter Working Week: The Lessons 6 Firms Have Learned," Industrial Management, February, 1974, pp. 16-17.

schedule moonlight.[55] When employees work under a four-day plan, this figure is likely to increase to 17%. Many workers trade away leisure hours gained for increased work opportunities provided the remuneration is satisfactory.[56]

Management is certainly concerned with the factors of health and unemployment when moonlighting percentages increase as substantially as indicated above. Generally, other concerns in this regard are trivial except where public security and public safety areas are involved. A number of companies take no stand and see no reason for a stand. One firm which strongly tried to discourage moonlighting finally instituted a policy where days off were rotated. This eliminated the problem.

4.) Effects of Fatigue

Fatigue is an important problem, but not an overwhelming one, depending largely on the nature

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[55]Hayghe, Howard V., and Michelotti, Kopp, "Multiple Job Holdings in 1970 and 1971," Monthly Labor Review, October, 1971, pp. 38-45.

[56]Logan, Nancy, O'Reilly Charles, and Roberts Karlene, "Job Satisfaction Among Part-Time and Full-Time Employees," Journal of Vocational Behavior, January, 1973, pp. 33-41.

of the job and the job's surroundings.[57] In some instances, it is considered a contributory factor to accidents. However, according to the National Safety Council, a 1968 study by the Pennsylvania Bureau of Research and Statistics covering 18 manufacturing and 20 non-manufacturing industries discounted a high degree of correlation between fatigue and accident rates by showing that accidents are evenly spaced throughout the workday.[58] It was found that the first hour of work usually accounted for most accidents and as a general rule, accidents were found to decrease as the day progresses. For the most part, figures and data available from firms which have instituted 4/40 back up the Bureau's findings. Important to note is that the 4/40 concept allows one less daily start-up period, the period cited as having the highest accident rate.

In addition, as detailed in Figure 1, human factors such as faulty attitude, failure to

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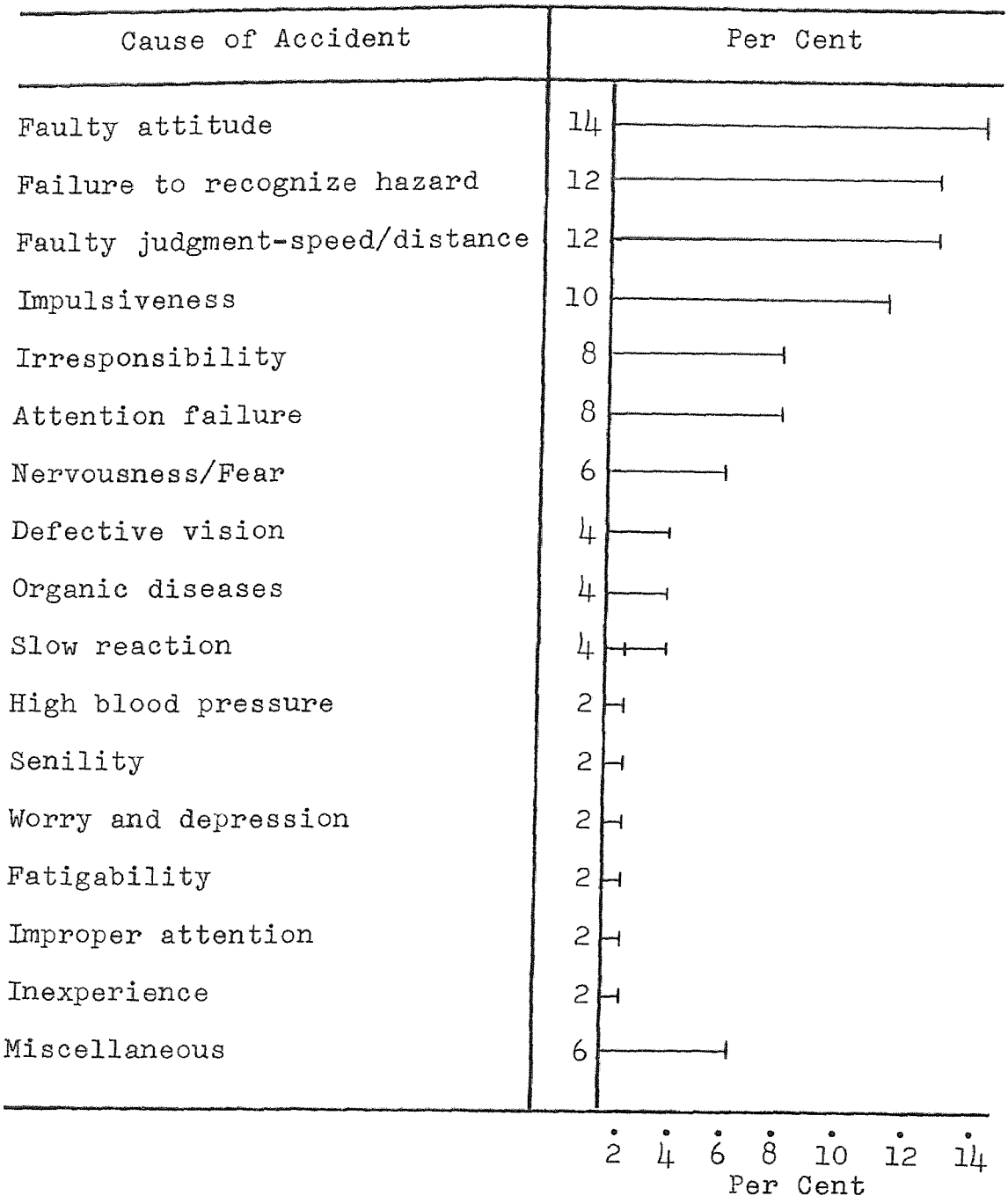
[57]Martin, Neill A., "Can the Four-Day Week Work?," Dun's, July, 1971, pp. 39-40, 45.

[58]"Shorter Working Week: The Lessons 6 Firms Have Learned," Industrial Management, February, 1974, pp. 16-17.

FIG. 1 - PRIMARY CAUSES OF ACCIDENTS



Source: Blum, Milton L. and Naylor, James C., "Industrial Psychology," Revised Edition, New York: Harper and Row, Inc., 1968, p. 518.

recognize potential hazards, impulsiveness, and irresponsibility appear to be the primary causes of accidents, rather than fatigue.

A survey of some 3,100 employees of the U.S. Automobile Association, a 4/40 company, indicated that 71% did not regard the ten-hour day as fatiguing, while 15% did, and 14% had no opinion. Interestingly, of the 15% that find the job fatiguing, 80% were female. Upper age bracket employees found the ten-hour day less demanding than did lower age bracket employees, and the largest group of exhausted females were those under 25 years of age.

Jacob Clayman, Administrative Director of the AFL-CIO's Industrial Union Department, sees problems with fatigue under the 4/40 concept due to the fact that there is less time in which to recuperate and restore energy.[59]

5.) Effects on Employee Morale

The most frequently cited advantage for converting to the four-day workweek is

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[59] Ibid.

increased employee morale.[60] However, a survey of 370 engineering technicians found no direct linkage between the 4/40 approach and morale. Many feel that in the long run, as the novelty of the system begins to wear off, it is doubtful that employee morale will stay at the high level reported by many 4/40 firms. The concept would become more of a right than a privilege.

6.) Impact on Total Supply and Demand of Labor

It is felt that the four-day week will create employment opportunities in various fields by enlarging a market for leisure goods and leisure services. It is also felt by many that it will attract more married women to the labor force, while at the same time, postpone retirement plans for some older workers.[61]

Conversely, the ten-hour day might present a hurdle to full-time employment of women with

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[60]Gannon, Martin J., "Four Days, Forty Hours: A Case Study," California Management Review, Winter, 1974, pp. 74-81.

[61]Hedges, Janice N., "A Look at the 4-Day Workweek," Monthly Labor Review, October, 1971, pp. 33-37.

family responsibilities. An intriguing point exists in that demands for part-time workers, i.e., workers to man a four-hour shift after two successive 4/40 ten-hour shifts in order to provide continuous operations, may increase.

7.) Miscellaneous Impacts, Benefits, Disbenefits

A. Reduced energy consumption.[62]

B. Improved usage of plant and equipment.

C. Better customer service through better morale.

D. Task completion satisfaction.[63]

E. Good opportunity for introducing other changes.

F. Difficult inter- and intra-organization communication.

General Scenario For The Three-Day Workweek

The three-day workweek compresses the usual hours associated with the five-day week into a three-day period.

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[62] "Is the Four-Day Week For You?," Nation's Business, January, 1974, pp. 49-51.

[63] Parrish, Robert L., "PSA Thrives on Four-Day Week for Employees," Airline Management, July, 1971, pp. 32-34.

Its application is by no means universal. It is applied by management only under certain conditions, and when the correct conditions exist, and when proper application occurs, results have been most beneficial. The adoption rate is low with only a few companies participating. The failure rate is difficult to estimate. Current literature details applications, but mentions no abandonments of such applications.

Application Instances

In order to portray the technique, a few instances of three-day workweek application are presented:

1.) The Wales Manufacturing Company, a small North Carolina textile producer, instituted a three-day, 36-hour, two-shift operation in 1972.[64] The firm had experimented with the four-day week in order to, according to Wales President Lester E. Cutler, "be progressive and keep up with everybody else." After four weeks, the four-day week experiment was abandoned because productivity was reduced substantially. Instead of returning to the

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[64]"5-Day Week? 4? One Firm Succeeds With a 3-Day Week," Industry Week, September 25, 1972, pp. 20-21.

five-day week, the firm instituted a three-day, two-shift operation and enjoyed immediate success with the concept. The two-shift format called for one shift to work Monday through Wednesday, while the other shift worked Thursday through Saturday. Once a month employees switched shifts. The technique is credited with reducing absenteeism, while maintaining productivity standards. Management was found to work as many hours as it formerly did.

2.) The Gulf Oil Company has employed a 3/36 concept at a few locations; its Edmonton, Canada refinery and gas processing plant, its Montreal refinery, and its Varennes chemical plant in Quebec.[65] Excluded from program participation are maintenance workers, office staff and certain unspecified personnel. Employees at the aforementioned locations work three straight 12-hour days, followed by either three or four days off, so that over the course of a year, workers average 40-hours per week.

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[65]"Gulf Slices Work Week to 3 Days at Two Alberta Plants," The Oil and Gas Journal, February 5, 1973, p. 35.

Employees are said to like the plan because it offers more weekends and consecutive days off, reduces travel time and, hence, reduces expenses.

3.) Computer Consulting Service, an Iowa based computing firm employing 25 individuals, was "forced into three-day workweek operations" in order to provide sufficient customer satisfaction.[66] The concept involves overlapping 13½ hour shifts. The fatigue factor was said to be minimized because the type of work performed was more mental than manual. The main benefit seemed to be a high degree of operator communication.

4.) The James Austin Company, Inc., of Mars, Pennsylvania originally went to a four-day week in order to get more production from two older assembly lines.[67] The concept called for one-half of the 180 employees to work from Monday through Thursday, and one-half to work from

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[66] "This Firm is Strong for the Mini-Week," Nation's Business, November, 1972, p. 20.

[67] "Smaller Companies Enjoying Success With Shortened Week," Industry Week, November 29, 1971, p. 22.

Tuesday through Friday. This resulted in the firm's two best assembly lines running 50 hours per week. The results were staggering--productivity increased by 33%, while absenteeism decreased by 41%. The productivity increase was too much for the firm and its facilities to handle. In solving the problem, management decided to try a three-day, 36-hour week, two-shift operation. Under this arrangement, productivity increased by only 20% over five-day week figures, while absenteeism was reduced by an astounding 62%.

5.) Two other firms applying the three-day week concept were the Motorola Company, Inc., Franklin Park, Illinois; and the Nationwide Insurance Company, Electronic Data Processing Operations.[68,69] Benefits resulting from these applications were the increased utilization of equipment and facilities.

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[68] "Firms Try Shorter Workweek: Flextime," Industry Week, May 7, 1973, pp. 18-20.

[69] Levy, R., "How's the Four-Day Week Working?," Dun's, July, 1972, pp. 52-54.

CHAPTER III

FLEXTIME

The four-day week and the three-day week compress the standard workweek, differing only in the degree that such is performed. Firms employing the compressed workweek scheme enjoy its benefits, but as noted, situations exist where the concept is not universally applicable and useful.

Firms facing this situation are not bound to remain with a standard five-day, 9 a.m. to 5 p.m. work schedule. There is an alternative, an alternative called flextime (or flexitime, or gleitzeit, or simply abbreviated FWH-flexible work hours). It works, and it works well.

The type of flexible system instituted varies according to the characteristics of the firm employing the concept. Nevertheless, it is a well-defined system featuring specified widths and times for "flexible" and "core-time" periods, provisions for crediting and debiting time, and methods for keeping track of accumulated hours.[1] The system is shown by Figure 2.

With flexible hours, employees can have as much as a two-hour "window" in which to arrive and another two-hour

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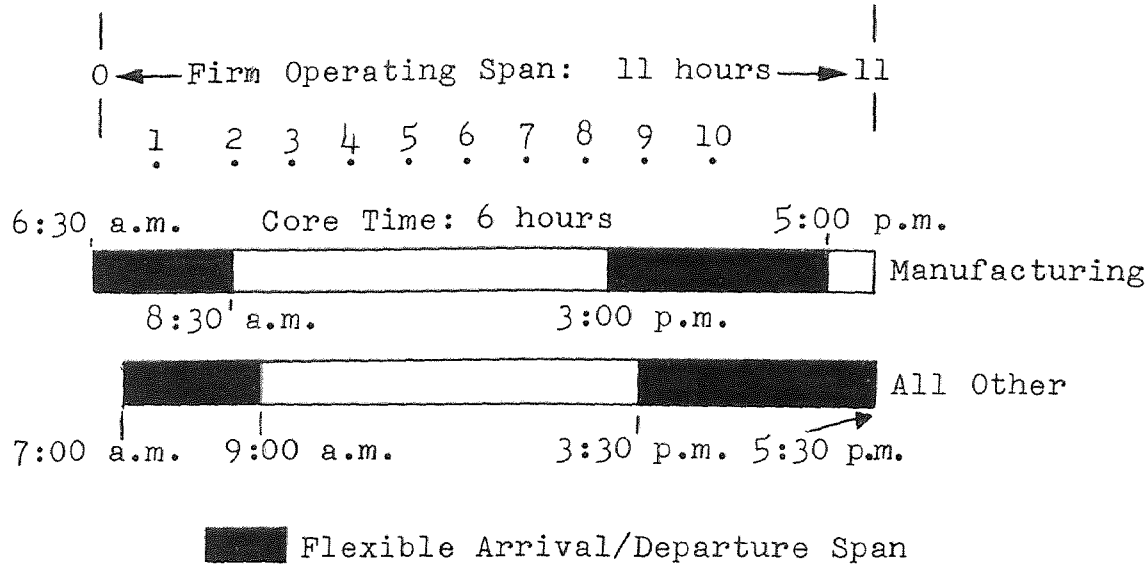
[1]Hedges, Janice N., "Q & A on Flextime," Supervisory Management, October, 1974, pp. 9-15.

FIG. 2 - DESCRIPTION OF THE FLEXTIME DAILY WORK SCHEDULE ARRANGEMENT



Source: Cathey, Paul J., "Flexible Hours - An Idea Whose Time Has Come," Iron Age, May 31, 1973, p. 35.

period to leave after completion of required work hours. The two-hour "windows" mentioned are standard but are not binding and necessary. Individual business firms employing the concept may expand or contract the time period covered by the "windows" to fit local requirements and needs.

The "core-time" is the time each normal working day that employees are required to be at their respective workplaces. "A" and "B" are flexible time periods. Employees have an option to be, or not to be, at their workplace during these periods. The length of these flexible time periods vary from firm to firm, but are usually somewhere between 2 and 3½ hours in length.

Flexibility, of course, varies with the type of plan developed. Lunch hours provided under the concept also may be flexible in length. Some firms establish weekly required arrival and departure times in advance, others do not. Where group work is a necessity, the group usually decides among themselves what their start and stop times will be. If the group does not, management does.

The purpose of FWH is to allow people a greater degree of flexibility in arranging their personal schedules.[2] Methods differ as to the system of recording hours. Some firms have instituted mechanical clocking devices, or a direct labor fill-in card. Others have gone as far as allowing an honor system reporting method.

Flextime changes neither the total number of workdays nor the total hours required per week. Employees have an option to determine the number of hours worked in any particular day outside of core-time.[3] Credit hour terms vary from system to system. Generally, a time period of one fiscal month (i.e., a four- or five-week period) is used as a reference frame. During this time frame an employee may work as many as ten hours over or under the normal time required to be worked during that period. Any deviation, either negatively or positively, is not credited or is debited as an absence. Studies have shown the employees maintain an average credit balance of 3½ hours.[4]

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[2]Cathey, Paul J., "Flexible Hours-An Idea Whose Time Has Come," Iron Age, May 31, 1973, pp. 35-37.

[3]Elbing, Alvar O., Gabon, Herman, and Gordon, John R. M., "Flexible Working Hours: It's About Time," Harvard Business Review, January, 1974, pp. 18-20.

[4]"What is Meant By Flexible Working Hours?," Harvard Business Review, January, 1974, p. 19.

Growth of the Concept

Adoption Rate

The flextime concept was introduced in Germany at the Ottobrunn Research and Development Plant in 1967, during what was then a labor shortage market.[5] Many firms instantly became enchanted with the idea and it was rapidly adopted by large portions of the German business community. Interestingly, it was this German business community which experienced the fewest strike days per 100 workers over the period from 1969 through 1974, in comparison to other Western European countries. In addition, as indicated by Table 5, it was Germany which also achieved the largest increase in real income over the same period, while experiencing the smallest annual inflation rate. These figures indicate a loose correlation between social progress and the rate of flextime concept adoption.

It was not until early 1972 that the first application of the technique was undertaken by an American firm, The Control Data Corporation, Minneapolis, Minnesota (April 3, 1972).[6]

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[5]Hedges, Janice N., "Q & A on Flextime," Supervisory Management, October, 1974, pp. 9-15.

[6]"Picking Your Own Work Time," Nation's Business, September, 1973, pp. 71-73.

TABLE 5

COMPARISON OF STRIKE DAYS, REAL INCOME INCREASE AND INFLATION RATE EXPERIENCED BY VARIOUS WESTERN EUROPEAN NATIONS OVER THE PERIOD FROM 1969 THROUGH 1974. (1975)

Nation	Strike Days Per 100 Workers	Increase in Real Income Per Capita in $'s	Annual Inflation Rate
W. Germany	240	3339	5.2%
France	901	2347	7.4%
England	3035	1221	8.9%
Italy	5083	1089	8.0%

Source: Shearer, Lloyd, "Strikes," Statistical Bureau of the European Community - Parade Magazine, Sunday Star Ledger, December 28, 1975, p. 4.

By the end of 1973, some 5,000 American workers were enjoying the concept. A year later, 30,000 workers were involved with some big name companies participating--Hewlett Packard, Scott Paper, Occidental Petroleum, Samsonite, Sun Oil, Nestle' and Lufthansa German Airlines.

Areas of Application

The historic origins of FWH indicate that it is an appropriate system in a research and development atmosphere. The system can easily accommodate professional employees who work on an independent basis rather than as a part of inter-dependent teams. Clerical activities can also be handled quite well. The system has been successfully installed and profitably used in a number of production operations ranging from the manufacture of heavy industrial hydroelectric equipment, to an assembly line production-type operation in the watch-making industry. In addition, with proper controls and procedures, job shop applications do not seem beyond the realm of possibility.[7]

The extent of flexibility allowed is related to the degree of interdependence among jobs.[8] Relatively

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[7]Elbing, Alvar O., Gabon, Herman, and Gordon, John R. M., "Flexible Working Hours: It's About Time," Harvard Business Review, January, 1974, pp. 18-20.

[8]Werther, William B., "The Good News and Bad News of Flexible Hours," Administrative Management, November, 1973, pp. 78, 82, 96.

independent jobs such as clerk-typist, janitorial and bookkeeping positions are usually allowed high amounts of flexibility. On the other hand, production workers, bank tellers and those working in teams, or subserviant to peak hour demands, can take advantage of only limited flexibility.

Failure Rate

The failure rate of flexible work hour systems is extremely low. Available literature on the subject lists no substantial findings in this regard. It appears to be a stable system with the only major disadvantage, discussed later, appearing to be the ability to properly schedule operations.

FWH on the International Scene

The flexible work hour system enjoys widespread application in Western Europe. The concept started in West Germany, where it was known as "gleitende arbeitszeit" or gliding work time. In France, it is called horaire dynamique; in Norway, flexsibel abeidstid.[9] In West Germany, ten companies had adopted the system by 1969.

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[9]Cathey, Paul J., "Flexible Hours-An Idea Whose Time Has Come," Iron Age, May 31, 1973, pp. 35-37.

By the middle of 1972, 400,000 workers were covered by the concept.[10] At the beginning of 1974, 3,000 German companies were on flextime.[11] Less than a year ago, it was estimated that 50% of some 12 million West German white collar workers were covered by the system.[12] The West German government is presently conducting a study to determine the feasibility of extending the concept to all federal employees, being encouraged by the success achieved in the field by Volkswagen, Siemens, Lufthansa, Boehringer and its own Ministry of Transportation and Communications.[13]

The idea, although originated in Germany, has by no means been limited to German application. In Great Britain (in October, 1974), it was estimated that 500,000 civil servants and over 80 different companies are involved.[14]

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[10]"I'll Work When I Feel Like It - A Promise Not a Threat," Industry Week, August 7, 1972, pp. 36-39.

[11]Elbing, Alvar O., Gabon, Herman, and Gordon, John R. M., "Flexible Working Hours: It's About Time," Harvard Business Review, January, 1974, pp. 18-20.

[12]"Flexitime Endorsed," Monthly Labor Review, January, 1975, p. 85.

[13]"Europe Likes Flexi-Time Work," Business Week, October 7, 1972, pp. 80-82.

[14]"Flexitime Endorsed," Monthly Labor Review, January, 1975, p. 85.

In Holland, 54% of the country's workers are on flextime.[15] Switzerland has moved fast in implementing the new concept with Omega Watch (2,500 employees) and Sulzer, a builder of machines and pumps (8,000 employees) leading the way.

The Canadian Treasury Board approved implementation of a flexible hour system, while denying application of the compressed workweek, after considerable analysis and experimentation.[16]

The Japanese have surprisingly found the system, which was introduced in 1971, to be useful. The FWH concept was said by many to violate Japanese working traditions and its quick demise was forecasted. To the contrary, the Japanese Ministry of Trade has recently reported that the system is still presently employed by many firms and is working well.[17]

Social Reaction

The Feelings of Big Labor

The flexibility attained through FWH implementation lubricates a traditional point of friction in the

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[15] "Flexible Working: Late Rush on Hours," The Economist, September 30, 1972, p. 95.

[16] Elbing, Alvar O., Gabon, Herman, and Gordon, John R. M., "Flexible Working Hours: It's About Time," Harvard Business Review, January, 1974, pp. 18-20.

[17] Ibid.

labor-management adversary relationship. Being on time has become a dead issue, resulting in less union strife on this point. Unions, however, do have concern over some aspects of flexible work hours.[18] They do not want flexible schedules to result in a loss of overtime pay, and have realized that if FWH increases productivity it may be an area in which they will be able to share. In addition, union organizations are most interested in reducing, rather than in redistributing, working time, a point that also impacts upon implementation of the compressed week concept.[19]

Heinz Beykirch, Secretary of the DGB, the principal German trade union federation, has stated, "organized labor is not hindering flexible hours, but we are not promoting them yet either.[20] In Germany, where 20% of the workforce still put in 45-hour weeks, labor is more interested in winning the 40-hour week for the entire workforce than in experimenting with the daily or weekly distribution of hours.

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[18]"I'll Work When I Feel Like It - A Promise Not A Threat," Industry Week, August 7, 1972, pp. 36-39.

[19]Hedges, Janice N., "New Patterns for Working Time," Monthly Labor Review, February, 1973, pp. 3-8.

[20]"Europe Likes Flexi-Time Work," Business Week, October 3, 1972, pp. 80-82.

As of July, 1975, there were few (if any) collective bargaining agreements covering flexible hour programs.[21] Most labor-management discussion on the subject has been through informal meetings called at the request of management. During these discussions, it has been established that unions consider the setting of hours for the beginning and end of the workday to be a management prerogative. To date, unions have been helpful in communicating the FWH idea to the rank and file, and of urging adherence to newly established time rules. This is probably due, in most part, to worker satisfaction brought on by the concept, a possibility underscored by Edouard Duc, Union of Swiss Employers Association, who stated "there was a lot of pressure from the workers on fixed hours (for continuation) once they saw how they were enjoying it."[22]

Family Reaction

Roger G. Wheeler, Vice-President of Corporate Personnel Services, Control Data Corporation, the first American firm to institute the FWH scheme, states, FWH

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[21]Donahue, Robert J., "Flex Time Systems in New York," Public Personnel Management, July, 1975, pp. 212-215.

[22]"Picking Your Own Work Time," Nation's Business, September, 1973, pp. 71-73.

"makes better mothers and fathers out of our employees."[23] The concept has been credited with allowing more time at home, while providing a pressure valve which substantially reduces the amount of job tension carried over into the home environment.

Employers who have experimented with flexible hours have found that they bring more contented workers with no sacrifice in volume of output or quality of profit.[24] This contentment or reduction in psychological and physiological stress has flowed directly from the ability of an individual worker to make personal adjustments in the timing of their work.

Legal Constraints

Many of the laws constraining implementation of compressed workweeks also apply to flexible work hour concepts. The main reason is that should an employee work the full"bandwidth" established over the course of a five-day week, that employee would definitely work more than 40 hours per week, and would hence be covered under existing

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[23]"Europe Likes Flexi-Time Work," Business Week, October 3, 1972, pp. 80-82.

[24]Cathey, Paul J., "Flexible Hours-An Idea Whose Time Has Come," Iron Age, May 31, 1973, pp. 35-37.

legislation which mandates overtime pay in such instances. It matters not that an employee may choose to work only "core-time" the following week, thus making the two-week total 80 hours, or 40 hours per week. It is, however, recognized that within any one given week employees can work shorter and longer days so as to total no more than 40 hours, and not be obligated to receive overtime premiums under the law.[25]

In a promising development, federal civil servants have recently gained relief from Title 5 of the U.S. Code which strictly prohibited virtually all forms of altered work schedules.

Results, Benefits, Disbenefits

Effect on Productivity and Related Performance

Professor Paul A. Samuelson, of the Massachusetts Institute of Technology, stated before the government Joint Economic Committee that, "one of the greatest frontiers to improve U.S. productivity and our economic welfare is the present unused potential of women in our economy." Therein lies the first benefit of flextime;

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[25]Hedges, Janice N., "Q & A on Flextime," Supervisory Management, October, 1974, pp. 9-15.

it enables females to secure management positions and still tend properly to family-related matters.[26]

Tasks and assignments are more likely to be completed when an employee works under a flexible time format and the result is that productivity output per hour is increased. This feature was detailed in an October, 1974 report issued by the General Accounting Office, and has since been verified by employee survey statements.[27]

On the negative side, a few firms have noticed a loss of productivity during the early and late flexible portions of the work schedule and attribute this to the lack of proper supervisory coverage.[28] This negative aspect, however, can be overcome by careful work planning that ensures that employees know specifically what they are to do at all time.

Effects on Absenteeism, Tardiness, Time Considerations

Flextime is credited with reducing lost man-hours and virtually eliminating tardiness.[29] It has been reported

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[26]Martin, Virginia H., "Recruiting Women Managers Through Flexible Hours," Advanced Management Journal, July, 1974, pp. 46-53.

[27]Hedges, Janice N., "New Patterns for Working Time," Monthly Labor Review, February, 1973, pp. 3-8.

[28]Donahue, Robert J., "Flex Time Systems in New York," Public Personnel Management, July, 1975, pp. 212-215.

[29]Hedges, Janice N., "Q & A on Flextime," Supervisory Management, October, 1974, pp. 9-15.

that absences of less than one-half day have substantially declined and surprisingly, so have full-day absences. In addition, on-time reliability has been noticed to have improved.[30]

Interestingly, "coffee conversations" usually held during early morning hours and "unwinding sessions" predominant in the afternoon, are reported to be greatly diminished when flextime is incorporated. This seems to be due to the flextime feature which allows staggered arrival and departure times.

Some firms experienced some drawbacks with respect to controlling employee timeliness. It has been said that tardiness is not reduced to the extent believed, it just is less easy to identify.[31] In addition, the accurate recording of each employee's work time becomes, at times, impossible unless some mechanical time-measuring devices are installed, a feature that may be irksome to some types of employees.

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[30]Werther, William B., "The Good News and Bad News of Flexible Hours," Administrative Management, November, 1973, pp. 78, 82, 96.

[31]Donahue, Robert J., "Flex Time Systems in New York," Public Personnel Management, July, 1975, pp. 212-215.

Effects on Employee Morale, Responsibility

Employers who have tried flexible hours find their workers to be more content.[32] Dean O. Morton, Division General Manager for Hewlett-Packard has stated, "one of the greatest benefits was the heightened sense of responsibility brought by the system"[33] Another attribute brought by flextime is that employees are found to be more receptive to changes in procedures and routines due to the increased work morale climate.[34]

A problem exists when certain workers such as switchboard operators, cafeteria personnel, and possibly production workers are excluded from the program while others enjoy its benefits.

Effects on Scheduling and Assembly-Type Operations

It has been found that if employees are not internally motivated or a management-by-results system has not been installed, administrative controls falter.[35]

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[32]Cathey, Paul J., "Flexible Hours-An Idea Whose Time Has Come," Iron Age, May 31, 1973, pp. 35-37.

[33]Ibid.

[34]Hedges, Janice N., "New Patterns for Working Time," Monthly Labor Review, February, 1973, pp. 3-8.

[35]Werther, William B., "The Good News and Bad News of Flexible Hours," Administrative Management, November, 1973, pp. 78, 82, 96.

Work on the assembly line must go on as scheduled and requires coordinated teamwork. One firm, General Foods, at its Topeka Plant, devised a team concept whereby each team is allowed to schedule their own time as long as the results forthcoming from their work efforts meet standards.[36] The Omega Watch Company (Switzerland) has solved the problem by building up a "buffer-stock" at each point along the line. Omega reports that production has dropped slightly under the concept, but that quality has improved substantially enough to produce a net gain.[37] Another Swiss firm, Sulzer, solved the problem of assembly line scheduling by specifying that each team must "float" as a group. Under this concept, team members must agree on the specific starting time for the next day's operations before leaving work each day.

In instituting a flextime program to ensure cost-efficient operation, it is necessary to monitor in-process inventory levels. The expense in this area is likely to become a problem whenever one person's output becomes another person's input. The key to solving such problems

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[36]Schonberger, Richard J., "Time Inducements For A Superior Workforce," Advanced Management Journal, April, 1974, pp. 23-27.

[37]"Europe Likes Flexi-Time Work," Business Week, October 7, 1972, pp. 80-82.

lies with determining work schedules in advance. Otherwise, the wide range of start and stop times leads to confusion, idle time and unnecessary duplication.

Besides determining work schedules in advance, any amounts of overtime required, likewise should be scheduled in advance. Overtime is usually handled under a flextime program by beginning the workday early and/or by extending the workday into the early evening hours.

Miscellaneous Advantages

A.) Greater independent work patterns for workers, more delegation of authority necessary by supervision.

B.) Extends flexible work features normally enjoyed by managers and professionals and other white-collar employees to other types of work groups, helps democratize work.

C.) Provides a successful means of installing affirmative action programs by attracting groups of women with a high potential for promotion and advancement; eliminates job discrimination, sex discrimination.

D.) Reduces stress, reduces transportation time, allows schedule adjustment to suit personal and/or family needs and preferences.

E.) Corporate facilities such as parking lots, cafeterias, locker rooms, etc., become less crowded.

F.) Employees tend to become task-oriented rather than clock-oriented.

G.) Easier recruitment of employees.

Data depicted in Table 6 indicates the affects that the introduction of flextime had on a group of British government employees. The data was obtained via survey methods by asking first, if the flextime concept had affected general office activities; and, had that activity been "improved/increased," remained "about the same" or "worsened/decreased?"

Figure 3 showed survey results which ranked the advantages of flextime as seen by the same group of British Government employees as cited above. Interestingly, the advantage most endorsed was that flextime offered a feeling of greater freedom. Closely following were the advantages of additional shopping opportunities, the ability to keep previously arranged appointments and the easier traveling to and from work possible under the concept.

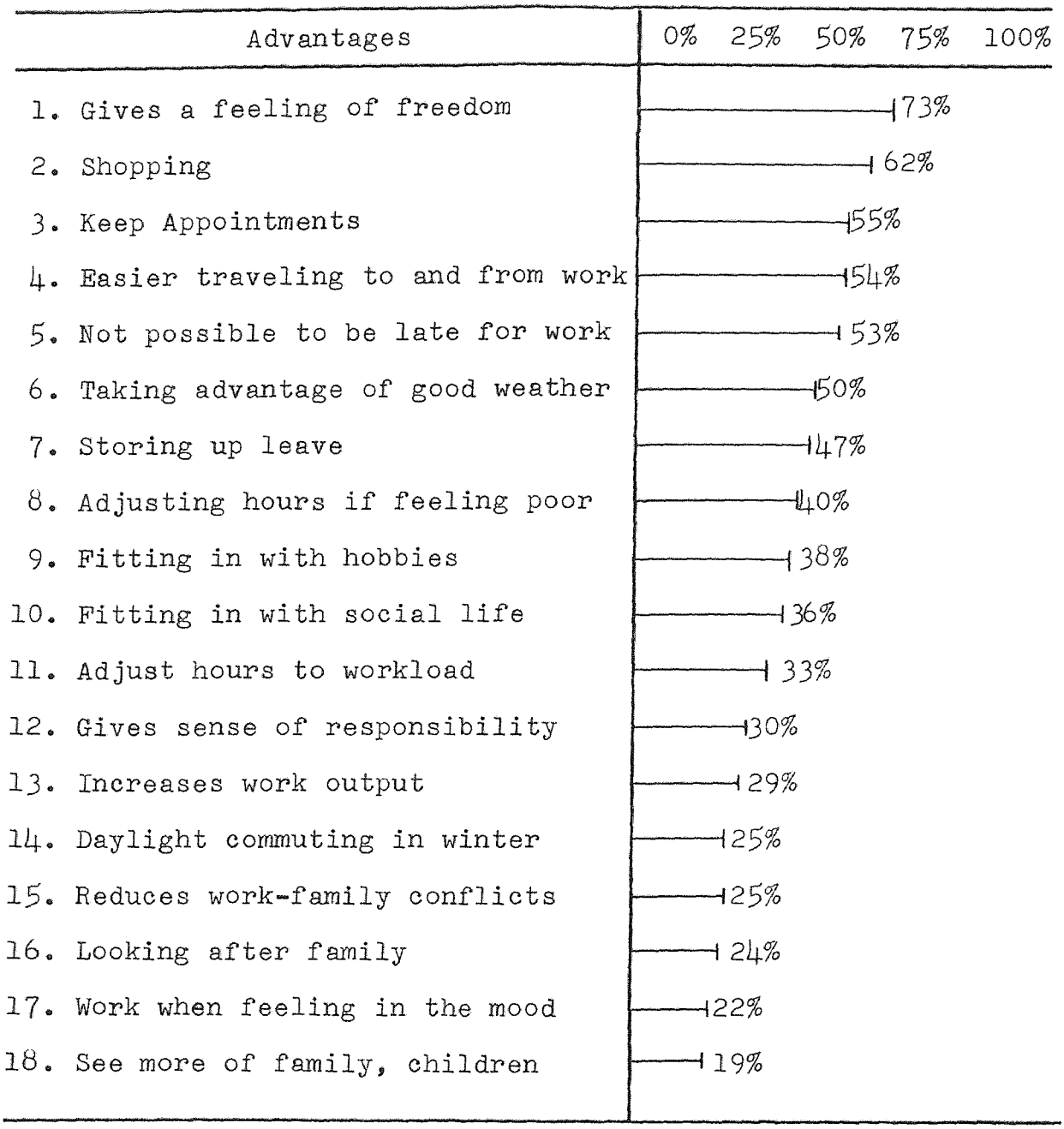
TABLE 6

PER CENT VARIOUS BRITISH GOVERNMENT OFFICE ACTIVITIES ARE AFFECTED BY THE INTRODUCTION OF FLEXIBLE HOUR CONCEPT (1975)

Factor	% Increased/ Improved	About the Same %	Decreased/ Worsened
General Office Life	43	46	11
Communication	7	78	15
Amount of Work Completed	25	74	1
Job Satisfaction	28	71	1

Source: Walker, James, Fletcher, Clive and McLeod, Donald, "Flexible Working Hours in Two British Government Offices," Public Personnel Management, July-August, 1975, Table 1, p. 218.

FIG. 3 - ADVANTAGES OF THE FLEXIBLE WORK HOUR CONCEPT, RANKED IN ORDER OF PERCENTAGE OF RESPONDENTS ENDORSING THEM, AS SEEN BY BRITISH GOVERNMENT EMPLOYEES (1975)



Note: Items 16 and 18, though ranking low for all respondents taken together, come second-equal for the group of married women with children under sixteen.

Source: Walker, James, Fletcher, Clive and McLeod, Donald, "Flexible Working Hours in Two British Government Offices," Public Personnel Management, July-August, 1975, Fig. 2, p. 219.

Miscellaneous Disadvantages

A.) Difficulty in maintaining adequate external and internal communication, telephone coverage, conference scheduling.

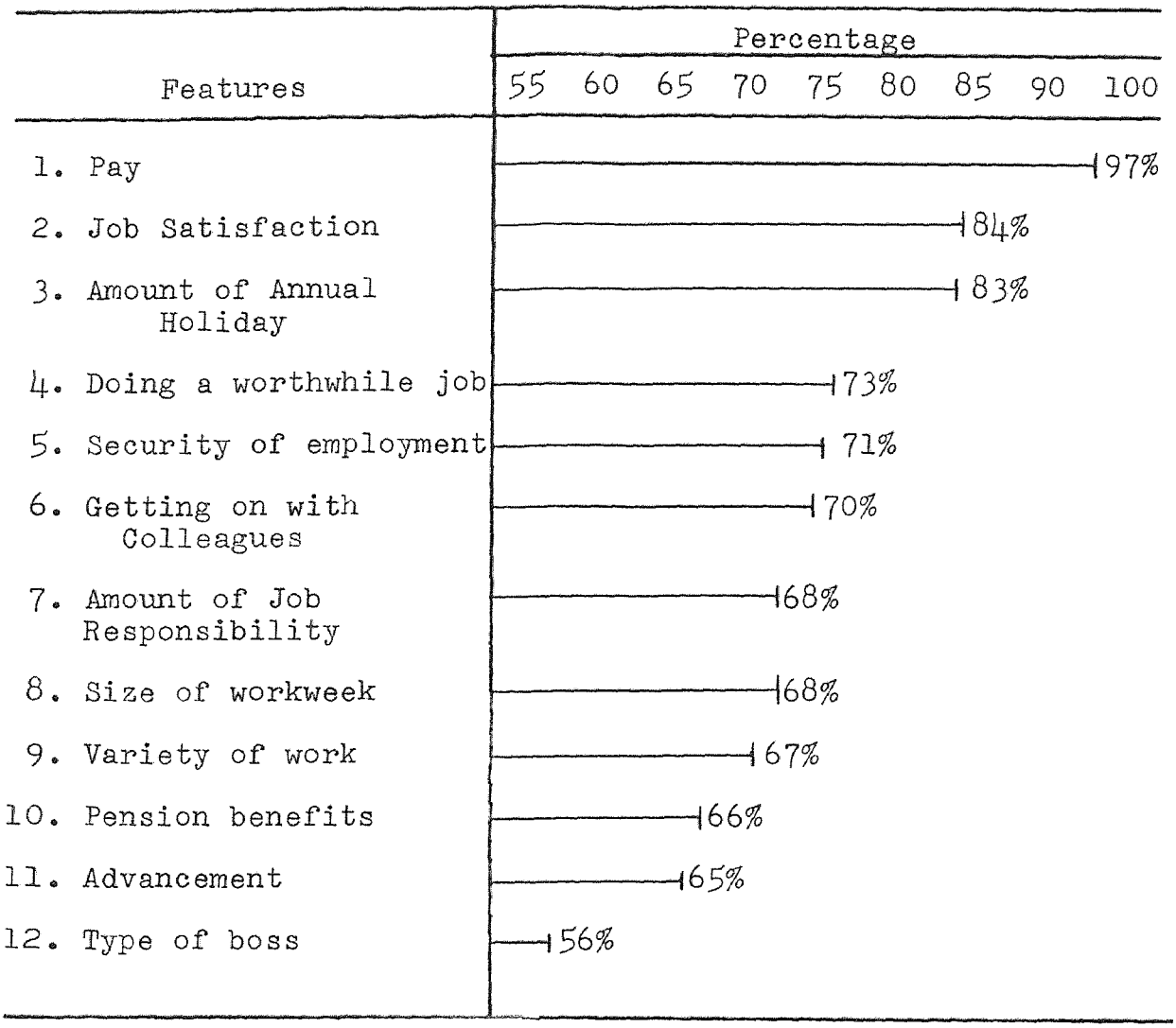
B.) Increase in some utility costs, purchase of special timing mechanisms, longer plant operating hours.

Flextime vs. Other Job Feature Comparison

Figure 4 indicates job features seen to be more important than flextime. Most individuals saw such job-features as pay, job satisfaction, the degree of holiday and vacation allowances and employment security as being more valuable than flextime.

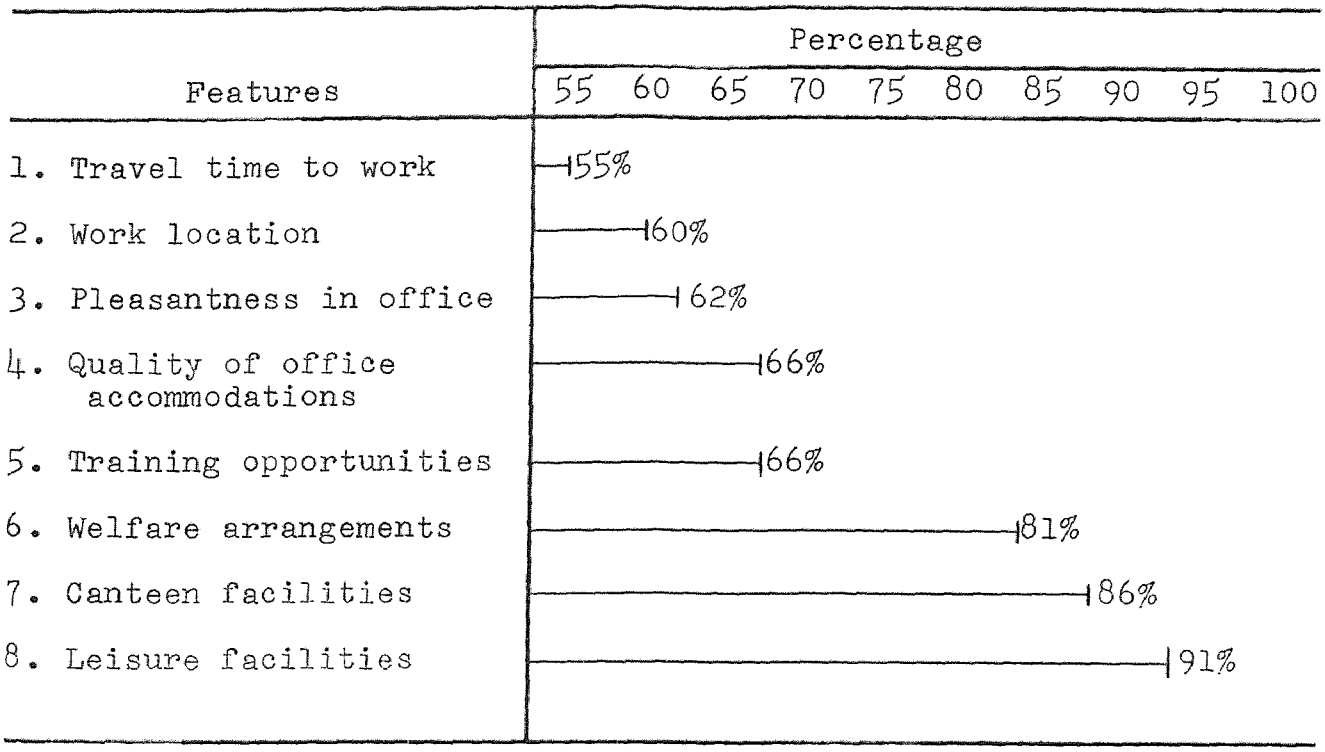
Figure 5 details job features that were seen to be less important than flextime. Listed in this regard were such items as travel time to and from work, work location, pleasantness of the office situation and training opportunities.

FIG. 4 - FEATURES CONSIDERED TO BE MORE IMPORTANT THAN FLEXTIME RANKED IN ORDER OF THE PERCENTAGE OF RESPONDENTS ENDORSING THEM



Source: Walker, James, Fletcher, Clive and McLeod, Donald, "Flexible Working Hours in Two British Government Offices," Public Personnel Management, July-August, 1975, Fig. 3, p. 221.

FIG. 5 - FEATURES CONSIDERED TO BE LESS IMPORTANT THAN FLEXTIME RANKED IN ORDER OF THE PERCENTAGE OF RESPONDENTS ENDORSING THEM



Source: Walker, James, Fletcher, Clive and McLeod, Donald, "Flexible Working Hours in Two British Government Offices," Public Personnel Management, July-August, 1975, Fig. 3, p. 221.

CHAPTER IV

STAGGERED WORK HOUR PROGRAMS

Staggered Work Hour Programs (SWHP) are principally designed to alleviate facility congestion. Specific facilities involved may be either external, internal or both to a firm; a cluster of firms such as can be found in industrial park complexes; a municipality or township; or a large urban area involving many assorted firms. Whatever the magnitude or size or location or number of participants may be, a necessary requisite for successful program completion is a definite commitment to intra-group cooperation.

Although the SWHP work-scheduling technique has been predominantly employed and successfully tested in large congested urban area environments, the features associated with the plan, and the benefits derived from its application, do not limit or restrict deployment of the technique to such an environment. However, the general benefits derived from the technique tend to be more accented and evident when large urban-center application occurs. This can be easily understood when one considers that such urban-centers simply by size alone have greater magnitudes and types of commuting facility devices from which benefits can be reaped.

While program benefits are more easily recognized in urban-center application, the degree of coordination and cooperation essential for program success becomes vastly more complex and detailed as the field of program application expands from singular company usage to substantially larger areas of application. Such coordination and cooperation, by nature, must be voluntary, not mandatory.

While participant cooperation and coordination are essential, so also is the degree of involvement by firms within the universe for which the improvement of facility usage is sought. Affiliated enterprises are encouraged and called upon to voluntarily undertake modifications of work schedules by either advancing or delaying them by at least one-half hour from the schedule customarily followed by the predominant number of firms within the universe considered. The goal of the SWHP concept is to reduce the degree of difficulty experienced by commuters in daily egress-regress patterns followed to and from locations of employment. To achieve this goal it is not absolutely necessary that all community offices and/or firms convert to staggered hours. It is merely necessary to convert only a portion to the concept so that local arrival and departure patterns become more evenly distributed.

The Staggered Work Hour concept was initially instituted on a small scale basis over thirty years ago during World War II.[1] The concept at that time was short-lived, meeting its temporary demise shortly after the conclusion of the War. The program remained dormant until the early 1960's, at which time its features were dusted-off, modified to fit requirements of the time and implemented in a master plan applicable to, developed and funded by, the City of New York. For some unresolved and undetermined reason, probably a lack of prevalent business community interest, the program once again failed to take root. However, the New York metropolitan area continued to be the most appropriate area for the logical application of the concept, primarily due to the mamouth size of the transportation facilities involved, and the amount of local populous which depended directly upon these facilities as means to reach Manhattan work-centers. Nevertheless, the concept continued to lay dormant through the remainder of the 1960 decade.

It was not until April of 1970 that the program was again reinstituted on a large-scale basis. The reinstitution

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[1] "Work Schedule Changes to Reduce Peak Transportation Demand," Transportation Research Board National Research Council, August 6, 1974, p. 2.

was due mostly to the efforts of the Port Authority of New York and New Jersey, supported by the findings of an experiment conducted the preceding year in which 100,000 individuals working in the lower-Manhattan business district participated.[2] The primary reason cited for reinstitution was two-fold. First, projections for the 1970's and 1980's indicated a substantial growth in employment within lower- and midtown-Manhattan work districts. Second, if realized, such an expanded employment picture would severely tax existing transportation facilities. In addition, because of area crowding, planned expansions of transportation facilities were seen to be extremely expensive and intricate. Only minor facility improvements were planned and approved. Therefore, the only avenue available to substantially improve commutation facilities existed in the more realistic and complete usage of presently constructed networks. The time was ripe, the SWHP concept was available and forward-looking planners took the opportunity to meld the two to achieve sensible results.

Adoption Rate

The Port Authority of New York and New Jersey estimated that initially, 45 private firms employing some 50,000

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[2]"Staggered Work Hours in Lower Manhattan, First Anniversary Report," Downtown-Lower Manhattan Association and the Port of New York Authority, April, 1971, p. 1.

people voluntarily participated in the staggered work-hour program undertaken in New York City when it was first introduced in early 1970. About a year and a half later, participation had grown substantially to where 70,000 individuals from 116 private firms enjoyed the concept. Analysis of these figures divulged that smaller enterprises joined the plan during the second year of its existence, while larger firms were those in the forefront of plan implementation.

Since larger firms spearheaded participation, it is interesting to note their initial reactions to the concept. The Western Electric Company reports, "Headquarters employees are overwhelmingly in favor of continuing the work schedule." Chase Manhattan has stated, "in terms of participation, cost-related considerations, and administration and staff supervisory reactions the staggered hours program has proven to be a success." Merrill Lynch, "Merrill Lynch has been very satisfied with the effectiveness of the Staggered Work Hours Project, as it has helped ease the strain on public transportation facilities and has been well-received by employees." The New York Stock Exchange's Stock Clearing Corporation reported,

> "As a result of the program, the efficiency of our operation has increased, and at the same time the morale of our staff has improved measurably, since most of our people are now avoiding the

> brutal transit crush. The Staggered Work Hours Program has certainly been a great help to us at Direct Clearing."[3]

By the beginning of 1974, 100,000 workers or approximately 20% of the lower-Manhattan workforce, were covered by the program. This figure, however, amounted to only slightly over 4% of the total lower- and midtown-Manhattan workforce. As stated previously, to reap total potential benefits, the project must necessarily encompass a large percentage of the firms within the applicable universe concerned. 4% is obviously not a large percentage and although the concept and the portion of benefits attained were noteworthy, at this juncture they were by no means satisfactory. To be effective, the program would necessarily have to encompass a far greater segment of the working population.

With this in mind, the Port Authority armed with factual information portraying the success of the concept in lower-Manhattan, ventured into the midtown-Manhattan business district looking for, and hoping to convert, local firms to use SWHP. The business concerns in the area were waiting

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[3] "Work Schedule Changes to Reduce Peak Transportation Demand," Transportation Research Board National Research Council, August 6, 1974, p. 17.

and openly welcomed the venture. Quickly, the figures for total participation in Manhattan grew to 210,000 men and women and 400 affiliated organizations. These figures constituted approximately 10% of Manhattan's workforce. As late as February, 1975, over 400 firms, including more than 220,000 employees could be counted as having changed their work schedules under the SWHP format.

Areas of Application

The SWHP is applicable almost universally. Exceptions, however, do exist. These exceptions are most notably in strict-time adherence labor institutions such as exist in some processing industries which call for the derivative of work output at some fixed specific required time daily through adherence to rigid enterprise scheduling. Examples of this are the daily newspaper publishing industry (where outputs, newspapers, are scheduled to hit the streets regularly) and assorted food processing industries. These exceptions constitute only a small percentage of the entire business population. The scheduling of multi-shift operations under a SWHP also presents a problem, but such a problem is much less formidable than the aforementioned one, and can eventually be overcome through schedule rearrangements and compromises, if management is willing and labor is cooperative.

Literature on the subject does not contain deep or even cursory analysis of constraints to program implementation. In addition, available writings devoted to the subject concentrate on the application of the SWHP concept exclusively to the Manhattan business district. This exclusivity should not be interpreted as an application limit. SWHP is available for consideration in other than large urban centers where the work-schedule hours of the predominant number of firms in the immediate area are clustered. The SWHP idea can easily be extended to locations remote from urban centers and can also be usefully employed as an internal facility balancing device.

The primary application point to remember about SWHP implementation is that the concept can be beneficial when its features are applied directly to a facility which becomes overloaded during the day due to the requirements dictated by the predominant work schedule adhered to within the universe which impacts upon that facility.

Participant Reaction

Since the inception of the Staggered Work Hour Program in Manhattan nearly six years ago, its primary sponsor and benefactor, the Port Authority of New York and New Jersey, has periodically conducted assessment surveys of

participants. Reactions of the general employee population along with that of supervisory and administrative employees indicate a most favorable positive reaction.

Most of the survey data has been conclusive. For example, an initial participant survey divulged that 85% of those program participants questioned viewed SWHP favorably. 46% found commuting more satisfactory while only 10% felt otherwise. Transportation systems were perceived to move faster with fewer delays and breakdowns. Interestingly, even though participants were working the same total number of hours daily, 31% felt the workday was shorter. Only 9% reported that the workday seemed longer. In terms of the reaction of the effects of SWHP on family life and family institutions, an almost unanimous favorable reaction was received. Some cited the trite benefit that getting home a half hour earlier each day amounted to one extra week of "vacation" of usable time every year. Family life patterns, however, remained basically unchanged. Although slight perturbations existed, there were no situational patterns found that posed insurmountable degrees of inconvenience.

Management's response to SWHP has likewise been receptive and favorable. According to Dr. Derek Phillips, an Associate Professor of Sociology at New York University

commissioned to determine employee response to SWHP, the ratio of productivity gains to productivity losses experienced by program participants was approximately 6.0. Translated, this means that almost six times as many SWHP participants reported gains in productivity as reported losses.[4] Dr. Phillips also found that employee punctuality was shown to have increased under the concept. This finding seemed logical as transportation delays tended to increase closer to morning peak hour usage which for the area studied was 9:00 a.m. 80% of those supervisors canvassed reported employees were arriving on time or earlier under the new SWHP schedules. However, 11.6% reported employees to be arriving later. These findings generally agree with other survey data obtained in response to the question of SWHP punctuality impact.

Under the Staggered Work Hour Program, as with other primary innovative work-scheduling techniques discussed, namely Flextime and the Four-Day workweek, management was concerned with the effect that schedule changes would have upon the ability to properly communicate with businesses in western time zones. Of those corporations specifically

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[4]"Work Schedule Changes to Reduce Peak Transportation Demand," Transportation Research Board National Research Council, August 6, 1974, p. 20.

surveyed and questioned directly on the matter, none found such communication to be impaired. In response to this matter, Mr. Robert MacKenzie, Manager of Employment and Personnel Services WESTVACO, stated,

> "Concerning the effect of our change in work hours to 8:30-4:30 on communications with West Coast facilities, I can report no adverse effect. If we were confronted with a situation where business must be handled after 4:30 p.m., manpower schedules could be arranged for a few people to accommodate the situation."

The Personnel Manager for the Continental Can Company, Ms. Cynthia Darrah, reported the following with respect to communication with Western time zones,

> "None of the reactions have been derogatory. As a matter of fact, with only a half hour difference in our closing time, no one seems to feel the experience has been the least bit difficult. The problem relates wholly to a matter of planning properly for the placement of calls to locations within Westerly time zones."

Others responding to the same question indicated that only a very small adjustment was necessary under the SWHP concept, and therefore, only small adjustments in communication habits were required.

Real Estate management firms, leasing agents and landlords have been quite cooperative and receptive toward instituting the SWHP concept. Most of this positive acceptance was due to the enhanced facility usage factor

which resulted from program adoption. In addition, certain areas where physical plant facilities were demonstrated to have been inadequate to handle personnel or vehicular movement by institution of a SWHP plan, these facilities no longer received harsh tenant criticism and complaint. The spreading of hours in turn promoted building ancillary facilities such as stores, restaurants and newstand operations by easing the shopping experience and occasionally by providing additional space which potentially could be used to display extra merchandise items.

Schedule Preference

To qualify for consideration under SWHP, a firm must adjust its regular 9:00 a.m. to 5:00 p.m. schedule by 30 minutes to either 8:30 a.m. to 4:30 p.m. or earlier; or to 9:30 a.m. to 5:30 p.m. or later. This, of course, is only if the concentrated mass of work-schedules surround the regular 9:00 a.m. to 5:00 p.m. time period. Should this concentration be at a different hour then that particular hour should be the focal point determining the outside bandwidth limits toward which firms must adhere in order to be considered a firm participating in the staggered work hour schedule concept.

Data indicates that most shifts of program participants were principally to a new schedule with an earlier format

as opposed to a later format. In addition, the earlier format had a greater likelihood of being favorably received by the masses. Later schedules appeared to be ones that individuals were least likely to prefer. Delving further into the preference for the earlier format, it was noticed that while 67% of those surveyed were willing to work an earlier format by adjusting their work-schedules by one-half hour, only 50% were prepared to accept a three-quarter hour change. Slightly fewer, 49%, were willing to accept a one-hour alteration in their schedules.[5]

Interestingly, whatever the altered schedule was, whether it was advanced or delayed (magnitude disregarded for the moment), 70% of those having tried a particular schedule indicated a preference to stay with that particular schedule. In this regard, indications are that program participants showed a high degree of ability to quickly adjust to newly formed schedules. In fact, as time progressed, people became attached to the particular schedule to which they had been assigned; and, when canvassed, stated a willingness for that particular schedule. Important here is that change is disliked by the populous

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[5]"Staggered Work Hours in Lower Manhattan, First Anniversary Report," Downtown-Lower Manhattan Association and the Port of New York Authority, April, 1971, p. 1.

in general, and that true employee acceptance/rejection ratios should only be determined after the new hours brought about by SWHP adoption have had a sufficiently reasonable period in which to be accepted and take root.

Results, Benefits and Disbenefits

Staggered Work Hours have been shown to benefit the attractiveness of participants as progressive community employers.[6] Many firms employing the concept proudly advertise Staggered Work Hours as part of their benefit package when seeking new applicants for employment positions. In turn, it has been reported that potential new applicants are swayed by the SWHP features which result in commuting without congestion; less time spent commuting; and for many, more time at home in the late afternoon. The opportunity to return home earlier in the day enabled individuals to perform other undertakings such as continuing their education, greater enjoyment of miscellaneous leisure activities and the comfort of traveling in safety before darkness. All these were obtained while only sacrificing a small interval of sleep or by retiring earlier.

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[6]Fields, Cynthia J., "Staggered Work Hours - A Roundtable Discussion," Personnel Journal, February, 1975, pp. 80-82.

On the work scene itself, the degree of job satisfaction was reported to have increased under SWHP. Participants report that four times as many people were more satisfied with their jobs than were less satisfied. Many workers found the early part of the workday, "recaptured" under the concept, to be very productive citing less extended telephone conversations as one reason.

Besides being beneficial to employers and employees, staggered work hour programs have been found to be beneficial to municipalities by spreading commutation facility usage. Eliminated are massed patterns of people converging on crowded transportation terminals and stations within narrow time bands, with resulting degrees of inconvenience and discomfort for all concerned. Again, citing the effects of SWHP application to the Manhattan business district, peak hour congestion is significantly reduced by employing the concept. Reductions in the vicinity of 15% were experienced in transportation facility passenger counts. Covered were such facilities as subways; the Port Authority Trans-Hudson System (PATH); and bus accommodations.

The SWHP concept, however, should not be thought of as a cure-all for inadequate or improperly arranged transportation facilities and facility schedules. It is often

necessary to rearrange and revise existing facility schedules in order to fully capture potential program benefits.

Various miscellaneous benefits are obtained from SWHP implementation. Support services essential and important in the operations of a business enterprise such as telephone usage patterns, energy consumption requirements and food-service operations should ultimately experience beneficial results. Results, however, should not be expected immediately in these areas as such are more pronounced and more easily identified only after the program is implemented to nearly all segments of the population in a controlled area. Dr. William J. Ronan, Chairman of the Port Authority of New York and New Jersey has underscored this by stating that the SWHP is "definitely a program that could lead to savings on the part of the public-transportation operators throughout the country, if it is participated in fully enough."

A number of individuals and communication entities have expounded on the benefits of SWHP. A number of them are presented below:

John Cooney, Manager of Personnel Services, Lever Brothers Company, "I can't help but feel that because of

Staggered Work Hours people are able to get to work on time and not have the problem of crush."[7]

Andrew Heiskell, Chairman of the Board, Time Incorporated,

> "The result (of SWHP) has been a significant reduction in transportation congestion. The program also represents a significant way to conserve energy while at the same time providing real gains in punctuality, better commuting and improved employee morale."8

A local New York City television station, WOR-TV Channel 9, in a series of editorials addressed the SWHP concept in terms of energy consumption levels as follows:

> "We see SWHP as a method of conserving energy. It makes public transportation more attractive encouraging people to shift to more travel by rail or bus. While many energy conservation measures simply result in belt-tightening, SWHP has been found to be extremely beneficial, workers like it, commuting has improved, punctuality has improved, (with) no loss in efficiency or productivity."9

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[7]Fields, Cynthia J., "Staggered Work Hours - A Roundtable Discussion," Personnel Journal, February, 1975, pp. 80-82.

[8]"Work Schedule Changes to Reduce Peak Transportation Demand," Transportation Research Board National Research Council, August 6, 1974, p. 24.

[9]"Hour Power, Report on the Manhattan Staggered Work Hours Program," Port Authority of New York and New Jersey, 1974, pp. 1-4.

WINS Radio New York has stated,

> "There is one way that passenger loads could be more evenly distributed and public transportation made more comfortable and thus more attractive to people who now drive to work; and that would be for more firms, particularly those in mid-town Manhattan, to stagger their work hours. We hope more firms will join the Staggered Work Hours Program soon as part of much needed local efforts to conserve fuel and improve public transportation."10

Staggered work hour programs have proved to have been useful and beneficial both to management and workers. As mentioned, staggered work hours stress the idea that divine power did not mandate that the workday run from 9:00 a.m. to 5:00 p.m. By altering the traditional starting hour certain operational benefits are obtained. But, flexible hours and the program of flextime also provide such benefits. Those employee reactions and productivity effects mentioned as resulting from SWHP's are certainly attributable also to FWHP's. Although flextime programs bring certain disadvantages to operating routines that staggered hours do not, flextime, in turn, offers many advantages that staggered hours does not.

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[10] Ibid.

Summary

This and previous Chapters have collected facts relevant to the major work-scheduling alternatives considered and have provided the decision maker with sufficient background necessary to complete the comparison function detailed in the forthcoming Chapter. Discussed in detail were the major work-scheduling alternatives flextime, the four-day workweek, the three-day workweek and staggered work hour programs. Presented for each alternative are topics such as a general description, adoption rates, application areas, labor feelings, etc., gleaned from numerous articles of the subject appearing in current periodicals.

CHAPTER V

METHOD FOR THE ANALYTICAL COMPARISON OF ALTERNATIVES

Chapter I has provided an introduction and background to the problem of selecting a proper work-scheduling technique by defining the problem, providing background information and delineating the objective and general method of approach to be followed in reaching a suitable conclusion. Chapters II through IV have presented relevant facts and major feasible work-schedule alternatives. Together these Chapters have determined the vital factors and issues of the problem and have presented possible alternatives. By doing so, the first three steps of the five-step decision-making procedure have been completed. The fourth-step, that of analyzing and comparing alternatives, forms the basis of this Chapter, Chapter V.

It is the purpose of this Chapter to present to the decision-maker a means by which a logical comparison of alternatives can be conducted by blending the knowledge possessed by the decision-maker in the area in which potential work-schedule alternatives are being considered with a rigorous systematic approach routine. The results provided by adherence to the principals and procedures

brought forward by this Chapter will be scientifically and mathematically sound, and will provide the most return to the individual enterprise adopting the work-schedule concept projected by the procedure to be the most beneficial.

This Chapter calls for the active participation of the decision-maker in the analysis procedure. It is necessary to do so to enable the alternative ultimately selected, by whatever decision choice rule employed, to be useful, workable and economically beneficial to the enterprise adopting the particular alternative.

Method of Approach

The method of approach followed by this Chapter is prescriptive rather than descriptive. It is prescriptive in the sense that it details how the decision-maker should make a particular decision, rather than detailing how conclusions have been reached by other decision-makers in the past.

A systematic analysis procedure is defined and presented to aid in the search for the best course of action to the complex multiple-objective decision problem addressed. The method of approach primarily deals with developing a search routine for the most efficient path to the best solution. The application of decision theory detailed by the Chapter allows the decision-maker to

encompass social, ethical, temporal and environmental considerations into the analysis procedure, so as to provide a result that is in-step with the current challenges of our modern day society.

The Systematic Approach

Definition and Discussion

The systematic approach to problem solving involves tackling a problem of choice under conditions of uncertainty through examining the effectiveness of various alternatives.[1] Essential is the determination of: 1.) the broad goals desired to be achieved, 2.) the alternative methods to achieve the goals determined, and 3.) the benefits of various approaches that lead to the achievement of predetermined objectives.

Henry Rowen, President of the RAND Corporation, has stated that a systematic approach "is a way of making discoveries. Discoveries not of things, but about objectives, or values, or relationships, or facts."[2]

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[1]Quade, E. S., "Analysis for Military Decisions," Santa Monica, California: The RAND Corporation, 1964, p. 5.

[2]Rowen, Henry, "Statement Before the Special Sub-Committee on Scientific Manpower Utilization - Senate Committee on Labor and Public Welfare," January 27, 1967, p. 3.

The use of a systematic approach enables the decision-maker to achieve larger objectives more efficiently by considering the entire situation surrounding the problem as opposed to examining separate problem parts which, at most, consider only parts of the entire situation. This enables the decision-maker to take into account qualitative values, although to a lesser extent and degree.

It must be realized that there is no uniform method for making a systematic analysis. There is no described "book" procedure on the matter. Each particular individual problem addressed and considered calls for a separate and individual approach method tailored specifically to that problem, to ensure that optimized results are obtained. Although there are no exact procedures to be followed, no common system of analysis enabling a universal application of the concept, there appear to be characteristics associated with the systematic approach which differentiate it from other complex problem-solving techniques, and which directly result in its usefulness as a concept.

For example, one characteristic is that systematic analysis permits, and strongly encourages, that the judgment, knowledge and even intuition of managers and experts in the field be blended with scientific sense in a systematic and efficient manner toward reaching a

suitable conclusion. Another characteristic it employs and emphasizes is the scientific method which makes the concept both systematic and objective. It is systematic in that conclusions are reached by adherence to a prescribed design. It is objective in that quantitative information normally receives paramount attention over qualitative values. By employing scientific methods, the approach enables the accurate verification of results after such has been determined and, therefore, adds a degree of credibility and a degree of defense to developed conclusions. This, however, should not be confused as meaning that the results obtained are suitable to, and agreeable to, all concerned, or for that matter acceptable to all concerned.

Still another characteristic of the systematic approach is that it attempts to deal in exact, explicit ways with situations which are at times characterized by degrees of uncertainty normally present in the decision environment. Most other approaches fail to do so. These imponderables occasionally present analyzation problems but are, nevertheless, addressed forthrightly by the concept in an attempt to reach a satisfactory conclusion.

There appears to be no evident and direct guiding theory for systems analysis. The reaching of a suitable

conclusion most of the time involves the artful consideration of a number of intangible factors ultimately resolved through the specific application of various essential human decision-making factors such as judgment, assessment and intuition. However, wherever convenient and possible under the approach, these factors are supported by inductive and numerical reasoning.

In summation, systems analysis is a methodolgy applied by decision-makers to large complex problems as well as problems of a lesser nature by combining scientific problem solving techniques with assorted amounts of managerial artfulness to yield optimized results. Analyzed and explored by the approach concept are alternative objectives and their resulting implications, through using a large percentage of quantitative elements blended with lesser amounts of qualitative elements to reach suitable conclusions.

Types of Decision-Making Possible

The objective of this Chapter is to find a method that will aid the decision-maker to adopt the most suitable work-scheduling technique so as to optimize and maximize the firm's operations, to the extent that such can be governed by selection of an appropriate work schedule. An alternative that will yield the greatest aggregate of wanted

consequences such as increased employee morale, productivity, etc., while decreasing the amount of unwanted consequences such as absenteeism rates, punctuality deviations, and job tension, is what is desired.

Decision-making is undoubtedly the most difficult and the most essential task a manager performs. A decision is always a choice between various ways to accomplish a particular objective, or to reach a particular conclusion or end. Final judgment is usually made only after the close and careful examination of many governing facts. It is difficult because it involves not only the use of experience, knowledge, common-sense and judgment on the part of the decision-maker, but in addition, calls for that individual to contemplate a great many present and future degrees of uncertainty influencing the area of problem concern.

It is because of these degrees of uncertainty involved in the decision-making process that a number of principal types and conditions of decision-making categorically appear in the field. First, there is decision making under certainty. This type of decision-making occurs when a decision problem exists in which it is known with certainty what state of nature will occur. It primarily concerns itself with comparing only a single attribute

per considered alternative. In theory there is no difficulty in handling particulars associated with this type of decision-making. The alternative with the largest indicated "payoff" or benefit is the alternative which should be selected. There is little reason for doing otherwise as there is only a single "payoff" or state of nature involved. Since this payoff represents the degree of achievement of the objective, the largest payoff magnitude is absolutely the best one that can be obtained. Difficulty only arises when there are a substantial number of payoffs involved which must be successively determined, verified, compared and ultimately selected.

Another type of decision-making is decision-making under risk. It occurs where there are a number of states of nature and the decision-maker knows the probability of occurrence of each state. For many organizational problems, the probabilities of the various states of nature are known by virtue of determining how frequently these states have occurred in the past. Under this concept one payoff exists for each alternative considered, one for each possible state of nature. Determination of an appropriate alternative, the decision criterion, is necessarily based on a comparison of the possible singular payoffs associated with each respective alternative, or, if desired, based on a portion of available payoffs according to some predetermined screening rule.

A third type of decision-making is decision-making under uncertainty. This type occurs where the probabilities of occurrence of the states of nature are not known. Not specifically known is the frequency with which each nature state has occurred previously. Probability descriptions for nature states are therefore meaningless. Decision-making under uncertainty is far more complicated than the other decision-making concepts mentioned. At the present time, decision theory provides no single best manner for selecting a strategy leading to a solution or conclusion under this concept. Instead, there are a number of different criteria that may be instituted each of which has a perfectly good rationale to justify it. The choice among these criteria is usually determined by either experience, organizational policy and/or the attitude of the decision-maker.

The last type of decision-making, decision-making under partial information, is probably the most common category of "real" decision problems. It exists conceptually between decision-making under risk and decision-making under uncertainty and involves limited knowledge of nature state probabilities. Exact placement depends solely upon the relative knowledge and make-up of individual payoffs. Decision-making under partial information is not considered

by purists as being a separate decision-making type and condition. It is considered by purists to be an offshoot of decision-making under uncertainty and, therefore, should not be considered a separate entity.

The decision at hand, that of selecting an appropriate work-scheduling technique, can be considered to be a systematic analysis of decision criteria under uncertainty. Once the alternatives to the present condition have been determined and relevant criteria for problem analysis have been analyzed, it is necessary to develop the payoff associated between each criteria and each alternative. This is the point at which the degree of uncertainty is introduced. The decision-maker is normally called upon to provide an appropriate and accurate criteria measurement. Being uncertain in this regard brings about complications and certainly offers formidable challenges in reaching the best conclusion.

The Comparison

Preliminary Steps Involved - Steps 1 to 4

The decision-maker, in the analysis of the problem at hand, must determine whether the work system presently employed by the enterprise deviates intolerably from desired performance. In addition, this individual or group of individuals comprising the decision-making body

must determine the accrued advantages associated with the potential adoption of various new work-scheduling techniques and weigh the difference between the present and these various proposed techniques prior to selecting a plan to follow.

In order to do so, the decision-maker must perform the following preliminary Steps in comparing alternatives:

Step 1 - Determine who must be satisfied by the change.

Step 2 - Determine who will be affected by the change and how will these individuals, groups, et al. be affected.

Step 3 - Determine criteria governing the decision of alternative selection, i.e., determine the direct and indirect effects of the work-scheduling technique upon enterprise operations.

Step 4 - Assign proper weights to the interests of all affected parties and all affected enterprise operations so that the conclusion reached will simply not create new and perhaps more troublesome problems.

Satisfaction of preliminary Steps 1, 2 and 4 rests with the individual decision-maker associated with the particular enterprise contemplating a work-schedule change. The scope of this discussion would become overwhelming should an attempt be made to provide exact and conclusive details for these Steps as such varies tremendously from enterprise to enterprise and should be, in essence, unique per individual enterprise. However, as a guide and direction, a broad outline of those individuals or groups potentially classified as being impacted upon by a work-schedule change is provided by Table 7 as a preliminary guide to the decision-maker for completion of Steps 1 and 2.

The establishment of weights to affected parties and enterprise operations, Step 4 of the analysis procedure, likewise is unique and must be handled solely by the decision-making individual. Again, however, some guidelines are provided in tabular form. See Table 8.

It must be remembered that Tables 7 and 8 are provided only as guides for the decision-maker. The information portrayed by these Tables should not be construed as being a required grouping of particulars. In routines established for addressing the problem, individual decision-makers are urged to construct an independent analysis of problem-solving particulars and to use the aforementioned Tables only as broad outlines and references, if desired.

TABLE 7

LISTING OF INDIVIDUALS AND/OR GROUPS
NECESSARILY SATISFIED AND/OR AFFECTED
BY AN INTRODUCTION OF A NEW
WORK-SCHEDULING TECHNIQUE
(PRELIMINARY STEPS 1 AND 2)

No.	Groups and/or Individuals Affected
1.)	Maintenance department employees
2.)	Security department employees
3.)	Employees on shift-work (if applicable)
4.)	Cafeteria service employees (if applicable)
5.)	Remote location service-handling groups
6.)	Customers, suppliers, vendors
7.)	Labor representatives
8.)	Municipal service concerns - police, fire, ambulance, etc.
9.)	General employee population - shipping, receiving, etc.
10.)	Production control, computer operations, scheduling

Source: Developed by author for illustrative purposes.

TABLE 8

GUIDELINES FOR DETERMINING WEIGHTED VALUES TO PARTIES AND ENTERPRISE OPERATIONS AFFECTED BY THE INTRODUCTION OF A NEW WORK-SCHEDULING TECHNIQUE (PRELIMINARY STEP 4)

Weight Level	Parties and Enterprise Operations Affected
High	1.) Customer work schedule, location 2.) Type of enterprise operation-service, manufacturing, warehouse; shift operations, scheduling guidelines, production control guidelines, computer orientation 3.) Absenteeism, tardiness programs 4.) Intra-organization communications 5.) Nature of jobs - independent, dependent 6.) Enterprise internal and external facility usage patterns and usage loads 7.) Union activity and relationship with management
Medium	1.) Enterprise location, size; employee makeup - age, gender; recruiting situation 2.) Supplier work schedule, location 3.) Employee family reaction 4.) Real to nominal work ratio 5.) Sense of worker responsibility 6.) Centralized or decentralized operations 7.) Corporate community image, public relations goals 8.) Internal enterprise economic conditions

TABLE 8 (cont'd)

Weight Level	Parties and Enterprise Operations Affected
Low	1.) Fringe benefits offered
	2.) Work schedule concept relative failure rate
	3.) External economic business community conditions
	4.) Enterprise moonlighting policy
	5.) Energy consumption rate
	6.) Maintenance, security and cafeteria operations
	7.) Vendor work schedule, location

Source: Developed by author for illustrative purposes.

Although preliminary Steps 1, 2 and 4 cannot be addressed directly for reasons mentioned, such is not the case concerning Step 3, Determination of Criteria Governing the Decision of Alternative Selection. Background information necessary in this regard has been provided by the previous Chapter. Direct information is provided by Table 9.

Once the decision-maker has determined the relative values of applicable criteria obtained by reference to Tables 8 and 9, or by some other suitable means, specific numerical weights should be assigned to these values. The method of weight assignment itself is left to the discretion of the decision-maker. However, a simple manner in which to assign desired values is to rank-order values according to some predetermined numerical rating scale or other similar device, and then to attach a numerical significance to the ordering accomplished by giving the highest rank-ordered item the highest numerical weight and the lowest rank-ordered item the lowest numerical weight, and so on.

The Spectrum of Alternatives

Prior to the development of future steps in the analysis and comparison operation, it is necessary that a "spectrum" of alternatives be developed. This "spectrum"

TABLE 9

LISTING OF CRITERIA GOVERNING THE DECISION ALTERNATIVE SELECTION (PRELIMINARY STEP 3)

1.)	Absenteeism rates
2.)	Communications (intra-organization)
3.)	Company location - urban, rural
4.)	Company size
5.)	Conversion costs
6.)	Customer-orientation toward
7.)	Customer application of concept considered
8.)	EEO-AAP effects
9.)	Economic conditions - internal
10.)	Economic conditions - external
11.)	Energy consumption rate
12.)	Facility usage conditions - external
13.)	Facility usage conditions - internal
14.)	Fatigue factor
15.)	Failure rate of concept
16.)	Family reaction to concept
17.)	Fringe benefits offered (other)
18.)	Inventory level flexibility
19.)	Job satisfaction degree experienced

TABLE 9 (cont'd)

20.)	Legal constraints
21.)	Male-Female employee % breakdown
22.)	Moonlighting policy of enterprise
23.)	Morale - of employees
24.)	Nature of jobs - independent, dependent
25.)	Productivity effects
26.)	Real to nominal work ratio
27.)	Recruitment situation
28.)	Safety considerations
29.)	Scheduling routine flexibility
30.)	Sense of worker responsibility
31.)	Shifts operations - degree followed
32.)	Supplier application of concept considered
33.)	Tardiness conditions
34.)	Type of enterprise operation - service, manufacturing, warehousing
35.)	Union activity
36.)	Vendor application of concept considered

Source: Developed by author for illustrative purposes.

of alternatives is merely a listing of primary and secondary work-scheduling techniques, either as presented in the preceding Chapters or extended intuitively from those presented, in a logical sequential manner according to individual time characteristics involved. The "spectrum" is detailed by Table 10.

The Initial Satisficing Step - Step 5

After the preliminary Steps 1 through 4 have been completed to the satisfaction of the decision-maker, the next Step, Step 5, involves an evaluation of all alternative solutions developed and considered against each of the relevant criteria established via Step 4. Step 5 is the initial satisficing Step. By satisficing, the decision-maker will choose from available alternatives the one shown to be best at providing for the business interests of the enterprise. The satisficing operation differs from an optimizing operation in that the alternative selected need not necessarily be the perfection of a work-scheduling technique. It merely must be the best of the available alternatives considered. Optimizing would call upon the decision-maker to search for the one last alternative which, in most instances, would involve vastly deeper and more intricate search, analysis and rearrangement activities while being also excessively time consuming and costly.

TABLE 10

DEVELOPMENT OF THE "SPECTRUM" OF ALTERNATIVES ACCORDING TO INDIVIDUAL TIME CHARACTERISTIC INVOLVED PER TECHNIQUE

Primary Alternatives	Secondary Alternatives	"Spectrum" of Alternatives
1.) Flextime		1.) Flextime
2.) SWHP's		2.) SWHP's
3.) Std. 5/40		3.) Std. 5/40
	a.) 5/37½	a.) 5/37½
4.) 4/40		4.) 4/40
	b.) 4/32	b.) 4/32
	c.) 3/36	c.) 3/36

Notes - 1.) Ranking performed in order of work-schedule:

a.) associated time restrictions, i.e., degree of decreasing flexibility.

b.) decreasing total time requirements.

2.) Additional alternatives may be added at the discretion of the decision-maker and placed within the "spectrum" according to individual desire and preference.

Source: Developed by author for illustrative purposes.

The principal operation necessary for the completion of Step 5 calls for the establishment of an Alternative Score Matrix or Decision Matrix. Development of the Decision Matrix involves providing rating-scores for each alternative developed per each criteria mentioned and provided by Table 9. The arranging and displaying in tabular form of the information gathered in this regard produces the Decision-Matrix called for by Step 5. The Decision-Matrix is illustrated by Figure 6.

The rows of the Decision-Matrix tableau contain the scores for each alternative on all criteria considered. The columns hold the scores for each criterion on all alternatives considered. Weighted values, provided by the completion of Step 4, are presented by the bottom row of the tableau. Individual alternative/criteria scores are expressed as variables on a multi-interval scale determined and selected by the decision-maker. Normally, a scale ranging from a low of 1 to a high of 10 is sufficient. The presently followed work-scheduling technique usually should receive a mid-range scale rating on all criteria considered. Higher and lower scores should be assigned according to whether individual alternatives aid or hinder the achievement of respective criteria.

FIG. 6 - AN ALTERNATIVE SCORE MATRIX OR DECISION-MATRIX EARNED BY EACH ALTERNATIVE FOR EACH CRITERIA RECORDED IN TABULAR FORM

Alternatives	Criteria or Objectives						
	1	2	3	... ...	j	... ...	m
1 2 . . . . . . m	(Evaluation of Alternatives for Each Criteria or Objective)						
Weights	W_1	W_2	W_3	... ...	W_j	... ...	W_m

The Decision-Matrix without weighted values is referred to as an Outcome-Matrix. Each alternative will have an individual Outcome Score Set which expresses through a set of numbers the scores assigned to that alternative by each criterion. In symbolic form, the Outcome Score Set for the i-th alternative in a set of m criteria is shown by:

$$A_{i\ \text{outcome}} = O_{i1}, O_{i2}, O_{i3}, \cdots O_{ij}, \cdots, O_{im}$$

where O_{ij} equals the number representing the i-th alternative on the j-th criterion. Table 11 and Figure 7 present the outcome score set and the Outcome-Matrix described above.

The Introduction of Utility - Step 6

Step 5 developed the Decision-Matrix and the Outcome-Matrix. The next Step calls for transforming the Outcome-Matrix into a Valuation-Matrix. However, in most instances a simple and direct transformation will not suffice, due to the non-linear relationship usually found to exist between Outcome-Score Sets and their related utility values. The decision-maker attempting to develop a Figure-of-Merit for alternatives directly from outcome-Score Sets makes a grievous error which, in most instances, will destroy the detailed analysis performed through the careful adherence to Steps 1 through 5. This

TABLE 11

THE OUTCOME SCORE SET FOR THE ALTERNATIVE FLEXTIME RATED AGAINST FIVE CRITERIA

	Criteria Number				
Alternative	1	2	3	4	5
Flextime	10	7	5	3	2

Note - Variable Scale Ration: Highest = 10, Lowest = 0.

Source: Developed by author for illustrative purposes.

FIG. 7 - DETAILS OF AN OUTCOME-MATRIX SHOWING THREE ALTERNATIVES AND FIVE CRITERIA (STEP 5)

Alternative Number	Criteria Number				
	1	2	3	4	5
1	O_{11}	O_{12}	O_{13}	O_{14}	O_{15}
2	O_{21}	O_{22}	O_{23}	O_{24}	O_{25}
3	O_{31}	O_{32}	O_{33}	O_{34}	O_{35}

destruction potentially occurs due to the fact that units of measurement associated with Outcome-Score Set figures are normally incommensurate, i.e., nonadditive, causing a simple almalgamation of their values to be of little use. To overcome this nonadditive condition, the decision-maker must account directly for the "utility" of each criteria.

In order to account for utility, i.e., the degree of desirability, attractiveness or merit of a particular function, it is necessary to multiply respective Outcome-Score Set figures by separate utility functions determined by the decision-maker to be appropriate for the individual criterion addressed. The resultant of this multiplication is the Valuation Matrix. Development of the Valuation Matrix constitutes Step 6 of the comparison procedure. In symbolic form, the Valuation Matrix Score Set for the i-th alternative in a set of m criteria is shown by:

$$A_i \text{ valuation} = O_{i1}U_1, O_{i2}U_2, O_{i3}, \cdots, O_{ij}U_j, \cdots, O_{im}U_m$$

$$= V_{i1}, V_{i2}, V_{i3}, \cdots, V_{ij}, \cdots, V_{im}$$

where V_{ij} represents the i-th alternative on the j-th criterion and U_j utility value for the j-th criterion.

Table 12 details data-sets for utility curves that the decision-maker must use to complete Step 6. The information contained in these data sets is depicted by Figures 8-13. The Valuation Matrix is depicted by Figure 14.

The decision-maker is charged with determining the proper utility for each criterion by selection of a proper utility curve and then by deciding the proper extent that the selected utility curve affects the criterion involved according to knowledge existing about the environment in which the considered alternatives are to operate. Reasonable introspective individuals normally should have no difficulty in this regard. By a limited understanding of basic utility theory and by properly responding to phrased interrogatories, usually an easy recognition can be made by the decision-maker of whether a constant, diminishing or increasing marginal utility curve is applicable and the degree of such application. An example seems appropriate.

Suppose for the moment that a firm considering a change in work schedule technique presently experiences a "tardiness-condition" rate of 20%, i.e., for some reason it has been noted that 20% of the firm's employees have been late at least once during a given workweek. The firm

TABLE 12

A SET OF DATA FOR CURVES HAVING MARGINAL UTILITIES
(STEP 6)

Quantity	1	2	3	4	5	6	7	8	9	10	11
0	0	0	0	0	0	0	0	0	0	0	0
10	1.0	1.9	2.8	3.7	4.6	5.5	6.4	7.3	8.2	9.1	10.0
20	4.0	5.6	7.2	8.8	10.4	12.0	13.6	15.2	16.8	18.4	20.0
30	9.0	11.1	13.2	15.3	17.4	19.5	21.6	23.7	25.8	27.9	30.0
40	16.0	18.4	20.8	23.2	25.6	28.0	30.4	32.8	35.2	37.6	40.0
50	25.0	27.5	30.0	32.5	35.0	37.5	40.0	42.5	45.0	47.5	50.0
60	36.0	38.4	40.8	43.2	45.6	48.0	50.0	52.8	55.2	57.6	60.0
70	49.0	51.1	53.2	55.3	57.4	59.9	61.6	63.7	65.8	67.9	70.0
80	64.0	65.6	67.2	68.8	70.4	72.0	73.6	75.2	76.8	78.4	80.0
90	81.0	81.9	82.8	83.7	84.6	85.5	86.4	87.3	88.2	89.1	90.0
100	100	100	100	100	100	100	100	100	100	100	100

Quantity	12	13	14	15	16	17	18	19	20	21	22
0	0	0	0	0	0	0	0	0	0	0	0
10	10.9	11.8	12.7	13.6	14.5	15.4	16.3	17.2	18.1	19.1	36.0
20	21.6	23.2	24.8	26.4	28.0	29.6	31.2	32.8	34.4	36.0	64.0
30	32.1	34.2	36.3	38.4	40.5	42.6	44.7	46.8	48.9	51.0	90.0
40	42.4	44.8	47.2	49.6	52.0	54.4	56.8	59.2	61.6	64.0	96.0
50	52.5	55.0	57.3	60.0	62.5	65.0	67.5	70.0	72.5	75.0	100
60	62.4	64.8	67.2	69.6	72.0	74.4	76.8	79.2	81.6	84.0	96.0
70	72.1	74.2	76.3	78.4	80.5	82.6	84.7	86.8	88.9	91.0	90.0
80	81.6	83.2	84.8	86.4	88.0	89.6	91.2	92.8	94.4	96.0	64.0
90	90.9	91.8	92.7	93.6	94.5	93.4	95.3	96.2	97.1	98.0	36.0
100	100	100	100	100	100	100	100	100	100	100	0

Notes: Columns 1-10, Increasing Marginal Utility (Figure 8)
Column 11, Constant Marginal Utility (Figure 10)
Columns 12-21, Declining Marginal Utility (Figure 9)
Column 22, U-Shaped Marginal Utility (Figure 11)

Source - Easton, Allen, "Complex Managerial Decisions,"
New York: John Wiley and Sons, Inc., 1973, p. 158.

FIG. 8 - Increasing Marginal Utility

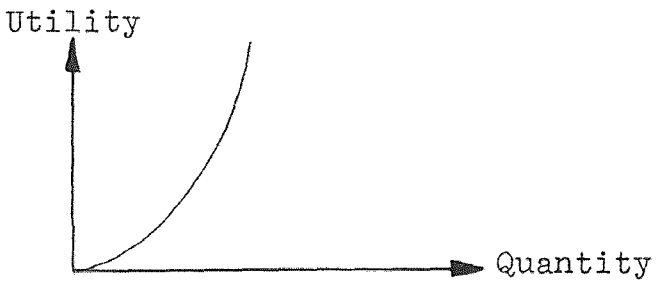

FIG. 9 - Decreasing Marginal Utility

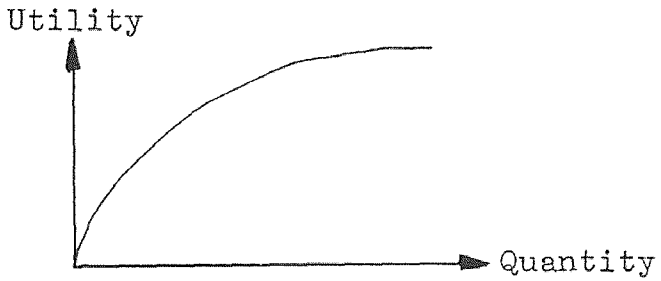

FIG. 10 - Constant Marginal Utility

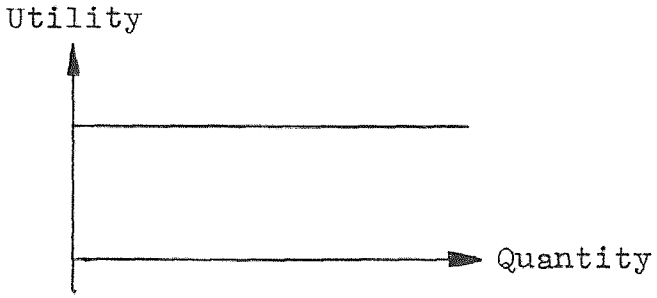

FIG. 11 - U-Shaped Marginal Utility

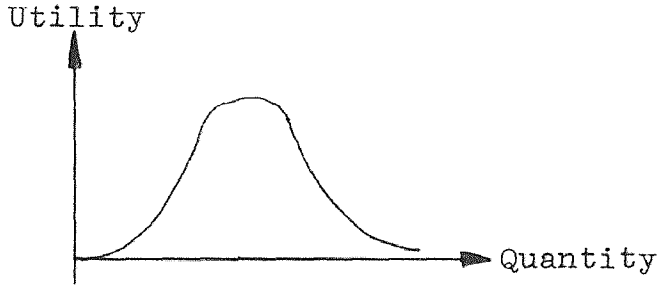

FIG. 12 - Linear Marginal Utility

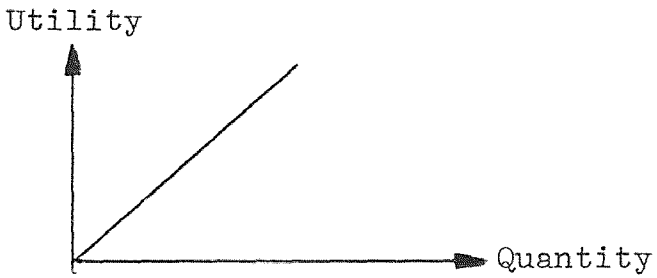

FIG. 13 - Non-Linear Marginal Utility

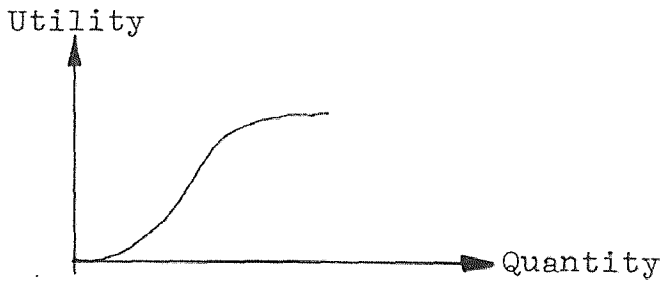

FIG. 14 - DETAILS OF A VALUATION-MATRIX SHOWING THREE ALTERNATIVES AND FIVE CRITERIA (STEP 6)

Alternative Number	Criteria Number				
	1	2	3	4	5
1	V_{11}	V_{12}	V_{13}	V_{14}	V_{15}
2	V_{21}	V_{22}	V_{23}	V_{24}	V_{25}
3	V_{31}	V_{32}	V_{33}	V_{34}	V_{35}

tends to gain a benefit or a "utility" should this tardiness-condition figure be reduced. However, this utility gained decreases as the degree of tardiness experienced decreases. A reduction from a 20% rate to a 10% rate is most attractive to the firm. A reduction from 10% to 5% is still again attractive, but probably less than the previous reduction experienced. A reduction from 5% to 2½% is likewise less attractive than previous reductions and so on. This is an example of decreasing or declining marginal utility portrayed by Figure 9. The criteria of "union-activity" might experience similar utility treatment, while a criteria such as "safety-considerations" might experience constant marginal utility (Figure 10) or even increasing marginal utility (Figure 8).

Once the marginal utility curve for each criterion is determined and the appropriate data for that curve has been ascertained by reference to Table 12, elements for the Valuation Matrix are obtained as indicated by Table 13.

The Valuation Matrix details the utility scores compiled for each alternative. As can be seen by inspection of Table 13, the work-schedule technique, Flextime, provides a maximized reduction in "tardiness-conditions" of all the alternatives considered. Although similar information could probably have been deduced by the

TABLE 13

RESULTANT OF A THEORETICAL CRITERIA "TARDINESS-CONDITIONS" EXPRESSED AS A VARIABLE AGAINST THE SPECTRUM OF ALTERNATIVES AND EXTENDED BY A DETERMINED UTILITY FUNCTION VALUE TO ACHIEVE A VALUATION MATRIX SET (STEP 6)

	Criteria - "Tardiness-Conditions"			
Spectrum of Alternatives (See Table 10)	Outcome Score Set Figure	Equivalent Q	Utility Curve (See Table 12)	Valuation Matrix Set Figure
1.) Flextime	10	100	14	100.0
2.) SWHP's	7	70	14	76.3
3.) Std. 5/40	5	50	14	57.3
a.) 5/37½	5	50	14	57.3
4.) 4/40	3	30	14	36.3
b.) 4/32	4	40	14	47.2
c.) 3/36	2	20	14	24.8

Notes - Equivalent Q converts each outcome-score set figure to a 0-100 scale value necessary for the application of the utility function.

Source: Developed by author for illustrative purposes.

decision-maker at the conclusion of the previous Chapter, its relative position with respect to other techniques was unknown at the time. This information, however, is provided by the analytical apparatus contained in this Chapter. Although only an analysis of the criterion "tardiness-conditions" was brought through Steps 1 through 6, performing such an activity for other pertinent criteria follows an identical procedure and presents results with commensurate units in preparation for the almalgamation process establishing a Figure-of-Merit, the basic analytical device for selecting a plan to follow.

Detailed Reason For Developing Valuation Scores From Outcome Scores

It has been mentioned that outcome scores usually do not have commensurate units, are usually non-linear in nature and, therefore, cannot be directly amalgamated to obtain a merit ordering of alternatives. This is because addition and allied mathematical operations are prohibited for incommensurate units, although multiplication is permitted. The time worn analogy that three apples plus two oranges is a nebulous quantity, while three apples multiplied by two oranges equals six apple-oranges serves as an example to illustrate this point. Apples and oranges although both fruits are obviously incommensurate or incompatible nonadditive units in other respects, and, therefore, cannot be directly amalgamated or mixed.

As stated, multiplication of outcome scores to obtain a Figure-of-Merit is permissible but it must be recognized that there are severe drawbacks associated with the procedure. For instance, the multiplication of outcome scores involves a hidden assumption that underlying values are expressible by means of an increasing utility function. In reality this cannot be reasonably expected. If it were to be assumed, the truthful and real appearance of a U-shaped utility function for one or more criteria would severely limit the accuracy and credibility of any Figure-of-Merit derived. In addition to the credibility and accuracy question, any amalgamated function obtained would be difficult to transform from a vector to a scalar quantity, and would therefore partially limit result analyzation undertakings.

Establishing the Weighted Valuation Matrix - Step 7

Step 7 calls for establishing a Weighted Valuation Matrix by taking values of the Valuation Matrix and multiplying such by determined criteria weights. The criteria weights used have been determined by the decision-maker through the completion of Step 4. Each element of the Weighted Valuation Matrix is obtained by taking each element of the Valuation Matrix and multiplying it by the respective weight related to the

criteria it represents. In symbolic form, the Weighted Valuation Matrix Score Set for the i-th alternative in a set of m criteria is shown by:

$$A_i \text{ weighted valuation} = V_{i1}W_1, V_{i2}W_2, V_{i3}W_3, \cdots, V_{ij}W_J, \cdots, V_{im}W_m$$
$$= u_{i1}, u_{i2}, u_{i3}, \cdots, u_{ij}, \cdots, u_{im}$$

where u_{ij} represents the i-th alternative on the j-th criterion and W_j represents the weight of the j-th criterion. The Weighted Valuation-Matrix is shown by Figure 15.

The Merit Ordering of Alternatives - Step 8

It is a rare situation when one particular alternative will be vastly superior to all others considered. Most of the time alternatives will be closely grouped. However, the superiority relationship, offered as part of the satisficing procedure and indicated below, offers a means to determine a single alternative which is superior to others considered.

At times, visual inspection of values is sufficient to determine the best alternative. However, most of the time it is not. Visual inspection is usually based upon a dominance relation. The dominance relation states that alternative A, A_a, is dominant or superior to alternative B, A_b, if u_{aj} u_{ij} for all values of i and j,

FIG. 15 - DETAILS OF A WEIGHTED VALUATION-MATRIX SHOWING THREE ALTERNATIVES AND FIVE CRITERIA (STEP 7)

Alternative Number	Criteria Number				
	1	2	3	4	5
1	u_{11}	u_{12}	u_{13}	u_{14}	u_{15}
2	u_{21}	u_{22}	u_{23}	u_{24}	u_{25}
3	u_{31}	u_{32}	u_{33}	u_{34}	u_{35}

except i=a, where i runs from 1 to m and j runs from 1 to m. Besides the dominance relation, there are two other relations useful in visual inspection - a contra-dominance relationship and an equality relationship. One alternative is contra-dominant to another alternative if criterion by criterion each of its outcome scores or valuation scores are lower than that of the alternative to which it is compared. In essence, this relationship is the converse of the dominance relation as is implied by its title. The equality relationship states that two alternatives, A_a and A_b, are equal if and only if $u_{aj} = u_{bj}$ for all values. This equality relationship is unaffected by the weights assigned to each criteria and/or the type of utility function chosen.

There are other means to determine the most appropriate alternative from among a group of alternatives besides employment of visual inspection relationships. The fundamental means in this regard involves converting the row vector for each alternative, as expressed by the weighted valuation set matrix, into a scalar quantity. This scalar quantity in theory represents the length of the vector in geometric space. The vector-lengths can be computed by application of the Pythagorean theorem as follows:

$$\overset{o}{A}_1 = \left[u_{11}^2 + u_{12}^2 + u_{13}^2 + \ldots + u_{1m}^2\right]^{\frac{1}{2}}$$

$$\overset{o}{A}_2 = \left[u_{21}^2 + u_{22}^2 + u_{23}^2 + \ldots + u_{2m}^2\right]^{\frac{1}{2}}$$

$$\vdots$$

$$\overset{o}{A}_m = \left[u_{m1}^2 + u_{m2}^2 + u_{m3}^2 + \ldots + u_{mm}^2\right]^{\frac{1}{2}}$$

where the m alternatives considered are rated on m criterions. A simple inspection of $\overset{o}{A}_1$, $\overset{o}{A}_2$, and ... $\overset{o}{A}_m$ would enable the decision-maker to easily select the highest value and, in turn, select the most appropriate alternative. Procedures of this sort where multivalued alternatives are transformed into single-valued items are called collapsing operations. These collapsing operations are necessary because an exact comparison of multivalued alternatives is unknown unless there accidently appears a dominance, contra-dominance or equality relationship the chance of which in real-life situations is a very low probability.

Summary

This Chapter details a means by which a decision-maker may make a logical comparison of alternatives under conditions of uncertainty. Described is an eight-Step routine which ultimately produces of single-numbered Figure-of-Merit. That routine is described below:

Step 1 - Determine who must be satisfied by the change.

Step 2 - Determine who will be affected by the change and how will these individuals, groups, et al. be affected.

Step 3 - Determine criteria governing the decision of alternative selection, i.e., determine the direct and indirect affects of the work-scheduling technique upon enterprise operations.

Step 4 - Assign proper weights to the interests of all affected parties and all affected enterprise operations so that the conclusion reached will simply not create new and perhaps more troublesome problems.

Step 5 - Establish an Alternative Score Matrix or Decision Matrix listing alternatives, criteria or objectives and weight values.

Step 6 - Establish a Valuation Matrix by transforming the Outcome-Matrix, i.e., the Decision-Matrix without weighted values, into a matrix considering individual criteria utility functions.

Step 7 - Establish a Weighted Valuation Matrix by taking values of the Valuation Matrix and multiplying such by determined criteria weights.

Step 8 - Convert the row vector of the Weighted Valuation-Matrix for each alternative through collapsing operations into a scalar quantity, called a Figure-of-Merit, by which respective alternatives can be compared.

At this point, the eight comparison Steps detailed above comprise the fourth of five decision-making steps. The remaining step, selection of the most appropriate alternative to follow will be addressed by Chapter VI.

CHAPTER VI

SELECTING A PLAN

The fifth and final step in the decision-making process involves a selection of the most appropriate alternative from among those alternatives considered. This decision deals with both economic and social factors, and considers as many environmental aspects as the decision-maker sees fit.

The purpose of this Chapter is two-fold. The first, and primary concern, is the selection of a proper work-schedule by inspection of the information provided by the comparison analysis conducted by the preceding Chapter. Although the selection of an appropriate work-scheduling technique is the paramount concern, a secondary concern which positively must be completed prior to the actual selection process involves determining a decision-choice rule by which the selection procedure will be conducted. Should a decision-choice rule not be determined prior to selection, due to the number of different ways available for arriving at a suitable conclusion, the selection procedure could, and probably would, become muddled and potentially the center of an intra-company political squabble or worse.

Determination of the Decision-Choice Rule

Prior to selecting an alternative to follow, the decision-maker must decide upon a rule by which the decision will be made. It is essential that this be performed just as it is essential that guidelines and rules be established in a competitive match prior to the start of match activities. Without such, any decision or conclusion reached could be challenged objectively by either contestant, or for that matter, by both contestants. The ground rules must be laid, established and mutually agreed upon in order to reach a satisfactory conclusion.

There are a number of "yardsticks" or guides which may be used to reach a suitable conclusion of a particular problem. Each of these guides or rule choices are one-dimensional in nature so as to further the accountability of the decision-making process. Various procedures which may be used by the decision-maker appear below.[1]

> Decision Choice 1: Establish a standard of acceptability for every decision criterion. Reject any alternative with scores that fail to meet or exceed standards.

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[1]Easton, Allen, "Complex Managerial Decisions," New York: John Wiley and Sons, Inc., pp. 255-266.

This Decision-Choice has several possible outcomes: 1.) No alternatives will survive the rule, 2.) One alternative only will survive the rule or 3.) Two or more alternatives will survive the rule. Should no alternatives survive, in order to select an alternative, acceptability standards should be incrementally reduced until a single alternative survives and becomes the one selected. If two alternatives survive under this procedure, both are equally acceptable to the decision-maker. Should a single alternative survive application of the decision-choice rule, that alternative is superior to all others considered and should be selected for implementation. The third possible outcome involves an instance where two or more alternatives survive the test. When this occurs, standards should be increased incrementally until only a single alternative survives and becomes the one selected.

> Decision Choice 2: Establish standards of acceptability for every criterion except the one judged to be most important. Apply Decision Choice 1 to nonreserved criteria. Select as a plan to follow the surviving alternative which has the highest score on the reserved criterion.

This Decision-Choice expands the features provided by Decision-Choice 1 by giving spotlight attention to one specific criteria over all others involved.

Decision Choice 3: Establish a dummy alternative as the worst alternative theoretically possible. Compute the deviation of all real alternatives from the worst case. Select the alternative furthest from the worst case.

Decision Choice 4: Establish a dummy alternative as the best alternative theoretically possible. Compute the deviation of all real alternatives from the best case. Select the alternative closest to the best case.

Decision Choices 3 and 4 are conversely related. Their appeal exists in that the absolute difference from an established standard is the factor determining alternative selection.

Although only four decision choice rules are presented, the decision-maker must realize that in theory there are a substantial number of other such choices that could possibly be listed. It is felt that the decision-maker must formulate the rule deemed to be most appropriate for the individual decision-situation encountered. The rule should be so developed so as to directly account for the particular impact of one or a number of those features deemed relevant to the problem situation existing. For example, should the individual enterprise considering a work-scheduling change have a current pattern of internal difficulty with labor representatives, the criteria responsible for accounting for the impact of this feature

upon the decision should be accented possibly by application of a relatively high weight, and/or by an appearance-of-merit in the decision-choice rule formulated.

The Selection Procedure

The decision-maker is offered three courses by which to properly select an alternative. One, mentioned above, calls for the formulation of a decision-choice rule, the second calls for determining a numerical Figure-of-Merit directly from the information conveyed by the Valuation-Matrix, and the third, and recommended method, combines the use of the first and second courses. The second course was presented in the preceding Chapter, Step 8 - Conversion of Weighted Valuation-Matrix Row Vectors into Scalar Qauntities. Each method is adequate and each method can, at times, be used to the advantage of the others, depending upon conditions associated with the decision-making environment. Each provides the decision-maker with a logical means for the completion of the task at hand.

CHAPTER VII

A HYPOTHETICAL CASE STUDY

In order to demonstrate the use of the systematic comparison approach detailed by this Thesis to determine the proper work-scheduling alternative an individual enterprise should adopt, the following hypothetical case study is presented:

Step 1 - Determine who must be satisfied by the change.

The following individuals or groups of individuals should necessarily be satisfied by the work-schedule change:

1.) Labor representatives
2.) Customers
3.) Enterprise management
4.) Enterprise employee population
5.) Individual employee families

Step 2 - Determine who will be affected by the change and how will these individuals, groups, et al. be affected.

The following individuals or groups will be affected by the work-schedule change. Also indicated is the manner in which the affected parties will be impacted upon:

Affected Party	Manner of Impact Upon Affected Party
1.) Shift-Workers	Starting and stopping times, family life-pattern situation, potential wage payment and salary structure, commuting schedule and arrangements.
2.) Maintenance Operations	Starting and stopping times, daily work activity schedule, amount of work required daily.
3.) Suppliers	Delivery schedule, quantity presented per delivery, hours during which services must be offered, potential billing routines.
4.) Security Operations	Surveillance hours, degree of coverage during hours of plant shut-down, degree of coverage during hours of plant operation, general scheduling of duties.
5.) Cafeteria Operations	Starting and stopping times, number of meals served, auxiliary canteen operations, type of meals presented, serving times and periods.

Affected Party	Manner of Impact Upon Affected Party
6.) Remote locations services	Hours of labor, availability of main plant contact, degree of direction provided, degree of responsibility assumed, potential inability to coordinate general operations.
7.) Labor Representatives	General relationship with management, features of contractual demands, number of grievances processed.
8.) Municipal concerns	Police coverage, degree of fire department coverage, degree of ambulance and other emergency condition coverage, availability of public commutation facilities, energy consumption rates.
9.) Internal enterprise operations	Receiving operations, shipping operations, warehousing operations, inter-department material transfer loads, inventory policies, scheduling operations, computer operations, production control operations.

Step 3 - Determine criteria governing the decision of alternative selection, i.e., determine the direct and indirect affects of the work-scheduling technique upon enterprise operations.

Step 4 - Assign proper weights to the interests of all affected parties and all affected enterprise operations so that the conclusion reached will simply not create new and perhaps more troublesome problems.

The decision-maker can combine Steps 3 and 4 or handle these Steps separately. The choice is open. For the sake of simplicity, Steps 3 and 4 are combined for the purpose at hand. Ten criteria are chosen by which each alternative will be compared. A greater quantity or a lesser quantity could be chosen. The following is indicative of those criteria and the weight assigned to each criteria:

No.	Weight	Criteria or Objective
1	10	Customer work-schedule and impact
2	9	Absenteeism-conditions
3	9	Tardiness-conditions
4	7	Union activity
5	6	Real to nominal work ratio, productivity
6	6	Employee family reaction
7	5	Internal enterprise economic condition
8	3	Corporate image
9	3	Enterprise "moonlighting" policy
10	2	Energy consumption rate

It should be noted that each criteria or objective was rated on a numerical scale ranging from a low of 1 to a high of 10. It should be further recognized that weights are not necessarily assigned in a uniform linear manner. For example, two criteria, absenteeism-conditions and tardiness-conditions, both have been assigned a numerical weight of nine. In addition, no criteria has been assigned a numerical weight of eight, four, or one.

Step 5 - Establish an Alternative Score Matrix or Decision Matrix listing alternatives, criteria or objectives and weighted values.

This Step is completed as detailed below:

		Criteria or Objective									
	Alternative	1	2	3	4	5	6	7	8	9	10
1.	Flextime	5	10	10	7	7	8	7	7	5	5
2.	SWHP's	5	6	10	7	5	6	5	7	5	5
3.	Std. 5/40	5	5	5	5	5	5	5	5	5	5
a.	5/37½	4	6	5	5	6	5	6	5	5	5
4.	4/40	2	7	4	4	8	5	8	6	3	8
b.	4/32	1	7	4	8	4	5	4	5	2	9
c.	3/36	1	7	4	6	3	3	3	5	1	10
	Weights	10	9	9	7	6	6	5	3	3	2

The decision-maker should normally assign a score of five for each criteria associated with the work-schedule

technique presently employed by the enterprise. Higher scores should be assigned where it is determined that the criteria or objective would be aided by the application of an individual alternative. Conversely, lower scores should be assigned where it is determined that the criteria or objective would not be aided by the application of an individual alternative. The degree of aid assigned to individual criterions or objectives is left to the discretion of the decision-maker. For example, the standard 5/40 work-scheduling technique is presently employed by the enterprise in this case study, and therefore, has been assigned a score of five on each criterion. In addition, criterion number three, tardiness-conditions has been scored as being aided or improved by the alternatives flextime and SWHP's, and adversely affected by the alternatives 4/40, 4/32 and 3/36.

Step 6 - Establish a Valuation Matrix by transforming the Outcome Matrix, i.e., the Decision-Matrix without weighted values, into a matrix considering individual criteria utility functions.

The choices available to the decision-maker for the assignment of a particular utility function for each individual criteria appear below:

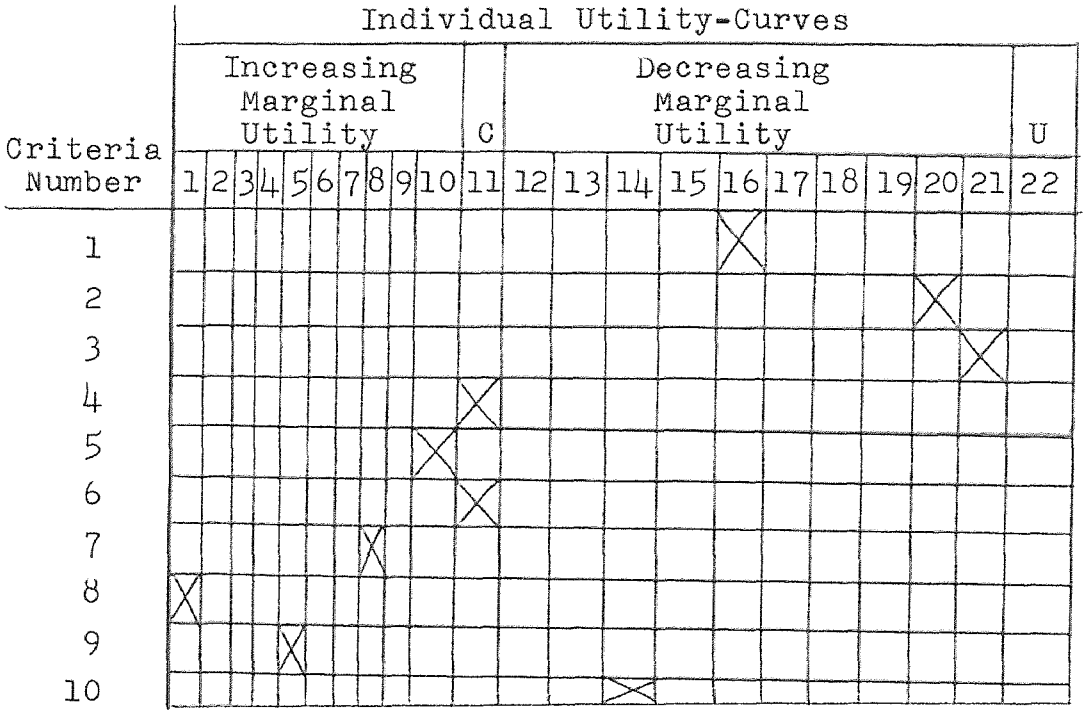
Utility Function	Degrees of Application									
	1	2	3	4	5	6	7	8	9	10
Increasing Marginal Utility										
Constant Marginal Utility	X	X	X	X		X	X	X	X	X
Decreasing Marginal Utility										
U-Shaped Marginal Utility	X	X	X	X		X	X	X	X	X

Should the decision-maker determine that a particular criteria experiences increasing marginal utility, an appropriate value of such should be assigned ranging from a value of 1 to a value of 10. A value of 1 would indicate increasing marginal utility in its most pronounced sense. A value of 2 would also indicate increasing marginal utility, but in a less pronounced sense than a value of 1, and so on up to a value of 10 which indicates increasing marginal utility but in its least pronounced sense. The same guidelines apply for selecting appropriate decreasing marginal utility values. A value of 1 would indicate decreasing marginal utility, but in a less pronounced sense than a value of 2, and so on up to a value of 10 which would also indicate decreasing marginal utility but in its most pronounced sense. The decision-maker is not faced with a choice of degrees when it is decided that constant marginal utility or U-shaped marginal utility exist as both are single-curved functions.

The first activity necessary to complete Step 6 calls for the conversion of scores detailed by the Decision-Matrix for each criteria into quantities relating to a uniform scale ranging from 0 to 100. Such is performed below:

	Criteria or Objective									
Alternative	1	2	3	4	5	6	7	8	9	10
1. Flextime	100	100	100	88	88	100	88	100	100	50
2. SWHP's	100	60	100	88	63	75	63	100	100	50
3. Std. 5/40	100	50	50	63	63	63	63	71	100	50
a. 5/37½	80	60	50	63	75	63	75	71	100	50
4. 4/40	40	70	40	50	100	63	100	86	60	80
b. 4/32	20	70	40	100	50	63	50	71	40	90
c. 3/36	20	70	40	75	38	38	38	71	20	100
Multiplied by:	X20	X10	X10	$X\frac{25}{2}$	$X\frac{25}{2}$	$X\frac{25}{2}$	$X\frac{25}{2}$	$X\frac{100}{7}$	X20	X10

The second activity necessary to complete Step 6 calls for the decision-maker to determine the individual utility curve that will be assigned to each decision-criteria. Such is performed below:



For example, Criterion 5 - Real to nominal work ratio, productivity, is determined by the decision-maker to have an increasing marginal utility value as described by utility curve number 10 of Table 12. Likewise, Criterion 6 - Employee family reaction is determined to have a constant utility curve as indicated by data-set number 11 of Table 12.

The third activity necessary to complete Step 6 calls for the decision-maker to determine the utility value for each alternative score converted to a scale of 0 to 100 by the first activity performed by Step 6. This activity is completed by securing the necessary utility value per criterion by reference to Table 12. Table 12 itself

shows individual quantities in increments of 10. Should the conversion of alternative scores to a scale ranging from 0 to 100 result in a particular score being not directly divisible by 10, the specific utility value will not appear in Table 12. Should this situation occur, the intermediate value, although not directly presented by the Table, can be obtained by extrapolation. For example, let us assume that an alternative score was found to be 78 and utility curve number 1 was determined to be applicable. The exact value of 78 is not listed in Table 12. However, values for 70 and 80 respectively are listed in the Table. The value for 78 can be determined through simple extrapolation to be 77.6 or 78. Although the utility curves in general are non-linear, the extrapolation procedure introduces an error of such a minor nature as to be tolerated for the purpose at hand.

Results of the third and final activity Step for Step 6 are indicated below. Formed in this regard is a Valuation-Matrix. The elements of this Valuation-Matrix are the elements of the Alternative Score Matrix or Decision Matrix transformed into their relative utility values:

	Utility Value per Criteria									
Alternative	1	2	3	4	5	6	7	8	9	10
1. Flextime	100	100	100	88	87	100	85	100	100	57
2. SWHP's	100	82	100	88	61	75	56	100	100	57
3. Std. 5/40	100	73	75	63	61	63	56	51	100	57
a. 5/37½	88	82	75	63	73	63	69	51	100	57
4. 4/40	52	89	64	50	100	63	100	74	46	85
b. 4/32	28	89	64	100	48	63	43	51	26	93
c. 3/36	28	89	64	75	36	38	31	51	10	100
Utility Curve	16	20	21	11	10	11	8	1	5	14

Step 7 - Establish a Weighted Valuation Matrix by taking values of the Valuation Matrix and multiplying such by determined criteria weights.

The Valuation Matrix established by Step 6 is sufficient for the decision-maker to compute a Figure-of-Merit or to apply a predetermined decision-choice rule if and only if criteria concerned are given equal weight in the selection process. However, per Steps 3 and 4 above, the decision-maker has chosen to assign weights to the governing criteria. It is the function of Step 7 to apply these weights. The incorporation of these weights must necessarily be performed at this particular point, i.e., after the completion of Step 6, the assigning of applicable utility functions. Should weighted values have been directly taken into account

by transforming the Decision Matrix into a Valuation Matrix, the activity of transforming individual criteria/alternative scores into quantities relating to a uniform scale ranging from 0 to 100, an activity necessary to apply utility functions, would have absolutely negated their value. Weighted values can only be applied after the application of utility.

The Weighted Valuation Matrix is presented below:

	Weighted Utility Value Per Criteria									
Alternative	1	2	3	4	5	6	7	8	9	10
1. Flextime	1000	900	900	616	522	600	425	300	300	114
2. SWHP's	1000	738	900	616	366	450	280	300	300	114
3. Std. 5/40	1000	657	675	441	366	378	280	153	300	114
a. 5/37½	880	738	675	441	438	378	345	153	300	114
4. 4/40	520	801	576	350	600	378	500	222	138	170
b. 4/32	280	801	576	700	288	378	215	153	78	186
c. 3/36	280	801	576	525	216	228	155	153	30	200
Weight Applied	10	9	9	7	6	6	5	3	3	2

Step 8 - Convert the row vector of the Weighted Valuation Matrix for each alternative through collapsing operations into a scalar quantity, called a Figure-of-Merit, by which respective alternatives can be compared.

Visual inspection provides no dominant, equality or contra-dominant relationships. It is therefore necessary to calculate a Figure-of-Merit for each alternative by applying the Pythagorean theorem. The results obtained are shown below:

Alternative	(Altn. Elements)^2	Individual F-O-M
1. Flextime	85,787	293
2. SWHP's	70,199	265
3. Std. 5/40	51,599	227
a. 5/37½	53,971	232
4. 4/40	56,007	237
b. 4/32	42,849	207
c. 3/36	34,824	187

The individual decision-maker now must apply the decision-choice rule to select the most appropriate work-scheduling alternative. If the decision-choice rule merely stated select the alternative with the highest Figure-of-Merit then naturally the concept of flextime with a Figure-of-Merit of 293 would be chosen. Other decision rules or choices might necessarily consider the top three Figures-of-Merit and use a particular criteria score as the decisive choice factor. Whatever the choice rule may be the decision-maker at this point must apply that rule to complete the selection process.

CHAPTER VIII

CONCLUSIONS AND RECOMMENDATIONS

Various innovations have appeared within the last decade which have concerned themselves with the handling of work-time. These innovations, while new and at times radically different from the standard, have provided management with an ability to employ time as a motivator and have further caused time to be looked upon as a resource much in the same manner as other resources.

Management, however, has not paid a sufficient amount of attention to the area. Although there have been shifts in management thought away from a traditional economic viewpoint of profit-maximization, to a more behavorial oriented approach, management has not fully realized the potential windfalls to be gained by the adaptation of a proper work-scheduling technique. All too often management has been concerned with keeping abreast with technical innovations, while at the same time allowing societal innovations to pass-by. It is strongly recommended that the degree of such concern be altered to such an extent that no less than a minor amount of attention be granted societal innovations. It must be remembered that the traditional approach to management is time-tested and of

proven ability, but so also are many features expounded by the behavorial approach.

The first step for management when considering a work-schedule revision becomes recognizing a need for change. Certainly, new work-scheduling techniques such as flextime, the four- and three-day workweeks and staggered work hour programs offer many promising benefits in their application. The subject-area and its resulting benefits need to be explored by management.

Once the need becomes recognized, it is essential that the management decision-maker address the situation by conducting a sound diagnosis of the problematic situation by identifying affected interest groups, defining decision objectives and assigning numerical weights to objectives. Next comes a prediction and an evaluation of all feasible alternative results followed directly by the selection of a method for identifying the best alternative. The results of these steps should provide management with a suitable scheduling technique which at times, strangely enough, may prove to be the one presently followed.

The essential point to be learned is that new innovative time-scheduling techniques should be explored, preferably as stated above, much in the same manner that

management would undertake an exploration of the improved use of other available resources. Many distinct advantages can be gained by doing so. For instance, the flextime concept has been established as a vehicle which improves efficiency, productivity and absence and tardiness rates, while benefiting the employee by allowing and calling for a greater degree of self-realization in individual undertakings. The four-day week likewise has proven to be beneficial in increasing productivity and efficiency, and absence rates too have generally been found to have declined for participating companies. Unlike flextime, which appears to be ideally suited to professional type employees, but causes difficulty when applied to group operations, 4/40 appears to be universally applicable.

The four-day week, however, does present problems that flextime does not, namely "moonlighting," and fatigue questions. The three-day week merely magnifies these problems. Staggered work-hour programs have been found to be most beneficial when applied to conditions existing where facility usage patterns experience congestion, i.e., congested transportation facilities, elevators, etc. It is recommended that contemporary management become aware of what exists in the field of work-schedule changes and

explore the possibility that one of the new innovations in the area may well be suitable for specific individual enterprise application.

When considering a definite desire to apply a new work-scheduling technique, it is recommended that a systematic approach to problem solving be used. This type of approach would enable the decision-maker to achieve specific objectives more efficiently and effectively. Such an approach considers the entire situation surrounding the problem, as opposed to examining separate problem parts which, at most, considers only parts of the entire situation. It is further recommended that individual decision-makers examine in quantitative terms the relationship existing between various alternatives and preliminarly decide upon decision-choice rules by which the ultimate selection will be performed. The latter being recommended strongly.

In concluding, let it be said that the basic problem addressed is one of blending company goals with worker self-realization concepts. Reduced by any incorporation of a new work-scheduling technique must be the degree of the referred to "attraction-antagonism" relationship an individual holds toward the pace of life enforced by employer work constraints. An increase in the actual degree of worker job freedom experienced or even the

degree of freedom thought to exist will prove beneficial both to management and labor.

Should history be a reliable indicator, the standard workweek of five eight-hour days will eventually give way to another form of work-scheduling. It is felt that although flextime appears to be substantially more beneficial and applicable to most contemporary enterprise operations, in the long-run the four-day workweek will become the standard. It is difficult for the author to conceive that the hours associated with a normal workweek can do anything but eventually decrease to an amount which approaches a ten, fifteen or even twenty per cent reduction. Flextime appears only to be a catalyst to this reduction, or a forewarning which will prepare and maybe even force management to consider other innovative changes.

The projected ultimate workweek was a topic of discussion in Chapter II. The projection presented by the author referred to expert evaluation that the ultimate workweek may well be thirty-hours long. Viewing this projection in the Spring of 1976 presents problems in foreseeing the exact configuration of such a workweek. Will it be based on a four-day concept of 7½ hour days? Will it be a three-day configuration with 10-hour days?

Conjecture as to the format and the ramifications associated with such a format would best be left to consideration by futurists. Realistically speaking however, logical deduction insists that new alternatives in the field that are truly feasible will appear eventually. With a conclusive and proper discussion of these alternatives through an updating of Chapters II through IV, the procedure conveyed by this Thesis will enable future decision-makers, perhaps decades removed, to arrive at a suitable conclusion to the question of which is the proper work-scheduling technique of their time.

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Supermarkets General Corporation

301 Blair Road, Woodbridge, New Jersey 07095

ecutive Offices 201-636-2400

May 3, 1976

Mr. John Oak
Department of Industrial Engineering
New Jersey Institute of Technology
High Street
Newark, New Jersey

Dear John,

Thank you for giving me the opportunity to review your Master's Thesis "Nonstandard Workweek Technique Selection".

I found the thesis extremely interesting, especially since I was not aware of the tremendous impact nonstandard workweek scheduling is presently having on the industrial world. Your research, presentation, and writing ability are to be commended. As an aside, your thesis is one of the largest, relative to the number of pages presented, that I have ever seen.

Concerning constructive criticisms or comments, let me say the following:

1 - Feedback from actual corporations using nonstandard workweek scheduling perhaps would have enhanced your presentation. A preprinted form mailed to "X" number of companies would have satisfied this concept.
2 - I personally feel the thesis was a little too verbose.
3 - Your mathematical analysis might "snow" the average reader who is interested in the topic of nonstandard workweek scheduling, but is not grounded in mathematical or operations research type presentations.

Outside of the above minor criticisms, you did an excellent job of presenting your material in a professional manner.

At your convenience, I would appreciate receiving a copy of your completed thesis. As SGC is a rather progressive company, I believe this concept of nonstandard workweek scheduling might perhaps have an excellent chance of succeeding in an environment such as ours.

Thank you once again for allowing me to review and comment on your thesis. Good luck in your future endeavors in the business world.

Sincerely,

Dan Walsh
Manager, Operations Research

THE PORT AUTHORITY OF NY & NJ

One World Trade Center
New York, N.Y. 10048

Planning and Development
Department
Edward S. Olcott, Director

Warren B. Lovejoy, Manager
Central Research and
Statistics Division
(212) 466-8691
(201) 622-6600 x8691

May 5, 1976

Mr. John A. Oak
866 Harned Street
Apartment 6C
Perth Amboy, New Jersey 08861

Dear John:

I've had a chance to look over your Master's Thesis entitled "Non-Standard Workweek Scheduling Technique Selection " and find it to be an extremely comprehensive effort. I've not seen a better presentation of the four-day week, Flexible and Staggered Work Hours all in one place and extensively documented.

Although it's probably too late for inclusion, I'm forwarding to you under separate cover, along with your thesis, two reports we've recently prepared on Flexible Work Hours at the Port Authority and an international survey of the current practice of Staggered Work Hours.

I would hope to receive a copy of the finished Thesis. It's an excellent job.

Sincerely,

Carl S. Selinger
Project Manager
Staggered Work Hours

CSS:hle

Enc.

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6-72

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OUR FILE
IN REPLY TO
YOUR FILE

May 5, 1976

Mr. John A. Oak
866 Harned Street
Perth Amboy, New Jersey 08861

Dear Mr. Oak:

Per your request, I have personally reviewed your Master's Thesis entitled "Non-Standard Workweek Scheduling Technique Selection." I found the Thesis to be both conclusive and interesting.

The scope of the Thesis was found to be most conclusive. You appeared to sufficiently cover the gamut of nonstandard workweek options and did so in a manner which presents concerned individual readers with a clear picture of available options of the topic at hand. Specifically, sufficient detail about the major concepts Flextime and the Four-Day Workweek were presented in proper depth. In addition, while the major concepts would in all likelihood be selected for contemporary business application, the discussion of the minor concepts (Staggered Work Hour Programs and the Three-Day Workweek) also carried a degree of appropriateness, and therefore, were rightfully included as supplements. Together all concepts discussed presented a full view of the available nonstandard workweek spectrum.

Supplementing your discussion correctly was your multi-stepped discussion method brought forward for the ultimate selection of a proper alternative. The method appeared to be uniquely suited to the selection situation at hand. Probably the most noteworthy feature of the method presented was its ability to encompass as many pertinent criteria as

the potential decision-maker deems necessary. One point of interest that should be mentioned is that should a single decision-maker be charged with determining the selection of a proper alternative, safeguards should be instituted to guard against personal bias. Possibly a committee with decision making responsibility and authority would eliminate such potential bias situations.

In closing, let me state that I found your Thesis to be of high quality. I wish you personal success in your future endeavors.

Sincerely,

R. S. Cameron
Management Administrator

:LCR