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# COMPENSATING INDUSTRIAL EFFORT

A SCIENTIFIC STUDY OF WORK AND  
WAGES

By

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To  
FRANK W. TAUSSIG  
AND  
GEORGE O. VIRTUE



## PREFACE

In the end the success of every business or other venture comes back to the men and women upon whose labor and thinking all creative work depends. So it is that the problem of getting every worker to give the best that is in him or her is of vital concern to every manager of an individual business, to every industrial and economic statesman.

This book, which is a sort of sequel to my *Economic Motives*, deals with this great problem of work-incentives. It is broader than either mere money rewards or physical production. Its subject matter has application in three important purposes, namely, (1) the improvement of labor management, including the management of executives and salaried specialists, from the standpoint of proficiency in production or other operations; (2) promotion of the well-being of the human factors; (3) making further headway in the pure sciences concerned. These applications are of course closely interwoven.

The book assumes frankly that the reader recognizes his practical problem, even in a single business, as one with which he cannot adequately cope except through application of thorough scientific method. The book endeavors to assist him in such an attack. It acquaints him with important facts, principles, and research methods which are relevant to the chief problems of work-incentives. It draws together and integrates for him things that have been learned in the fields of economics, personnel and general management, and industrial psychology. Its conclusions are general in scope and apply to motivation and remuneration of mental as well as manual personal services, in non-profit as well as profit organizations. It places considerable emphasis upon statistical treatments of the simpler kinds. For while it is true that human affairs to a large extent defy measurement and prediction, yet quantitative scientific measurements are capable of continually increasing understanding and control of them—especially, perhaps, because they tend to neutralize our

human weakness for selecting those cases which conform to our prejudices and neglecting and forgetting those which do not.

My thanks are due to the following publishers who have kindly permitted me to use materials from recent works published by them, as well as to the authors of these works: American Economic Association, American Society of Mechanical Engineers, Columbia University Press, E. P. Dutton & Co., Inc., Harper & Brothers, Harvard University Press, His Britannic Majesty's Stationery Office, McGraw-Hill Book Co., Inc., Personnel Research Federation, University of Pennsylvania Press, Viking Press, Inc., and Williams and Wilkins Co. A few specific personal obligations are acknowledged in footnotes below; and some others, of a more general sort, must be noted here. Mr. J. B. Probst has generously supplied me his recent forms, and permitted me to reprint such parts as I wished. My researches on suggestions from employees have been abetted and encouraged by Mr. Waldemar Kaempffert and Dr. S. C. Gilfillan; various of my colleagues, notably Professors Charles B. Gordy, John W. Riegel, and Margaret Elliott Tracy have assisted me at sundry points; and furthermore my former students Charles Eubank and Paul Stanchfield have devoted, I fear, all too many man-hours of the very best quality to inquiries, drafts, and revisions which directly contributed to this book. This volume has also benefited greatly, I am sure, by my extensive correspondence with Mr. Durant Rose. My debt to Mr. Sam Mavor is much greater than is apparent from the numerous references to him and his firm in the following pages; for during nearly a decade he has been making generous and enlightening responses to my frequent notes and queries.

Problems of the stimulation and compensation of human effort, with due regard for protection of each person's mental and physical health, are very complex; but the need of workable solutions is pressing. It is hoped that the book will offer some measure of welcome aid. Whatever our purpose, scientific knowledge of causes and effects is indispensable for the fullest practical control of events.

Z. C. D.

Ann Arbor, Michigan,  
January, 1937.

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**PART I**  
**HUMAN NATURE IN WORK**

## CHAPTER 1

### WORK, INCENTIVES, AND TYPES OF APPROACH

The following pages deal with some outstanding problems of work and wages, and the motivation and welfare aspects of each. How do these problems emerge, and what are the relations among them? Answers to these questions are suggested by the practical standpoints of the employer, the employee, and the citizen.

The employer regards the *wage* he pays as an incentive, by means of which he can get valuable work out of the employee. He knows there are many other factors, besides the wage, which affect the employee's performance, and he can easily conceive a great science of the effects of all sorts of circumstances on working efficiency. With the beginnings of this science we are concerned in this book. The employee, on the other hand, regards his *work* as an incentive, by which he can provoke the wage-paying reaction from his employer. The employee's practical problem is to get what he wants in the way of wages, working conditions, and so on, by means of work or the appearance of work. Members of "the public" (consisting of outsiders, relative to any particular employment relation) have still other special interests; such as cheapness, quality, steady supply of service, and the welfare of all persons affected by this or that feature of work, supervision, and pay. We shall study, in some degree, all these types of question; partly because each of us is likely, at some time, to be a member of the employing or employed group, as well as of the public; but mostly because all parties have to deal with the same set of underlying facts.

**Work.**—To what sorts of work shall we give our attention? Mostly to the commoner manual kinds, which are done under rather close supervision, on an hourly or output wage basis.

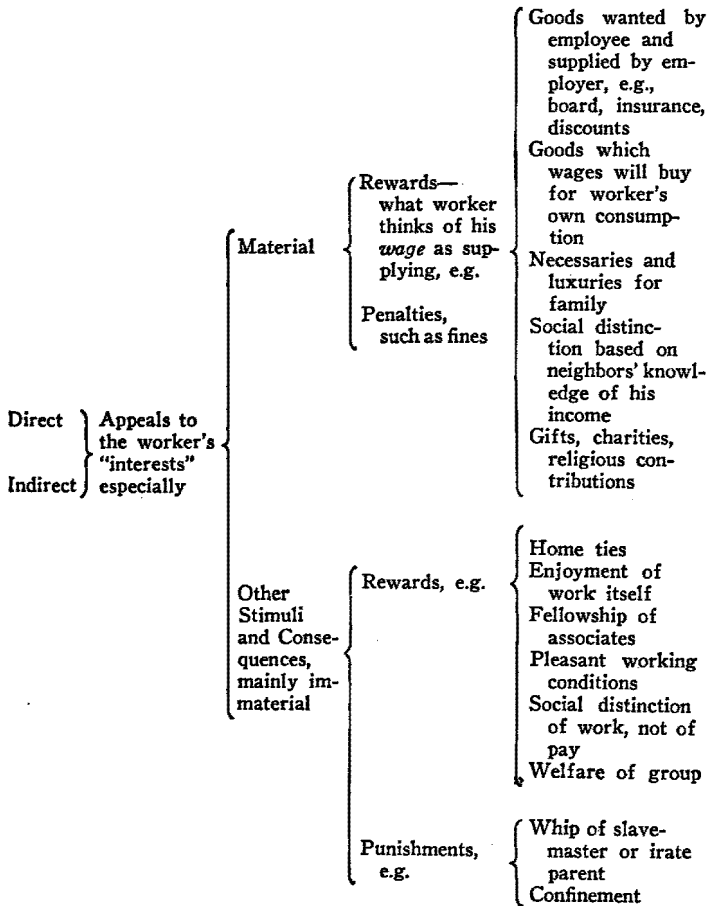
But we shall make some excursions into other employments, such as those of so-called salaried workers, of executives (in business and elsewhere), and of specialists like chemists and physicians. Occasionally we may even take for comparison uncommercial work like the chores and studies which are required of children.

Just what *is* work? An attempt at formal definition of this all-too-familiar phenomenon will lay a foundation for a clear-cut concept of incentives. Yet no one definition will suffice for all purposes. Of course the *employee* is not the only worker, still less the *manual laborer*; the teacher, the independent farmer, and the business executive all do work; and so let us beware of addiction to use of "the worker" as synonymous with "the employee" or "the manual employee." When people emphasize the contrast between work and play, they are often concentrating on the *disagreeableness* which characterizes much work with the joy of much play; and so they may tell you "Work is what you don't want to do, but are obliged to." We may easily convince ourselves, however, that not all work is disagreeable; in fact, in Chapter 20 below we shall find that there are some reasonable grounds for the assertions of optimists that eventually most of the world's work may be converted into play. We might define work as the satisfaction of some want, except that the same is true of play. Apparently all these characteristics of work are given their due by the economist's definition, "Work is any activity which you undertake, not as an end in itself (as is the case in play), but primarily for an ulterior purpose, such as a wage, a profit, mere 'experience' which is expected to be useful, or for the benefit of some person whom you want to help." Such work may or may not be inherently agreeable; if it is, then the activity satisfies at least two wants.

**Incentives; General Classification.**—These agreeable and disagreeable features (inherent in the work, and connected with the ulterior rewards) constitute *incentives* or motives to work. Some principal varieties may be outlined as follows:<sup>1</sup>

<sup>1</sup> Compare the somewhat fuller outline in Chapter 20, below.

INCENTIVES (STIMULI, MOTIVES) TO AND FROM WORK  
(Positive and Negative; Attractions and Repellents)



**Interaction of Pecuniary and Non-Pecuniary Incentives.—**

The expression "direct and indirect appeals" in our outline calls attention to the devious paths which our motives often take. A leading example of the indirect wage appeal is the prospect of promotion or of higher pay in the future, which often tips the scale in favor of an immediate reward which otherwise would not secure that worker for that job. Again, the installation of output and quality records among various crews whose operations are similar is likely to increase production, even if the men continue to work on a time-wage. Mr. Robert B. Wolf and others, therefore, have referred to such records as "non-financial incentives," and I shall argue later that to some extent they are non-pecuniary. But here we must notice that only a dull worker will not realize that his job and pay in the future will be more secure if he is a high-record man than if he has been associated mostly with tail-end crews. In this manner such comparative records supply incentive partially via an *indirect* appeal to the worker's interest in his *wage*.

This latter interest, again, as our outline says, breaks down into a number of specific attractions; so that the effectiveness of the wage stimulus is well known to depend on how keen the worker is for what he can buy with the wage of a given exertion. During the war, when wages of the commoner sorts of work were rising rapidly, many men began to prefer larger amounts of leisure to the wages which they thereby failed to earn; and a serious problem of absentism arose. Notice, too, that the wage incentive is not necessarily more selfish or less amiable than the satisfactions which are not mediated by money. One man may stick to a low-paying job, to the detriment of his family, in order to indulge his non-financial motive of laziness; while another may work hard for higher earnings, in order to provide more handsomely for wife and children or for philanthropy.

The next section of our outline deals with attractive inducements to work which are largely distinct from the wage or salary received. Listen to the eloquence of Mark Twain's Connecticut Yankee on this topic:

There are wise people who talk ever so knowingly and complacently about "the working classes," and satisfy themselves that a day's hard intellectual work is very much harder than a day's hard manual toil, and is righteously entitled to much bigger pay. Why, they really think that, you know, because they know all about the one, but haven't tried the other. But I know all about both; and so far as I am concerned, there isn't money enough in the universe to hire me to swing a pickaxe thirty days, but I will do the hardest kind of intellectual work for just as near nothing as you can cipher it down—and I will be satisfied, too.

Intellectual "work" is misnamed; it is a pleasure, a dissipation, and is its own highest reward. The poorest paid architect, engineer, general, author, sculptor, painter, lecturer, advocate, legislator, actor, preacher, singer is constructively in heaven when he is at work; and as for the musician with the fiddle-bow in his hand who sits in the midst of a great orchestra with the ebbing and flowing tides of divine sound washing over him—why, certainly, he is at work, if you wish to call it that, but Lord, it's a sarcasm just the same. The law of work does seem utterly unfair,—but there it is, and nothing can change it: the higher the pay in enjoyment the worker gets out of it, the higher shall be his pay in cash, also.

It may surprise some readers to learn that economists, also, from Adam Smith's day to the present, have recognized that we cannot thoroughly investigate the causes of wage levels without taking into consideration other attractions or repellents connected with the work.<sup>2</sup> Doubtless most people, on occasion and for part of the day at least, enjoy the activities of their work, apart from the earnings it brings them. It is proverbial that some workers, such as teachers, judges, ministers, bank clerks, and employees of powerful corporations, are

<sup>2</sup> Adam Smith said: "The five following are the principal circumstances which, so far as I have been able to observe, make up for a small pecuniary gain in some employments, and counterbalance a great one in others: first, the agreeableness or disagreeableness of the employments themselves; secondly the easiness and cheapness, or the difficulty and expense of learning them; thirdly, the constancy or inconstancy of employment in them; fourthly, the small or great trust which must be reposed in those who exercise them; and fifthly, the probability or improbability of success in them."—*Wealth of Nations*, Bk. I, Ch. 10 (1776).

All these are, directly or indirectly, supply-and-demand factors, which influence wage rates. Alfred Marshall's is representative of the modern economic treatment of the subject: "Thus then the attractiveness of a trade depends on many other causes besides the difficulty and strain of the work to be done in it on the one hand, and the money-earnings to be got in it on the other. And when the earnings in any occupation are regarded as acting on the supply of labor in it, or when they are spoken of as being its supply

partly paid by the social prestige which attaches to their job. Personal relations with bosses and fellow-workers will normally affect any worker's diligence and loyalty. Occasionally we catch ourselves setting a money value on one or more of these immaterial attractions, as when we choose a job which carries lower financial return, rather than some higher-paid position which we might have. In effect we are then acting as consumers, buying the special attractions of the work or the living conditions which go with it, with the salary increment we might secure by sacrificing them.

**Positive and Negative Incentives.**—In the foregoing paragraphs we have dealt mainly with positive attractions. What may be said of negative incentives, repellents, or deterrents? On some occasions the pecuniary or material circumstances exercise negative force, in that holding a job means a net loss of our substance; the expenses of the job may even be greater than the pay, including perquisites. Ambassadors, governors, and many (other?) philanthropic workers furnish illustrations. Evidently the immaterial attractions are sufficient to overcome the pecuniary penalty. But the most common sorts of deterrent motives in work are those which are overcome by the pay—e.g., the toils and dangers of labor, its confinement and monotony, and the petty or grand irritations of the bosses and fellow-workers. The final section of our outline refers to the painful or negative incentive of punishment. Into this class fall, not disagreeable features inherent in the work, but unpleasant alternatives which the worker must accept if he refuses to work—alternatives which may be more disagreeable to him than is the work. Corporal punishment and confine-

price, we must always understand that the term earnings is only used as a short expression for its 'net advantages.' We must take account of the facts that one trade is healthier or cleaner than another, that it is carried on in a more wholesome or pleasant locality, or that it involves a better social position; . . . Of course individual character will always assert itself in estimating particular advantages at a high or low rate. Some persons, for instance, are so fond of having a cottage to themselves that they prefer living on low wages in the country to getting much higher wages in the town; . . ."—*Principles of Economics*, Bk. VI, Ch. iii, § 8 (6th ed., 1910).

One of the best modern economic treatments of all these matters is that of Professor F. W. Taussig in his *Principles of Economics*.

ment in prison are such incentives. They are fortunately rarer in our time and place than they have been in other epochs; it is chiefly for the sake of logical completeness that we notice them. Yet the topic may not be quite so obsolete as it seems, as was indicated fifty years ago by the German economist, Adolf Wagner. Wagner published a classical treatment of incentives to work, grouping them into five classes: (1) desire for livelihood and fear of want; (2) desire for approval of master and fear of punishment; (3) desire for praise and fear of being despised; (4) the impulse to activity or joy in work and dislike of inactivity; and finally (5) the moral command and fear of conscience. P. Sargent Florence has suggested for these the following nick-names, in the manner of Carlyle and Marx: The cash nexus (i.e., bond, between worker and work), the beat-or-treat nexus, the fame-or-shame nexus, the hobby nexus, and the duty nexus.<sup>3</sup> Wagner was sympathetic in many ways with the socialist ideas of his day; but he considered that, if a socialist state made all men's livelihoods secure and decreed substantial equality of incomes for all people, it would thereby relinquish use of the cash nexus, would try to rely on the amiable motives of duty, public spirit, and love of work; but might in the end have to make use of the whip and the prison cell to insure that every one did his share of the work. Reactionaries still consider this problem a poser for socialism of all degrees, and even an insuperable obstacle to any enduring extension of social-insurance principles; also the socialist Bernard Shaw intimates that a socialist state should force "Weary Willies" to do their share of work, and should not allow them the option of poverty and idleness.<sup>4</sup>

**Individual and Group Incentives.**—A grouping of incentives which has considerable practical importance, cuts across the above outline, and emphasizes individualist and collectivist motivations of the worker. We shall have occasion to notice

<sup>3</sup> See statements by Wagner in his *Grundlegung der polit. Ökonomie*, pp. 72ff. (3rd ed., 1892), or a condensed English version in *Quarterly Journal of Economics*, Vol. 1, pp. 117-129; and P. S. Florence, *Economics and Human Behavior*, p. 28; *Economics of Fatigue and Unrest*, p. 73.

<sup>4</sup> *The Intelligent Woman's Guide*, p. 72 (Brentano's, 1928).



this cleavage cropping out in several places. Most varieties of socialism, of course, claim that by proper arrangements people can be induced to work for the common good, without special rewards to individuals for extra-valuable work—in short, they propose to replace individualist incentives quite largely by collectivist. This issue is hardly an immediately practical one for us, but in every one's experience there are frequent collisions between some sort of *esprit de corps* and thoroughly individualist motives. Examples are furnished by the group bonus schemes, which have rapidly gained ground against time work, and—to some extent—against individual piece work; by loyal trade unionists, who not infrequently sacrifice their own immediate material interest for what they conceive to be the larger welfare of their group; and by the rivalry between the individual-reward and the team-work principles in groups organized for the promotion of research and invention.

**Approaches and Emphases.**—The foregoing outline and other schemes may be supplemented by yet another schematic diagram, to indicate the blocks out of which we may build our incentive principles:

LOGICAL PROBLEM-GROUPS	CORRESPONDING SPECIALIZED LITERATURES
1. Causes determining <i>amount</i> of wage (a) Of types, occupations (b) Of individuals	Economic theory, qualitative and quantitative
2. Relative <i>efficacy of various stimuli</i> or factors in getting work out of workers (a) Wages, material rewards (b) Other incentives and conditions of work—conscious and unconscious	Industrial and personnel management Some applied economics Industrial physiology and psychology
3. Broad <i>social consequences</i> of various work-and-pay situations	"Welfare economics" Sociology Industrial psychology

In this book we shall be concerned chiefly with the first and second problem-groups, as is indicated by the general headings in our Table of Contents. Matters which we are to consider in-

clude effects of various wage methods, hiring methods, labor organization policies, and still other factors on the performance of work; also economic theory and evidence on the determinants of wages. Generally the scope of this book is rather similar to the books of the English economists Schloss, Cole, and Pigou;<sup>5</sup> and like these authors, I cannot forbear some excursions into problem-group 3, the comparative social consequences of specified work and stimuli. A scientific efficiency study might demonstrate, for example, that it will "pay" an employer to offer less than the market wage to ignorant workers, or a high wage coupled with unwholesome working conditions. Another study may show it will "pay" a labor group to pursue certain restrictive policies. Yet a broader view would show that the long-run social consequences of such arrangements are undesirable.

**Empirical-Statistical Conception of a "Factor."**—Within problem-group 2 of the outline just exhibited (relative efficacy of various stimuli), we shall give primary attention to wage methods, making little attempt to survey in detail the multitude of studies on the influence of ventilation, noise, hours, rest pauses, nutrition, stimulants, climate, and other "factors in efficiency." We attempt, however, to import into the subject of wage methods something of the experimental and statistical point of view which characterizes the natural science types of research on working conditions. It is generally admitted that such infusion is needed. As Florence says,

These various [wage] schemes are described in detail in numerous text-books, but it is seldom that we are given any scientific information as to the specific measure of success in increasing output or decreasing output costs. Changes in method of payment are usually introduced.

<sup>5</sup>D. H. Schloss, *Methods of Industrial Remuneration* (London, 1892); G. D. H. Cole, *The Payment of Wages, a Study in Payment by Results* (London, 1918); A. C. Pigou, *Economics of Welfare*, Pt. III of first edition (London, 1920). Many other books on general wage principles and methods might be cited—some are mentioned in my later chapters. See also *The Problem of Incentives in Industry*, by G. H. Miles, D.Sc., Director of the National Institute of Industrial Psychology (London: Pitman, 1932). This small volume contains three rather brief and generalized lectures. Dr. Miles' organization has been a potent factor of late years in improving British labor management methods.

with changes also in organization, in methods of work, in training, or in other items of the scientific management repertory; so that however sensational the improvement in efficiency may be, it is impossible to attribute it to any one factor. . . .

In the course of the next few years there will no doubt be a further installment of books describing over and over again the subtleties of this or that system. May we urge prospective authors to devote less time to this recapitulation, and more to collecting and disentangling actual results? <sup>6</sup>

Material up to this specification is still extremely meagre; but at least we can make a critical examination of the problems involved. (See especially Chapter 15, Wage Experiments.)

In addition to wages, as the foregoing discussion indicates, we shall take some account of other attractions and repulsions, mostly those of which the worker is *conscious*. Included are such characteristics as a Whiting Williams may find, by skillful interviewing, to constitute a worker's idea of a "swell job" or a "rotten job." In American management literature, to be sure, "incentive" is often used synonymously with "production bonus," or "extra wage based on output" (F. W. Taylor referred to the older piece work and bonus practice as "the system of interest and incentive"): but in this book the term is used in the wider sense suggested by the dictionary and by Wolf's expression "non-financial incentives."

Indeed, scientific research makes it clear that these pecuniary and non-pecuniary, material and immaterial, rewards and punishments of which people are conscious, shade imperceptibly into factors like noise, rhythm, posture, monotony, and colors, which condition work efficiency without any one's realizing the fact until careful experiments are made. In the long run, studies of all conceivable factors in efficiency and welfare, regardless of whether employees or bosses realize their existence, or seem to care anything about them, must be integrated to make a full science of work and pay. And researchers in quantitative psychology frequently use the words incentive and motive in this most comprehensive way. In A. B. Crawford's *Incentives to Study*,<sup>7</sup> for example, statistical in-

<sup>6</sup> *Economics of Fatigue and Unrest*, p. 255.

<sup>7</sup> Yale University Press (1928).

vestigations are reported as to the effects on students' work, not only of the marks given by instructors, outside work, college activities, and scholarships given to students who achieve high marks, but even of intelligence-test ratings and characteristics of parents. Scientific students of fatigue and other factors in efficiency have repeatedly warned us that it is difficult or impossible to control the important factor of incentive, or will to work, in the subjects who are under observation.

A keen industrial psychologist has argued explicitly and cogently for the statistical conception of motives:

One of the most common inquiries is that concerned with the motivating factors that lead to increased or decreased productive effort. One kind of answer talks much of economic motives, creative instincts, and the like. Another sort of answer, and the one we would give, says frankly: We know very little about this matter and it is extremely difficult to obtain clear facts that throw light on the activities. However, we can collect some concrete evidence which will be helpful, and as we amass more and more such evidence we shall gradually have our answer to motives. We shall study the influence on the productive efforts of workers of such factors as hours, method and arrangement of wage payment, the age, schooling and nationality of the workers, the kind of work, the kind of management, the extent of organization among the workers, and so on through a wide range of facts. We shall study these relations by comparing different groups and different plants, by comparing results under changed conditions in the same plant, by detailed study of the feelings and attitudes of individual working people and by any other scientific methods that we may hit upon.

We are likely to be told that this is all very fine, but it is not a study of motives. Our reply is that it *is* a study of motives. . . . We believe it represents the only sort of fruitful inquiry into motives. To say that factual studies of this kind are not studies of motives is to imply a mystical conception of motives which sees them as special inner driving forces which are more than mere formulations of observed causal relations among acts and the events associated with the acts.<sup>8</sup>

Of course a great deal of unintelligent statistical work is done which gets us nowhere; sensible interpretation is indispensable. And of course an external condition like "untidi-

<sup>8</sup> A. W. Kornhauser, "The Motives-in-Industry Problem," *The Annals*, November, 1923, p. 114. A somewhat opposed emphasis appears in the writings of E. Mayo, cited below.

ness" may be difficult to define and may affect different workers in different ways. We can scarcely hope to decide once for all that a certain objective feature has a certain effect on work. The interacting forces are doubtless infinite in number, and many of them may always defy our efforts at measurement. In this sense the current talk about "total situation psychology" is salutary. If it is suggested, however, that *all* attempts at measurement in economics and psychology are futile, the reply may be made that certain factors, such as wage methods, exercise such a strong influence, compared with the innumerable other factors, that even the crude measuring technique we now have will demonstrate much of their effect. And scientific ingenuity is constantly bringing more factors into the domain of measurement or quasi-measurement. For dealing with the bewildering multiple causation in human affairs, the old-fashioned logic of causation has developed, through the old-fashioned logic of probability, into modern statistical methods of trial-and-error correlations, whereby not only the *existence* of influence but the *degree* of influence of many factors may now be more rigorously demonstrated.

In order to clarify these concepts further, and in order that we may give something like due weight to the worker's nature and history in considering the main factors or incentives of various work situations, it seems wise to devote the next two chapters to a review of relevant psycho-physiological principles. Any reader who finds these too detailed for his own purposes may pass over them hurriedly, and pick up the subject of wage methods in Chapter 4.

## CHAPTER 2

### INDIVIDUAL DIFFERENCES IN HUMAN CAPACITIES AND INTERESTS

Our perspective on all incentive problems is much affected by the spectacles of human nature theory through which we view them. Industrial psychology and physiology are particularly important, moreover, in one branch or function of labor administration: namely, the determination of a "fair day's work," and the extent and causes of willful restriction of output. In the present chapter we shall lay out some tools for tackling these problems, drawn from studies of human variability in work and work-aptitudes.

**Proficiency Measurements.**—What variations are found in the accomplishments of different people in similar tasks? What factors contribute toward causing these differences? Even the first of these queries is more difficult to answer accurately than might be supposed, because it is seldom possible to measure a worker's total service in a given time, with very high precision. The problems of such measurement will be discussed further in Chapter 7 and elsewhere below; but meanwhile we may obtain some useful preliminary notions by surveying a few investigations which have used two main types of evaluation of individual accomplishments. These two types are: (1) units of output as counted for piece and bonus payments, e.g., tons of coal loaded or number of rivets hammered in; and (2) special test performances or trials, such as the trade tests given in many employment offices, or the "achievement tests" in arithmetic, spelling, and countless other academic subjects, which are used now in most schools. These two types of measurement will give somewhat divergent rankings of the same people, for the special tests amount to short time spurts, and the person who is a hare for speed and accuracy in such a test may often be

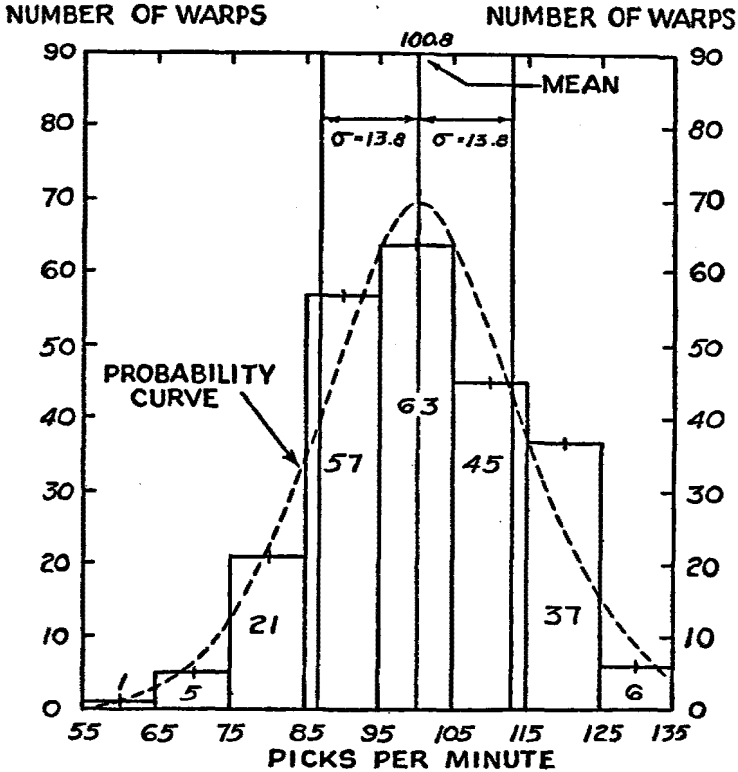


Figure I. Distribution of Time Rates of Production of 235 Warps of Silk Cloth (each warp 455 yards long). (After Elton)

less productive over a long period than his neighbor who is a tortoise. Yet the scientific study of individual differences has to rely heavily on short test scores, for the investigator usually finds that only by means of such sample performances can he collect cases of work done, under conditions which are known to be sufficiently similar or standardized for all competitors, in numbers which are large enough to be statistically significant.

**Sample Spreads of Proficiency; Weavers, Typists.**—An example of the variability of piece workers' outputs is given by Figure I, which is based upon an unusually careful research

in this field.<sup>1</sup> This chart shows the rates of production, in terms of "picks" or cross-threads per minute, in the weaving of 235 "warps," of about 455 yards each, of the same grade of silk cloth, in a British factory during several months on looms of the same type and speed. This chart shows that the times actually taken to weave these 235 pieces of cloth, by weavers who were working at piece rates, varied from 70 to 130 "picks" per minute,—if we disregard one isolated observation of 62 as freakish or abnormal. The ratio of best to worst normal performance, therefore, in this case was nearly two to one.<sup>2</sup> Elton's report is not clear as to how many weavers produced these 235 warps of cloth, but it appears that at least 125 weavers, of not less than three years' experience each, were studied by this investigator over a number of months; and that a variety of evidences indicated that the data of Figure I give a conservative reflection of the differences in efficiency among them.

To the foregoing illustration of long-run differences in outputs of piece workers we may now add an example of differences in scores made by competitors in a short trade test. A standardized typing test was given, in Minneapolis and St. Paul, Minn., about 1932, to 318 female typists; the scores are expressed in words written per minute, adjusted for errors. (One scheme, often used for such adjustment, is to deduct five words for each error; and to define a "word" as a fixed number of type-strokes.) The average score of the 135 employed typists was 57.8; the total range from 19 to 86; and the coefficient of variability 25.88. The 183 unemployed women, each of whom convinced interviewers in one of two public

<sup>1</sup> Adapted, by permission of H. M. Stationery Office, from P. M. Elton, *An Analysis of the Individual Differences in the Output of Silk-Weavers*. Industrial Fatigue Research Board (of the British Government; now called Industrial Health Research Board), Report No. 17 (1922), p. 9.

<sup>2</sup> Another measure of the spread between highest and lowest efficiencies is given by Pearson's Coefficient of Variation =  $\frac{(\text{Standard deviation})}{(\text{Arithmetic mean})} \times 100$

This coefficient, whose value is 13.8 in the above weaving example, is superior to the simple ratio of highest to lowest performance, because the former is affected much less than the latter by errors or abnormalities at the extreme ends of the scale.



employment offices that she was an experienced typist, made distinctly lower and more variable scores; those who claimed one year of experience or less made somewhat better average records than those claiming over five years; but those claiming least experience showed greatest variability—mean score, 15.82; total range, -0.7 to 71.0; coefficient of variability, 40.50.<sup>3</sup> No doubt these “years of experience” varied greatly as to quality and also as to actual totals of practice; and more skillful training and motivation doubtless could have raised the capacity of most if not all the employed, as well as the unemployed, typists quite appreciably. Nevertheless, it is well established that equal increments of practice and training do not by any means reduce all trainees to a common level of ability.<sup>4</sup>

Such variations in output and in test scores as were cited above illustrate the important general principle, which, however, is subject to various qualifications (some of which we shall discuss in a moment), that any sizable working group will contain a majority who are at or near the average of capacity and performance, and also minorities straggling out toward the “tails” of the frequency-curve, showing highest and lowest capacities. Our unemployed typists, whose best score was 75 and worst -7.6, exemplify extreme variability, due in part to the short test spurt method of measuring ability, and still more to the great heterogeneity which is to be expected within any army of job-seekers in a little-skilled occupation during a dark depression. Our employed typists, whose best score was 86 and worst 19, show the selective effect of ordi-

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<sup>3</sup> See J. G. Darley, D. G. Paterson, and I. E. Peterson, *Occupational Testing and the Public Employment Service*, Tables VI and VII, p. 19 (Univ. of Minnesota Employment Stabilization Institute, Sept. 1933). I have computed the coefficients of variability given in the text above.

<sup>4</sup> A fragment of evidence gathered by Wyatt on this point is cited below, on page 28; and another may be found in E. Farmer, *Motion Study in Metal Polishing*. Rept. No. 15 of Indust. Health Res. Bd., pp. 27-31 (1921). Farmer's tables, relating to female roughers and polishers of spoons, paid by piece rates, show that the time taken for a standard operation by 26 different workers varied as much as 5 to 1; that these differences were not explicable by variations in length of experience; and that, after special training based on motion study, the slowest worker took a little more than twice the time taken by the most efficient individual.

nary hiring and firing methods upon the distribution of abilities as measured by a spurt test; though in various ways it falls short of measuring adequately the spread in *capacities for sustained and all-around achievement* of these same individuals. Still less does this latter ( $4\frac{1}{2}$  to 1) ratio represent the variations in *all-around and sustained actual performance or productivity* of these people; for even if such total merit could be measured well, the methods of remuneration used with these workers were probably such as to cause the individuals of highest ability to refrain from exerting themselves, steadily, as much as did the less capable folk. Finally, our weavers' ratio of approximately 2 to 1, between best and poorest performance for a good-sized standard job, is probably typical of a homogeneous group of experienced and skilled piece workers.

**Causes of Such Variations.**—No doubt there are innumerable factors which operate more or less independently of each other to produce these individual differences in outputs and test scores; but further discussion of a few which are of outstanding importance will enable us to realize better how much and how little it is possible to predict about the spread of abilities within a given group of people. Let us consider six factors, namely: (1) the number of people measured, with reference to a given sort of performance or ability or capacity; (2) the technique of such measurement, including known and unknown handicaps on some or all the individuals; (3) the distribution of elementary physical and mental traits among a given race, age, and sex; (4) variations in interest and perseverance factors among members of our group; (5) variations in their susceptibility to fatigue; and (6) variations in the methods, motions, and techniques employed by the individuals in a given job, and in their relative dexterity or skill within any given motion or method. The first five of these factors will be discussed in the remainder of the present chapter; and the sixth will receive further attention in the latter part of Chapter 3.

**Number of Subjects Measured.**—This first item need not detain us long, but it is worthy of emphasis by being set

apart. Generalizations which are based upon measurements of less than, say, 100 individuals, who are homogeneous with respect to characteristics like race, sex, and age, must be accepted more tentatively than those based upon 100 or more. After general principles are verified by observations of numerous cases, we shall probably be no more able than before to predict the capacity of any one individual, whether he have few or many immediate comrades; but we shall be able to generalize more confidently about distributions within large groups, and also about the probabilities to be expected, with reference to any given person. The arts connected with these individual differences, in fact, are founded upon laws of chance which are similar to, and in part identical with, those which underlie the art of life insurance.

**Technique of Measurement.**—Another factor, or group of factors, includes external limitations on the individual's power to increase "his" output; e.g., the condition and speed of his machine.

Thus, worker A may be credited with less output than Worker B, in part because A's equipment was less easy to operate than B's—the former operator was carrying an undetected handicap. Or the speed of the machinery or supplies of material or the ease of the task may have set an upward limit on individual products, which say half or one-third of the members of the group could reach,—and none could surpass, however competent. This last condition might account for a curve of outputs which is negatively skewed—the right-hand "tail" cut sharply off, somewhat like the Feb.-Mar. 1917 chart, Figure VI, page 129, below. Analogous distributions result, in school tests, when the problems are nearly all too hard, all too easy, or too few for the time allowed, to bring out clearly the variation in ability within the group taking the examination. If we set out to make a thorough study of this factor of external handicaps which may prevent each competitor from demonstrating the full measure of his capacity, in fact, we should be led on and on through a great lore of technique dealing with standardization of working and testing conditions—a

matter on which scientific management people have laid considerable stress.

**Distribution of Elementary Physical and Mental Traits.—**

In an important degree, differences in working capacity and accomplishment are caused by variations in simpler physical and mental qualities. Both sorts of variation, moreover, may be discussed fruitfully only with reference to the basis of selection of the group whose members are being measured. The data discussed above, for example, show a very different distribution in means and extremes of ability, among employed as compared with unemployed typists; and we naturally expect that almost any sort of employment will imply the operation of selective factors—that only a minor fraction of the people *least* suited by aptitude and experience are to be found actually trying to practice a given occupation. It might be expected, therefore, that the variation of simple physical and mental traits among members of a whole population, selected only by the obvious factors of race or nationality, age, and sex, would be much greater than the differences in outputs among fellow-workers in a given business establishment; but such evidence as is available seems to show that the latter differences are somewhat more pronounced than the former,—especially if we remember that unsuitable motivation and undetected handicaps commonly prevent individual differences in capacity, or even in actual achievement, from revealing themselves clearly. The nature of the distribution curves which would be shown by really adequate measurements of capacity is therefore a subject on which experts disagree.

The orthodox view among psychologists, as to the general range of human aptitudes, is stated thus by Professor Clark Hull: "We shall probably not be in great error if we conclude that *among individuals ordinarily regarded as normal, in the average vocation the most gifted will be between three and four times as capable as the poorest.*"<sup>5</sup> A further assumption

<sup>5</sup> *Aptitude Testing*, p. 36 (World Book Co., 1928). Italics in original. Hull supports this proposition by references to mental and educational test scores, also nine studies of variations in efficiency among employees. Many other data on individual outputs of workers are now available, in literature

which is also very common among scientists, is that such abilities are distributed, in each large group of a given race, age, and sex, by a symmetrical probability curve. This notion was suggested by Quetelet about 1871, on the basis of a few bodily measurements, such as adult stature. It will be observed that the actual outputs charted in Figure I, page 16, above, fall rather close to the dotted probability curve. Is such correspondence a rare occurrence, or is it normally to be expected?

In a recent monograph Dr. David Wechsler has dealt with 89 collections of physical and mental measurements, nearly all of them containing 100 cases or more—some, in fact, based on tens and even hundreds of thousands. The accompanying table presents a few specimens taken from Wechsler's master table.<sup>6</sup>

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not cited by Hull; but I have not seen any comprehensive and quantitative treatment of them—aside from studies such as those referred to in Chapters 8 and 12 below.

An unusually comprehensive statistical analysis of piece work earnings of members of a single large craft of skilled workers, in a single establishment, is to be found in E. B. Alderfer, *Earnings of Skilled Workers in a Manufacturing Enterprise, 1878-1930* (University of Pennsylvania Press, 1935). These journeymen, called "shapers" in some textile trade whose precise nature is not disclosed, increased in number from 98 in 1895 to 974 in 1914, after which year their ranks declined somewhat, reaching 685 in 1929, the last year before a considerable displacement was effected by mechanization.

Alderfer gives a chart (p. 40), showing the frequency distribution of average weekly earnings of most or all the 900 journeymen for 1916. This curve is nearly symmetrical, though the mean, \$16.79, is perhaps one dollar higher than the mode. The range is from \$24 at one extreme to \$8 at the other; but these few men may have had unusually many or few hours of work, on the average, for each week in which they worked at all. The highest producers, therefore, tended to earn perhaps not over 2½ times as much as the lowest in equal hours of work. The standard deviation for 1916 was \$2.40; hence the coefficient of variability was 14.31. For other single years in the complete series, 1895 to 1930 inclusive, the total ranges are not given, but Alderfer's table (p. 43) shows for each year the mean, the standard deviation, the coefficient of variation, and a coefficient of skewness of the frequency-distribution. The coefficient of variability showed remarkably little trend upward or downward, though in 1921 it reached a low of 8.73, and in three of the years 1900-1904 it went a little over 21. The annual coefficients of skewness are so small that it is evident the frequency-distribution each year was nearly symmetrical up to 1930, when a sharp cleavage (bimodal distribution) appeared between earnings of machine and hand "shapers."

<sup>6</sup>*The Range of Human Capacities* (Williams & Wilkins, 1935). I am reproducing these data by permission of the publishers. See also Indust. Health Res. Bd., Rept. No. 44, *The Physique of Women in Industry* (1927); and No. 71, *The Physique of Man in Industry* (1935). Each of the latter two monographs gives statistical data in great detail, based upon individual

EXAMPLES OF HUMAN VARIABILITY, CITED BY WECHSLER

Trait or Ability	Unit of Measurement	Number of Individuals and Description of Group	Mean	Standard Deviation	Coefficient of Variability*	Extremes	Range Ratio
Stature (at birth)	Inches	273 Male Infants (English)	19.69	0.63	3.20	22.4- 18.5	1.21:1
Stature (at birth)	Inches	209 Female Infants (English)	20.14	0.74	3.68	22.7- 18.2	1.25:1
Stature	Inches	1,219 Females (English), 21-32 years old	63.38	2.46	3.89	70.7- 56.7	1.26:1
Stature	cm.	96,239 White American Soldiers	171.99	6.63	3.86	194.9-152.6	1.28:1
Body Temperature	Deg. c.	121 Normal English Girls, 12-13 years	99.13	0.396	.399	100.0- 98.0	1.02:1
Body Temperature	Deg. c.	601 English Male Convicts	98.38	.486	.495	99.9- 96.5	1.04:1
Blood Pressure	Hg. mm.	1,216 Males, 18 years (col- lege students)	130.0	13.4	10.31	183.0- 87.5	2.09:1
Blood Pressure	Hg. mm.	1,961 Females, 18 years (college students)	117.7	11.0	9.40	169.0- 83.0	2.03:1
Weight of Body at Birth	Kg.	500 Female Infants (Ger- man)	3.15	0.42	13.31	4.41- 1.90	2.32:1
Weight of Body at Birth	Kg.	500 Male Infants (German)	3.24	0.44	13.58	4.56- 1.92	2.38:1
Weight of Body	Pounds	868,445 White (American Soldiers)	141.54	17.82	12.60	230.0- 90.0	2.44:1
Weight of Body	Pounds	1,241 Adult Females ages 17-36 (English)	125.86	17.21	13.70	206.0- 81.0	2.54:1
Simple Reaction Time	10 <sup>3</sup> sec.	113 Trained Adult Males (University Students)	199.1	25.50	12.80	275.6-122.6	2.24:1
Memory Span for Digits	No. correctly repeated	236 Male Adults	6.60	1.13	17.12	10.0- 4.0	2.50:1
Hard Learning (Substitution test)	Seconds	766 Boys, 14 years	111.8	28.56	25.55	232.7- 60.1	3.87:1

\* This coefficient  $\left( \frac{\text{standard deviation}}{\text{mean}} \times 100 \right)$  I have computed and added to Wechsler's data.

INDIVIDUAL DIFFERENCES.

It will be observed that, as Wechsler says, body temperature is in a class by itself in showing but the slightest variation; also that sex differences (compare means for males and females) in stature and weight are small at birth, and much more pronounced in adult life. The same is very likely true of many other traits, both physical and mental.

Wechsler holds that *symmetrical* distribution is uncommon, rather than normal, through the whole range of human traits; and other testimony might be cited in the same direction; hence we may do well not to lean too heavily on the assumption that ability in any group of qualified workmen is distributed according to a symmetrical curve. In Chapter 8, page 128 ff. below, it will appear that upon this apparently academic issue depend rather profound practical problems, connected with restriction of output.<sup>7</sup>

Wechsler, concentrating attention on his final ("Range Ratio") column, contends that the variation of human capacities and abilities (apart from the two-tenths of one per cent of the population which consists of geniuses, idiots, dwarfs, giants, and other very rare specimens) is of a smaller order than most psychologists suppose. Most of his 89 range ratios run from 1.5-to-1, to 2.5-to-1. He easily shows that the problems involved in measuring mental traits are very perplexing; that test units of equal difficulty, well suited to the powers of the population being measured, are hard to come by and were not used to build up many of the exhibits which purport

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examinations of thousands of subjects, classified by age and certain other characteristics; e.g., of the 13,656 men, 1,328 were unemployed and 1,735 were university undergraduates. The measurements included stature, weight, distance of middle finger tip from ground, and several strength tests. It is not surprising to learn that the unemployed men, at most or all ages, were inferior to the students and employed men in weight and strength; but the reader might not expect that the unemployed were also distinctly inferior in stature, at all ages over 15. Somewhat similar findings were made by examinations of unemployed men in Duluth, by the Minnesota Employment Stabilization Institute.

<sup>7</sup>The column headed "Coefficient of Variability" in my table of Wechsler data shows that all these traits exhibited some considerable dispersion from their means, since if nearly all observations clustered very close to the mean, the standard deviation would be but a minute fraction of the mean. This coefficient, however, does not show whether the distribution tends toward the symmetrical or the J-type extremes.

to show variability of capacity among normal human groups. He criticizes in detail, however, only a very small fragment of the mental test literature; and hence does not support convincingly his thesis that, whatever the trait, the second-best person in a thousand is only about one and one-half to three times as gifted as the second-worst. But, at any rate, we may take it as well established that at *least* this degree of variability is to be expected, apart from training and other environmental influences; and I think it probable that mental traits,—at least the more complex ones—are decidedly more variable than are physical traits, such as stature.

One other point of Wechsler's seems in order here. He claims plausibly "(1) that the native capacities of most men tend to attain their maximum between the ages of 22 and 28 years, and in some cases even earlier; (2) beginning with about age 25, there starts a steady decline in both physical and intellectual vigor which increases progressively with advancing age; . . ."<sup>a</sup> This factor, age, we shall discuss further in Chapter 3; and it should be borne in mind as a possible cause of variations in capacity and output within a working group.

**Interest and Perseverance; Relations with Ability.**—Thus far we have dealt with abilities and capacities, assuming tacitly either that the motive power is a constant factor, or that it is merely another name for ability and capacity. This assumption may now be scrutinized a bit more closely, with the aid of a few fragments from relevant researches in industrial psychology; and Interest in Work will also have the last word in this book, through a monopoly of Chapter 20.

Vocational psychologists have been concerned for a long time with problems of measuring the relative vocational preferences of children, at various stages of their development, and trying to determine the significance of these preferences as to

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<sup>a</sup> *Op. cit.*, p. 99. He also points out (*op. cit.*, pp. 34-37) that the shape of the frequency-curve depends on the unit chosen for expressing the measurement. If the data to which Figure I above refers, for example, were plotted to show individual variations in terms of "minutes per pick," the curve would look different from the "picks per minute" view given by Figure I.



the child's real chance of vocational success and contentment. Important subsidiary problems may be represented by these: To what extent, and under what influences, such as advancing age, do the preferences of individuals change? What sorts of correlations are found between interest and capacity? In recent years this slowly-growing scientific plant has flowered rather suddenly into a great array of statistical studies, centering around analysis and comparison of the interests of both aspirants and practitioners, in distinct occupations.<sup>9</sup>

In part the relations between interest and other aptitudes and abilities are obvious enough; we all recognize many degrees of failure to utilize fully a given capacity, by reason of some lack of incentive or drive; and contrariwise we are all acquainted with young persons who would like very much to be poets or lawyers or actors or what not, but who are wanting in some vital qualities needed for satisfactory standing in such occupations. And, if we carefully compare the performances of different workers on the same job, in relation to their respective capacities, we shall find, to use Wyatt's aphorism, that "it is often difficult to say whether an operative likes her work because she does it well or does it well because she likes it."<sup>10</sup> A friend of mine, who leans toward the philosophy that we are mainly creatures of environment, plays tennis much better than I. He assures me that if I would only practice faithfully I should presently become his equal. I think, on the contrary, that difference in our native aptitudes is a much more fundamental cause of the gap between our skills; that I have not been interested enough to play very much, mainly because nearly all persons with whom I have ever played have been able to beat me, whereas the practice which he gets from frequent playing serves merely to maintain his skill at about the level which he reached rather quickly after he took up the game.

The nature and causes of correlations between interest and ability, in reference to occupations, are the more difficult to

<sup>9</sup> See, for example, D. Fryer, *The Measurement of Interest* (1931); E. K. Strong, Jr., *Change of Interests with Age* (1931); and numerous papers by these and other authors in the *Personnel Journal*.

<sup>10</sup> Indust. Health Res. Bd., Rept. No. 69, p. 50 (1934).

trace because any one, or combination, of at least three sorts of interest may be involved, namely: interest in the activity itself; interest in the end-result, in terms of pay or profit; and interest in excelling competitors. The first type of interest we might call intrinsic; the others extrinsic. They cannot be thoroughly disentangled; in part because it is impossible to ascertain accurately the individual's enjoyment and material and competitive success, not merely relative to actual competitors within the occupation or occupations which he has seriously tried, but relative to potential competitors in all the occupations that were conceivably available to him—most of which he has not tried. As will be shown in Chapter 20 below, however, there is a positive but only moderately definite tendency for an individual to be intrinsically interested in those activities to which his own other aptitudes point.

The following table gives a quantitative illustration of the imperfect correlation which exists between interest and ability,

INDIVIDUAL DIFFERENCES IN OUTPUT, IN RELATION TO CAPACITY<sup>12</sup>

	Workers									
	A	B	C	D	E	F	G	H	I	J
Output .....	104	120	109	96	103	106	115	90	76	81
Capacity* .....	91	109	104	103	86	113	111	90	100	93

\* Based on records obtained in the second quarter-hour of each afternoon spell, when the operatives were asked to work as quickly as possible.

by comparing the "abilities," as measured by long-run average outputs of each of the ten confectionery operatives who were studied by Wyatt and associates,<sup>13</sup> in relation to the "capacities" of these same girls, as demonstrated by their outputs in a large number of quarter-hour spurts. Their spurts did not afford wholly adequate measures of their long-run capacities, but other evidence cited in the report leaves no doubt that Workers A, B, and E, especially, were most steadily inclined to make the most of their capacities, whereas D, I, and J were at the opposite ex-

<sup>12</sup> Further particulars of their research are given in Chapters 15 and 20 below. Ten cases, of course, is too small a number to be statistically significant.

<sup>13</sup> Data from Indust. Health Res. Bd. Rept. No. 69, p. 44. The indices are percentages of the group average, in each case.

treme. Apparently the data in this table came mostly, if not entirely, from periods when the operatives were paid by piece rates. The investigators report various temperamental and general characteristics of these individuals; for instance, Worker B was like D and I in being physically robust and assertive and talkative, but B was extremely competitive, frequently out to break records. The scores of these girls in an abstract intelligence test were as follows: A,  $106\frac{1}{2}$ ; B,  $66\frac{1}{2}$ ; C,  $80\frac{1}{2}$ ; D, 59; E,  $49\frac{1}{2}$ ; F,  $95\frac{1}{2}$ ; G, 70; H, 57; I, 112; J, 111. Workers I and J, therefore, may have been somewhat handicapped by superior abstract intelligence for becoming intrinsically interested in simple repetitive work; yet A, who was only a little their inferior in the same mental test, steadily utilized her aptitude for the work; while B and D, both with low "intelligence" ratings, were very different in constancy of application to their industrial tasks.

**Are Individual Differences Decreased by Practice?**—This report of Wyatt's also exhibits the existence and significance of individual differences in motivation, by means of another ingenious combination of techniques.<sup>18</sup> He had these girls perform simple laboratory tests involving manual dexterity, every Saturday morning for 37 weeks. These equal increments of practice made the girls more nearly equal in test scores at the end than at the beginning of the experiment; and so this test procedure, by itself, added weight to the findings made in many psychological laboratories—that relative individual differences in performance tend to diminish, as all subjects acquire successive and equal increments of practice or training or both. But, in these same 37 weeks, the outputs of these girls in their regular factory work (all were hired at the same time) showed increase rather than diminution of individual differences! Wyatt quite plausibly infers that "The results are consistent with the view that practice will cause decreasing differences in output only when the incentives to work are strong (as they ordinarily are, in short and infrequent laboratory tests) and all the individuals respond

<sup>18</sup> *Op. cit.*, pp. 11-14.

according to their respective capacities. When the inclination to work remains relatively strong in some individuals but progressively weakens in others, differences in output may tend to increase."

It is rather probable, indeed, that the individuals who worked below their capacities in this job would show the same lack of steady effort in any other job which they undertook,—that perseverance is a rather general personal characteristic, and somewhat independent of capacity and liking for a particular job. At least Wyatt collected teachers' reports which tended to show that these girls had shown temperamental qualities in their school days, which they later displayed in the factory.<sup>14</sup>

The tortoise and the hare fable, then, should not be censored out of our children's books; but its wisdom is of somewhat limited applicability. If we learn that there is a high probability that our child lacks aptitude or capacity relative to a given occupation, to such an extent that he can become only a marginal or submarginal worker in it, then it is reasonable to predict that he would not really enjoy that work, however attractive many of its aspects may be. These traits of liking, perseverance, and other aptitudes are sufficiently independent so that information should be sought in each quarter. Quite probably, within limits, some extra degree of liking will compensate for some degree of deficiency in other capacity.

**Differences in Endurance and Fatiguability.**—Individuals also differ considerably in their capacity for output of energy in any given line of work or play; and of course this fatigue factor is important in the "fair day's work" problem. At first blush it seems that shortening the work week, even to the degree which has already occurred, pretty well solves fatigue problems; but with each reduction in hours the difficulties tend to recur, in altered form, by reason of increased intensity of work.

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<sup>14</sup> *Op. cit.*, p. 46. Part of his remarks on this point are cited below, in Chapter 20; and in Chapter 15 are given some other data on the variability in outputs of these ten operatives. Novelty was a potent stimulus to them; all tended to work up to capacity for a week or so after each change of wage method.

We are accustomed, of course, to empirical adjustments to age and sex differences in strength, as well as to still other obvious variations; but more exact scientific data are very difficult to come by. Fifteen years ago an eminent British investigator wrote: "In theory, one should endeavor, by observation and experiment, to attain the best possible conditions for the avoidance of fatigue in each individual worker. In practice such a plan is usually quite impossible. A number of workers are engaged in the same shop or factory on the same class of work, and one has to choose the conditions . . . which are best suited to the majority of the workers. The exceptional worker must make the best he can of the average conditions."<sup>15</sup> Since that time Vernon and others connected with the British Industrial Fatigue (later, Industrial Health) Research Board have published a great many data on individual variations found by various physical, industrial, and mental measurements, some of which were used earlier in this chapter and others elsewhere in this book; yet surprisingly little is to be gleaned from their work, or from other literature, about individual susceptibilities to fatigue. Researches in vocational guidance and placement, in motion study, in design of industrial facilities, and in measuring human energy-output, are all relevant in various ways; nevertheless it is broadly true that individual differences in endurance have not been very far explored, by rigorously scientific methods.

Some of the first quantitative studies of fatigue in industry, by F. W. Taylor, the "Father of Scientific Management," in the Midvale Steel Company prior to the year 1900 deserve mention here, though the story is rather well known. Taylor made "an attempt to find some rule, or law, which would enable a foreman to know in advance how much of any kind of heavy laboring work a man who was well suited to his job ought to do in a day; that is, to study the tiring effect of heavy labor upon a first-class man."<sup>16</sup> It was not, he said, a

<sup>15</sup> H. M. Vernon, *Industrial Fatigue and Efficiency*, pp. 5, 6 (New York: Dutton, 1921; also London: Routledge).

<sup>16</sup> *Principles of Scientific Management*, pp. 53, 54 (Harpers, 1911). Other quotations in my text at this point are from the same book, at pages close to these.

question of what a man could do in a spurt, or over a few days, but "the best day's work that a man could properly do, year in and year out, and still thrive under." He consulted the scientific literature, and he hired the famous pig-iron handler "Schmidt," as well as one or two others, to work with varying speeds, loads, rest periods, under the close direction of a young man with a stop-watch. "To our surprise we found that there was no constant or uniform relation between the foot-pounds of energy which the man exerted during a day and the tiring effect of his work. On some kinds of work the man would be tired out when doing perhaps not more than one-eighth of a horse-power, while in others he would be tired to no greater extent by doing half a horse-power of work." The problem was more complex than he had supposed.

But in the course of time his associate Carl Barth submitted the data to graphic and mathematical analysis; and, according to Taylor, he discovered the "simple law" for which they had been searching, at least for the plainest and heaviest sort of labor.

"The law is that for each given pull or push on the man's arms it is possible for the workman to be under load for only a definite percentage of the day. For example, when pig iron is being handled (each pig weighing 92 pounds), a first-class workman can only be under load 43% of the day. . . . As the load becomes lighter, the percentage of the day in which the man can remain under load increases. So that, if the workman is handling a half-pig, weighing 46 pounds, he can then be under load 58% of the day . . . finally a load is reached which he can carry in his hands all day long without being tired out. When that point has been arrived at this law ceases to be useful as a guide to a laborer's endurance. . . ."

His other accounts indicate that the outstanding discovery was the importance of properly-timed and spaced rest pauses.

After it was ascertained that "Schmidt" could carry out the 47-tons-a-day program, day after day, without seeming the worse for wear—and he was quite willing to do it, getting 60% increase of wages for 300% increase in output—Taylor experimented with other men of the crew; and he found "that

in this gang of 75 pig-iron handlers only about one man in eight was physically capable of handling  $47\frac{1}{2}$  tons per day. With the very best of intentions, the other seven out of eight men were physically unable to work at this pace." Nearly all of them, he recalled, were transferred to other work in the plant.

Taylor was given to dogmatism and over-simplifications, and I don't know how well this particular "law" of his has come through subsequent research; but at least he may be credited with revolutionary pioneering, not only as to the general idea of quantitative factory studies, but even in giving specific guidance to the modern movements for selecting workers according to their individual fitness for jobs, and in increasing human efficiency by proper rest pauses and improved equipment and layouts. Mr. Frank B. Gilbreth took up the "motion study" aspect of scientific management with great vigor and ingenuity, and emphasized strongly its function of reducing fatigue.

Probably one reason why progress now seems slow in this field is that the problem of fatigue, like the problem of intelligence, has been split into so many sub-problems that many scientific workers of our time prefer to use more exact and less ambitious and ambiguous terms. At any rate, three general aspects of the phenomena loosely called "fatigue" are apparent, each being subject to special technical methods of study. These are:

1. Variations in output or efficiency, relative to duration and intensity of work;
2. The bio-chemistry of metabolism; and
3. The subjective sensations of tiredness, boredom, etc.<sup>17</sup>

The indicators, of course, often do not point in the same direction; for the shape of the output curve depends a good deal, for instance, on incentives and boredom, in addition to elementary physiological fatigue or metabolic rate. As Taylor re-

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<sup>17</sup> See A. Ford, *A Scientific Approach to Labor Problems*, Ch. 11 (McGraw-Hill, 1931), and E. Mayo, *Human Problems of an Industrial Civilization*, Chs. 1 and 2 (Macmillan, 1933), for good brief treatments of these aspects or phases of fatigue, from the standpoint of industrial psychology.

marked, à propos the selection of pig-iron handlers, "The man who is mentally alert and intelligent is for this very reason entirely unsuited to what would, for him, be the grinding monotony of the work." And, among other complications which make it difficult to determine the range of variability of normal endurance, under specified conditions, are occasional pathological and under-nourished and extremely atypical individuals, including neurasthenics with morbidly low capacity for work, and hyper-thyroid patients with abnormally high rates of metabolism. Emotional conflicts generate what might be called pseudo-fatigue. Again, problems of fatigue, and especially of cumulative fatigue, can scarcely be cleared up while the mechanisms and functions and conditions of sleep are so little known as they still are.<sup>18</sup>

**Mental Fatigue.**—How does human endurance in "mental" work compare with capacity for physical labor? Here is another set of puzzling questions relating to fatigue, which have given many researchers an abundance of "headaches,"—literally as well as in the slang sense. This distinction between mental and physical effort, however, is only a matter of degree; all work involves both nervous and muscular-glandular reactions, though the bodily tensions and inhibitions of the "brain worker" whose job is sedentary are discernible only by delicate instruments—and by his own sensations of tiredness! Many grades of intellectual and other sedentary workers in the past have enjoyed shorter hours and longer vacations than manual workers, and perhaps, on the average, have needed these privileges more. Some, undoubtedly, have adapted themselves to more intense work during their shorter work-spells; and others are driven, by their ambition for distinction, to work through very long hours.

From materials such as are hinted at in the foregoing paragraphs I judge that variations in laziness and industriousness may be explicable, to some extent by differences in aptitude and interest for particular "jobs," and in some degree by dif-

<sup>18</sup> See Chapter 20, below, for further discussion of what Thorndike called "the curve of work and the curve of satisfyingness."



ferences in general capacity for output of energy, which in turn is very likely a matter of rate of metabolism. Probably most people are pretty well protected against dangerous fatigue by automatic bodily mechanisms which force them to stop working, and get whatever may be their essential minima of sleep. But apparently over-work sometimes produces a state of "nervous tension" which makes the subject unable to utilize adequately his opportunities for sleep and rest, and thus keeps him in a chronic state of disability. Many lazy people are comparatively indifferent to public opinion; but there may be no small number of conscientious and industrious weaklings who are unduly harassed, simply because their low endurance is not plainly visible to their more capable neighbors and employers. At any rate, much has been gained by the discovery that pupils who do poorly at school work are not necessarily lazy. Many of them, when their physical and mental handicaps and assets are recognized, can immediately be given spectacles or other physical doctoring, or steered into the learning of arts for which they have aptitude,—and then the problem of motivating them is much simplified.

## CHAPTER 3

### INSTINCTS AND LEARNING

#### **The Concepts Instinct and Aptitude.—**

Where the members of a species or other natural group are either more alike or more different in any respect than can be accounted for by their individual experience, we have reason to believe that the likeness or difference in their traits is due to the native factor. Thus cats are more alike in their propensity to hunt mice than can be accounted for by their experiences; while, on the other hand, some cats are better mousers than others to a greater degree than we can explain by differences in their bringing up; we conclude accordingly that cats are natural mousers, but that some of them are naturally better mousers than others.

So wrote Woodworth, a pioneer in the development of "psychological tests" for the measurement of individual differences. After discussing the groups of unlearned human reactions which are ordinarily called instincts, the same writer went on to say: <sup>1</sup>

Besides sensations, emotions, and reactions, native equipment also includes aptitudes or "gifts" for certain activities, or for dealing with certain classes of things. We recognize this type of native aptitude when we speak of one person as having a natural gift for music, another for mathematics, another for mechanics, another for salesmanship. . . . Native capacities differ from instincts in that they do not provide ready-made reactions to stimuli. We do not expect the musically gifted child to break out in song at some special stimulus, and thus reveal his musical gift. We expect him to show an interest in music, to learn it readily, remember it well, and perhaps show some originality in the way of making up pieces for himself. His native gift amounts to a specific interest and an ability to learn specific things. The gifted individual is not one who can do certain things without learning, but one who can learn those things very readily.

There would be little profit in attempting an inventory of this side of native equipment. We should simply have to enumerate the various occupations of mankind, and the various classes of objects in which he finds an interest, and in dealing with which he shows facility.

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<sup>1</sup> *Dynamic Psychology*, pp. 45, 59, 60 (Columbia Univ. Press, 1918).

These passages indicate how the ideas of instinct and aptitude are related. It should also be further emphasized that, from one point of view, they shade into one another; while from another point of view they are different ways of looking at the same thing. Instinctive reactions, in the narrower sense, as Woodworth says, are completely ready-made by nature. Examples are the crying and grasping reflexes. Nearly all the innate reactions, however, (e.g., food-getting) require some polishing off by experience before they operate serviceably. The capacities which are developed so quickly and easily as the sucking and swallowing of human infants, or the ability of young birds to fly, are clearly pre-formed for the most part, so that no one would seriously object to calling them instincts; but when we get on to the later-developed activities, such as fighting, the relative contributions of Nature and Nurture are much more difficult to assess. Thus we may pass through such degrees as musical and mechanical aptitude to propensities like desire for social esteem, which are still more debatable. Instincts in the narrower sense, therefore, shade imperceptibly into aptitudes which are of all degrees of definiteness and demonstrability. Here, apparently, is a principal source of the innumerable disputes over human "instincts." Innate aptitudes, if they exist, for imitation, emulation, parental solicitude, etc., are fundamentally within the family of innate behavior-tendencies—instincts, in the broader sense; but proof of the existence of tendencies like these is an enormous and endless statistical task. Music, for instance, seems to "run in families"; yet it is also true that musically trained parents usually give superior opportunities to their children.

**Different Views of Same Shield.**—I have said that instinct and aptitude also represent different aspects of the same thing. In making this statement I had in mind the propositions stated by Woodworth in the passage quoted at the beginning of this chapter. "Instinct" refers *qualitatively* to a *likeness* among all members of a species, in behavior; which likeness is believed to be due mainly to preformed or predetermined nervous connections and other bodily structures, rather than to mere simil-

arities of experience. Fondness for sweets, for instance, is no doubt instinctive; whereas desire for money and regard for public opinion are much more largely attributable to common environmental factors. "Aptitude," on the other hand, refers to inborn *quantitative differences* among members of a species, within a single trait. We differ, for example, in our ability to resist sweets. In certain instances, very likely, students of heredity will find qualitative behavior traits which are innate in some members of a species but not in others, as some children are born with "cow-licks" in their hair, others not.

It must be emphasized strongly that there is a fundamental affinity between, and even identity of, the laws of heredity in "bodily characters" and in "mental traits." The reason is very simple—mental traits are probably all founded on bodily characters—particularly, perhaps, the structures within the nervous system. Hence, Sir Francis Galton was an outstanding founder of the statistical study of heredity, in both biology and psychology. Many statistical investigators in this field have now become disgusted with the qualitative debates over "the instinct of" this or that, and say that instinct has become a meaningless term. Yet whatever they can prove about innate characters or "traits," and their relative strength among individuals, contributes an indispensable kernel to the ultimate theory of instinct. They can hardly show innate differences of degree without showing what is the general trait in which the differences occur. In its broadest sense, an instinct is simply an in-born character or trait—simple or complex.

**Instincts and Emotions.**—Besides the mechanisms and the behavior they give rise to, which we have discussed under the caption Instinct, we ought to give some attention to the emotional *feelings*, generally pleasant or unpleasant, which tend to accompany such behavior. Long has it been argued that one or the other of these factors is the prime mover of human action. Jeremy Bentham, for example, in the Eighteenth Century, said "Nature has placed mankind under two sovereign masters, pain and pleasure." Aristotle had used much the same language before him; common sense echoes it. But an

opposing view is represented by William James, who published about 1890 a classic statement of the contrary emphasis. Ridiculing the "psychological hedonism" which Bentham had upheld, James asked "who smiles for the pleasure of smiling; who frowns for the pleasure of a frown?" Actually, he maintained with many apt illustrations, human as well as other animals are primarily driven by the instinctive mechanisms which are hereditary and typical for each species. A kitten, for example, is born with eyes, nerves, muscles and claws so strung together that it is destined to pursue a little mouse and to run from a big dog. It seems highly improbable that, on the occasion of the first clumsy performance of such a native response, the actor has any premonition of the pleasures or pains to be experienced.

James held that man has more instincts than any other animal. He mentioned a number of supposed human instincts, remarking that nine-tenths of the world's work is motivated by instinctive emulation or rivalry. William McDougall's *Social Psychology* (1908) increased the vogue of instinct-explanations of human affairs. This author's instinct-kingdom, to be sure, was less hospitable than that of William James. McDougall rejected the alleged religious instinct, for instance, and even emulation. He centered attention on "seven primary instincts,"—flight, repulsion, curiosity, pugnacity, self-abasement, self-assertion, and parental behavior; and he assigned less general importance than do many authorities to the "instincts" of sex-attraction, gregariousness, acquisition, and construction.

**Instincts in Industry: The Issues.**—Many attempts have been made to use the key of instinct-psychology to open up problems of work, pay, and welfare. The writings of Veblen, Taussig, Tead, Carlton Parker, and Whiting Williams spring readily to mind. Taussig, for example, inquired if we may not be wrong in supposing that work is done wholly or mainly for the sake of pay. Citing biographical evidence for the contention that leading inventors are driven largely by "the instinct of contrivance," he maintained also that most of us obey

this instinct in some degree by taking delight in useful creative work. He suggested that certain features of modern industry, such as the workman's defensive reactions against piece rate cutting, stifle this laborer's instinct of workmanship, while that of his boss is given full rein.<sup>2</sup> We appear to have here one clue to labor difficulties. Carlton Parker pushed this doctrine further, along lines which he thought were indicated by Freud and other students of insanity. Unfavorable labor conditions, said Parker, repressing the worker's instincts, do not merely deprive him of the satisfaction which comes from exercising them normally. This repression (Parker held) actually makes the workman in some measure neurotic or insane, so that he is driven to outbursts like strikes, sabotage, and revolution. More lately somewhat similar doctrines have been taught by Elton Mayo.<sup>3</sup>

The foregoing line of argument appears simple to some people, who think "it" must be either true or false. But actually it consists of a number of distinct propositions, some of which stand or fall together, while others are more independent. The place of pleasure and pain in motivation, for example, is one problem; the nature of instinct (if any) is another, and possibly distinct problem. If there are human instincts, how should they be named? Do they hold their ground firmly, or are they easily modified by experience? Is full functioning of all instincts, or of some only, conducive to welfare? Is repression of all or any conducive to ill-health and abnormal behavior? These issues, among the many involved, we shall take up in order.

**Pleasure-Pain vs. Instinct: Blind Men and Elephant.**—The hedonist theory, that people always or usually try to secure pleasure or happiness and to avoid pain, is not necessarily a

<sup>2</sup> *Inventors and Money-Makers* (1915).

<sup>3</sup> Compare also: "Every effort should be made to use one's full complement of powers. Mechanical aptitude especially, when left unemployed, causes an unaccountable sense of dissatisfaction and restlessness. Often, when this feeling persists, an attempt is made to use the latent mechanical sense as a basis for an avocation; but the result is seldom satisfactory." J. O'Connor, *Born That Way*, p. 177.

contradiction of the instinct theory. The debaters are looking at opposite sides of the same shield. There are always two distinct ways of viewing mental phenomena, the subjective and the objective. The subjective aspect is that revealed directly to the individual or "subject" by *his own* sensations, desires, and so on. The objective view is that of the outside observer, who traces the relations of stimuli and reactions—who learns by statistics, dissection, and deduction something about the nervous and other bodily processes which make animals react as they do to various situations. Some "behaviorists," like Dr. John B. Watson, to be sure, deny that introspection is really a distinct point of view, since whatever the introspector tells us about his state of mind may be considered his verbal reaction to stimuli impinging upon him. But it seems more convenient to draw the customary sharp distinction between what we can know about our own mental life (and thereby infer with regard to the sensations and feelings of other people—and of lower animals), and what we can learn of the stimuli-bodily-mechanisms-response relations in others. Data from both points of view are necessary to the greatest development of psychology. Objective experiments on learning, for example, check and supplement subjective observations of memory and imaginal phenomena, including the contents of dreams.

How do these generalizations apply to pleasure-pain and instincts? It was realized long ago that the only way we can define pleasantness and unpleasantness is in terms of the direction of our attitude. Pleasant situations are those we tend to continue and seek, unpleasant those which we try to end and avoid. James and Lange added the important proposition that the stronger feelings which we call emotional are probably the subjective aspects of instinctive reactions, particularly internal reactions. We do not run away because we are afraid, said James, rather we are afraid because we run away (and our stomach, heart, and other organs behave characteristically); and we run away because our instinctive mechanisms make us run. With respect to the first performances of instincts, such as the child's reaction away from a painful or nasty stimu-

lus, this description seems to fit the facts pretty well. Subsequently, however, the mere *sight* of such objects, due to associations or connections formed by the earlier experiences, may call out the avoiding reaction sufficiently to keep the once-burned child at a safe range from the fire. Thorndike, in psychological studies of learning, formulated the "law of effect," which says in substance that acts which give pleasant consequences (e.g., the rat's taking a path which leads him to food) tend to become habitually performed, whereas acts giving unpleasant results (e.g., taking the path which leads to an electric shock) tend to become habitually inhibited or avoided. Hence it seems correct to say that animals tend to seek those situations which their innate or acquired propensities "associate" with "satisfying" reactions; and they tend to avoid situations which lead to "annoying" (instinctively repellent) reactions. This is the side of the picture which William James emphasized. But, according to his theory of emotion, this is only the objective side. Speaking in subjective terms it is also correct to say that we tend to seek pleasant or the least unpleasant situations, and to avoid the most unpleasant.

In detail the above account is much oversimplified. But at least it shows that the hedonist theory of motives is not so sharply inconsistent with the instinct theories as has often been supposed; and it also indicates that these doctrines may perhaps be completely reconciled, along lines of the James-Lange theory of emotions and Thorndike's "law of effect."

**Identifying Human Instincts.**—Another important squabble between the proponents and opponents of instinct theories of human nature may next be considered. This concerns the existence and identification of the human instincts. In effect the people who stress instincts usually emphasize Heredity as a determinant of human character; while those who pooh-pooh the instincts are apt to be Environmentalists—considering that human nature is largely plastic and teachable. The latter realize, of course, that infants are born with *some* instincts (from the subjective standpoint, "simple pleasures and pains") which tend toward survival; but they hold that these instincts im-



mediately begin to be modified by experience, and that by the time an individual becomes an adult, the effects of his inborn impulses have become negligible.

This view is very plausible, and indeed we must beware of the too-simple method of accounting for any important type of behavior which consists in merely calling it an instinct. William James himself did not accept quite *all* of the thousand or more candidates which had offered themselves for this rôle.<sup>4</sup> When we try to go beyond the specific narrow reflexes of the infant, such as crying, food-getting, and clinging, we find that our authorities are in serious disagreement as to just how the human instinctive behaviors should be described and named. Too little allowance is commonly made for *similarities of environment* which teach habits so alike in many individuals that they are mistaken for instincts. Avarice, the desire for money, is a case in point. We can hardly avoid learning to want money, but desire for it is pretty clearly not instinctive. Likely enough the "herd instincts" of seeking social distinction, avoiding ostracism, etc., may also be largely explained as collective habits drilled into us by the pleasant consequences which ensue from our pleasing other people, and the punishments which come from our annoying them. McDougall demurred at the "instinct of emulation" or rivalry, partly because he had observed the children of Borneo to be strangely indifferent to competitive games. This feature might, of course, be a racial biological characteristic, like their brown skins; but on the other hand it might be mainly a consequence of social traditions. All will agree that the human animal modifies many, at least, of its instinctive mechanisms by forming habits early and continually, so that the task of isolating instincts from their habit-auxiliaries is of the utmost difficulty. William James' opinion that man has more instincts than the lower animals may be sound, at bottom, but unquestionably man's adult behavior is less fully determined in detail by innate mechanisms. Apparently the lowest organisms are able to modify their small repertoire of behavior-tendencies in some degree, to "profit by experience"; but the range of possible adaptation to enviro-

<sup>4</sup>See L. L. Bernard, *Instinct*.

onment increases through the evolutionary scale, and reaches its maximum in man.<sup>5</sup>

**Learning in Childhood: Plateaus.**—The varieties of interplay among innate and environmental factors toward determination of human behavior are gradually being ascertained by experimental and statistical investigations. It is easily shown, for example, that the instincts of lower animals are not all complete at birth. Some of these, like the peckings of chicks and the characteristic songs of birds, have been subjected to laboratory studies, which indicate that inner maturation of these capacities goes on, alongside and independently of the teachings of experience. And in the human animal, the changes in voice, body-structures, and interests which are characteristics of puberty afford conclusive evidence that the individual's racial endowments in the way of behavior-mechanisms are not completely formed or detectable at birth.

If we now give a few minutes' consideration to phenomena of learning, as they appear in statistical studies, we shall have a firmer grasp of the nature of individual differences. Principles of human learning are of wide practical significance too. For labor turnover means that new employees have to be trained, or at least broken in; and it is no small problem to devise incentives, relative to each job, which will hold the learner through the period while the best output he can achieve is low, yet will stimulate him adequately to develop his maximum ability as quickly as is economical. Nor are the business-like applications of the science of learning and teaching confined to these obvious learners. Every one is, or ought to be, a learner every day—picking up or inventing some detail, however small, of better adaptation of whatever resources are in his control to the changing problems connected with his job.

The statistical foundations of the science of learning are largely derived from experiments with school children, who are most readily available as subjects in large numbers working under sufficiently comparable conditions. Generalizations

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<sup>5</sup>C. J. Herrick, *Introduction to Neurology*, p. 34.

based on these are obviously not immediately applicable to older learners; and so in a moment we shall deal with differences between younger and older subjects.

Figure II, taken from a recent article by Curtis, gives a simple learning curve for an individual school child.<sup>6</sup> On Monday morning he was first tested on a list of 20 words, two of which he could spell correctly. Then he devoted fifteen minutes a day to study of this list, and at the end of each study-period he was retested, with results shown in the curve; "practice makes perfect," provided that perfection is, as in this case, within the capacity of the learner.

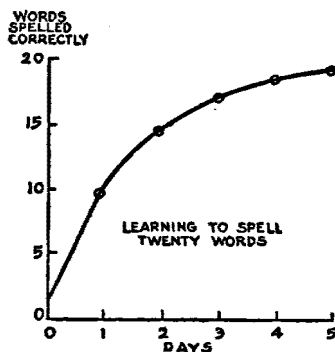


Figure II. Growth of Individual Child's Spelling Ability. (After Burt and Curtis)

One important factor in learning, which is illustrated by the above example, is distribution of practice. If this boy had studied his list for five quarter-hours in one day it is unlikely that his learning would have been as efficient as it was when he devoted fifteen minutes of each day to study; and if he studied only fifteen minutes once a week, more minutes of practice would probably be required for each word learned. So when we refer merely to amount of practice, we assume that its periods are distributed in time in an efficient manner.

<sup>6</sup>S. A. Curtis, "Advances in Health Education." Report of 7th Conference, 1934, published by American Child Health Association, New York City.

The spelling curve shows a much more rapid proportional gain in the earlier practice periods than in the later—7 words the first day, 6 the second, 3 the third, and one in each of the last two. As Courtis says, the teacher might think the boy was not trying as hard on the third as on the first two days. This flattening, however, as practice goes on is characteristic of most learning curves in which the subject-matter permits of accretions of ability rather than the “all or none” alternative, which applies to the solution of some puzzles. Or rather we should say that learning curves usually show *trends* of rapid learning at first, then of progress at a steadily lessening rate, and finally of a stabilized level; for these curves generally exhibit many saw-teeth or irregularities. The data on typing skill, published by Book and by Chapman, (but not reproduced here) are oft-cited examples. Temporary retrogressions and failures to gain are called by psychologists “plateaus,” and various studies have been made to ascertain their causes. Among these causes variable motivation of the learners seems to be outstanding. When each learner has an immediate and direct prospect of obtaining some reward, pecuniary or otherwise, which seems worth while to him, for every advance in his own proficiency, the curve of each subject tends to progress smoothly; and under a fresh incentive many a person has learned to double the performance which had long before become his normal pace and which he firmly believed was the limit of his capacity.<sup>7</sup>

**Spontaneous Maturation Masks True Learning.**—When the teaching and practice of children are distributed over a period longer than a few weeks, another factor tends to mask the effects of all others, including incentives. This factor is spontaneous growth, or similar steady cumulative changes which facilitate the particular learning in question, independently of practice and teaching. The two curves in Figures II and III

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<sup>7</sup> Experimental literature dealing with these points is summarized by M. S. Viteles, *Industrial Psychology*, Ch. 19 (1932); also in his *Science of Work*, Ch. 8 (1934).

illustrate as many instances of "simplex growth," meaning normal progression uncomplicated by irregular influences like disease or accident. Another example: Some 20% of Detroit 6th grade pupils could spell the word "sincerely" correctly; and by studying it in their spelling lessons in the 7th grade, about 70% became able to spell it. But in the same period the percentage of those who could spell "customary"—a word of about equal difficulty, which was not formally taught—advanced from 20% to 60%. Only the difference between 60% and 70%, therefore, may reasonably be attributed to this formal teaching of spelling. Still more clearly Courtis has shown that a large part of the gain made by a child during a semester in speed of addition or of multiplication is attributable to the growth of ability merely to copy numbers rapidly.<sup>8</sup>

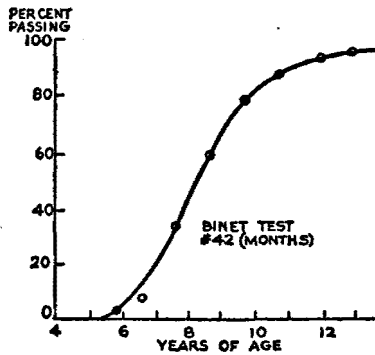


Figure III. Per Cent of Children, at Each Age, Able to Pass One of the Binet Tests. (After Burt and Courtis)

The individual differences which are to be found within a large sample of children, taken at random from the American or a Western European population, with respect to ability to learn rather simple associations, are indicated by Figure III. This chart refers to a single Binet test,—naming the months of the year. This test is considered symptomatic of a nine-

<sup>8</sup> S. A. Courtis, *op. cit.*, p. 184; "Maturation as a Factor in Diagnosis," in Thirty-Fourth Yearbook of the National Society for the Study of Education, pp. 181 ff.

year mental age, for about 60% of children at that age can pass it; but from 5% to 10% of the 11-year-old children of this sample could not pass it. By age 12, nearly all had learned their months.

**Adult vs. Child Learning.**—Such are some characteristics of learning during childhood. What may be added in respect to “teaching old dogs new tricks?” Learners in industry, of course, are ordinarily past puberty; and so it is principles of *adult* learning which are most directly applicable to problems of industrial incentives. But until recently, it was not deemed worth while to study the progress of gainfully employed learners by careful psychological methods; and scientifically valuable materials of this sort are still pretty scarce. Figure XIV, on page 314, is a specimen; it refers to the ten British confectionery girls in the factory experiment of Wyatt and associates, herein cited first in Chapter 2 above. Rather extensive experiments on learning, with large groups of adults from wide ranges of occupations and I. Q.’s, have been made in recent years in the interests of adult education.<sup>9</sup>

These studies show that there are many fallacies in the popular notions of learning in relation to age. The principal cause of confusion, perhaps, is ignorance or neglect of the steady organic growth which occurs up to puberty or a little beyond, and which amounts to an increasing preparedness to learn many “new tricks.” Because of this spontaneous development, the child makes a more rapid proportional gain over his low initial capacity than does the adult, who commonly “begins” his learning (of a foreign language, for example) with a higher initial capacity. After the age of fifty to sixty, to be sure, if not earlier, the gradual onset of senility renders learning increasingly difficult, and finally actual retrogression occurs in many abilities. The learning of adults, therefore, between, say, fifteen and fifty or sixty years of age, presents problems that are simpler than the learning of children; be-

<sup>9</sup> See especially E. L. Thorndike and others, *Adult Learning* (New York, 1928). Compare Thorndike's *Human Learning* (1931), and Wechsler, *op. cit.*, Ch. 7.

cause in adult life, learning (properly so called) is not much complicated by spontaneous organic development of preparedness to learn. From another point of view this proposition also means that, up to the maximum of such development, the older individual has an advantage over the younger, other things equal, in speed and economy of learning.

**Favorable Conditions for Adult Learning.**—How may the utmost of speed and economy of learning be achieved, as the adult applies himself to any new task? Many other conditions are important, but again we may stress the great factor of interest, of incentive, of resourceful and persistent effort. Though I speak here of “factor” in the singular, we are actually dealing rather with a point of view; for the specifications or requirements for maximum sustained interest of one individual at one time would not be quite identical with those for other times and other people. Yet a few generalizations have wide validity. The learner, for example, is apt to need some encouragement when his curve of progress reveals a plateau,—flattens out or dips backward—when improvement becomes slow, relative to his previous rate of gain, and when he wonders whether he has reached his limit.

Other extremely important means are emerging, for maintaining interest so that the individual will grow as rapidly and as far as possible, constantly finding small ways of improving his output, not only by increased speed and accuracy but by inventing better motions, better equipment, better layouts, and so on. Managers, as well as schoolmasters, are coming to realize that when an individual of either markedly superior or decidedly inferior aptitude is dealt with by routine procedures that are fitted to average capacity, the atypical individuals will be misfits. Apprenticeships and advances in pay are still too largely stereotyped, treating all alike, regardless of how much unlike the average person a given individual may be.

In general, those people who in the end become most skillful are also the most rapid learners; and if these are held for the whole “normal” learning period on a low learner’s rate of pay, the results are unfortunate for both these gifted

learners and their employer. The individual's early rate of learning discloses a fundamental probability as to how far he can ultimately go, as Professor Curtis's applications of the Gompertz curve to a host of learning data have shown; yet it would be unsafe to rely too much on rate of early learning as an indication of how high the individual's ability will ultimately rise; for some slow starters do go far, and some facile beginners prove not to have staying power. In this latter group, for example, is the "typical rote learner who has a good memory for routine facts but has a relatively poor reasoning capacity; he is the type of person who causes a great amount of waste in industry from false promotions. He gives signs of great efficiency when he is first placed on the job, and, because of the initial good impression he leaves, he frequently capitalizes on his reputation until he is promoted far beyond the limits of his capacity for adaptation."<sup>10</sup>

**Motion Study.**—Even a very cursory survey of either individual differences or of teaching and learning, in industry, should consider the factor-group which includes the motions and other methods employed by individual workers. This set of influences was numbered sixth in the enumeration of causes of individual differences in working efficiency which was given on page 19 above; and in the note on page 18 reference was made to a group of spoon polishers in which motion study and teaching had reduced the variability of times taken from five to one to only a little over two to one. Other researches might be cited to the same effect; for instance, Elton, in the paper cited on page 17 above, described methods employed respectively by good and poor weavers, and showed that the low producers were especially handicapped by inefficient motions and practices, despite their years of experience. Specialized instructors, too, are apt to cling to traditional ways; and each art is now increasingly recognized as a field for many exhaustive researches to determine what are the most efficient methods which should be taught to persons who aspire to the practice of such art. Herein lies the significance of the motion picture

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<sup>10</sup> A. Ford, *A Scientific Approach to Labor Problems*, p. 86 (1931).



and other techniques of the Gilbreths. Among all persons who have long practiced a given set of motions, of course, some individuals with special aptitudes can accomplish much more than others; hence the best workers with poor methods may surpass in output the poorer operatives who employ good methods.<sup>11</sup> But if all competitors are fully trained in the same methods then one important factor (out of many) in determining the curve of individual outputs has been brought under control.

**Repression Theories Mis-applied to Industry.**—The foregoing excursion into psychology of learning affords us some added facility for dealing with theories of labor problems which run in terms of instincts and their suppression. It is clear that Instinct is of some importance in human affairs, even in its narrower sense of a highly specific and reflex behavior-mechanism; also that it is of the very greatest importance in its broader sense of class of aptitudes. Though we are not born, as are the lower animals, with untaught abilities which mature into almost uniformly stereotyped behavior in acquiring food, shelter, care of offspring, and so on, we are abundantly provided with native aptitudes which give direction to our interests and learning, and which also determine how far our learning may go in each of the arts we take up.

We should, however, guard against attributing to all "elements of human nature" characteristics which probably do not apply to all. Some of our racial behavior-tendencies, for instance, are *appetitive* or self-stimulating, while others are not. Our food-getting behavior includes both instinctive reactions which enable us to grasp and devour food when it is available; also the appetite of hunger, by which the collapsed stomach walls and other deficiency-stimuli goad us into food-seeking activities. The sex appetites are set in motion primarily by internal stimuli, too; though of course the detailed behavior depends on the external situation. By habit-formation, appe-

<sup>11</sup> Doubtless nearly every typist, for example, who uses the superior "touch" method, has been annoyed at times to find some competitor making better speed and accuracy in spite of the handicap of zig-zagging eyes between copy and keys.

tites for tobacco, alcohol, or drugs may be set up. The lack of means to satisfy any appetite leads to discomfort and to continued attempts to find such means; but sweeping generalizations about the long-run effects of repressing appetites are not very enlightening. In some cases the appetite for a narcotic may be suitably overcome by mere forcible suppression. Much plausible evidence is offered by Freudians and others to the effect that certain types of suppression of sex appetites lead to psychoses or mental aberrations; yet the comparative effects of our innumerable types of love-life have been very little explored statistically or by controlled experiments. Many psychiatrists have derived their evidence largely from mentally abnormal people, most of whom have met various disappointments in love; but who has not?

The proper applications of these doctrines of repression thus seem still uncertain, even with respect to the sex appetite. How much more dubious they are with reference to "the instinct of workmanship"! It is not to be assumed that all instincts without exception should be exercised regularly in the interests of health. If we could be so sheltered, for example, that our reactions of nausea, fear, and embarrassment were never stimulated; if our potential appetites for whisky or morphine were never made actual,—surely we should not thereby be made insane. William James' suggestion as to sublimation of rage through "A Moral Equivalent for War" may be fraught with excellent practical possibilities; but perhaps an environment which never stimulated the rage-reactions at all (which, in effect, repressed them completely) would be still better for us.

**Rationalization.**—Another principle that was elaborated by Freud and other psychiatrists is easier and safer to apply to problems of motivation: the principle that we are all prone to "rationalize" our desires. It is the tendency to explain to oneself, as well as to others, one's actions by reference to "reasons" or motives which are respectable or otherwise acceptable to the subject's dominant personality. In a labor dispute, for example, the naïve employer or workman may engage a specialist to frame arguments for him, but he will have no

difficulty in believing most or all of the reasoning of his own advocate, and in thinking the opposing counsellor is merely "a dirty liar." This doctrine may readily be pushed to an unduly cynical extreme; but, sensibly applied, it is rather a chivalrous view. It recognizes that all of us, in some degree, devise respectable clothing to cover our naked desires. Probably self-deception of this sort is infinitely more common than deliberate or conscious attempts to deceive others. Frequently such rationalization seems practically advantageous to the rationalizer, by shielding him from any scruples that might otherwise restrain him, and by suggesting protestations which may fool his fellows; yet many varieties of "wishful thinking" bring, rather, false hope or security to the wishful thinker. We are apt to underestimate the real strength of our opponents, and to believe too easily what our "yes-men" tell us about them. All these processes are fundamentally similar, however; the type of self-deception which is commonly called rationalization amounts to belief, on insufficient evidence, that the subject's conduct is up to whatever moral or conventional standards he cares about.

**PART II**  
**WAGE ELEMENTS, INFLUENCES, AND**  
**ADMINISTRATION**

## CHAPTER 4

### OBJECTIVES OF EMPLOYERS AND OF EMPLOYEES; LABOR COSTS

The foregoing bird's-eye view of the scientific study of human nature, it is hoped, will illuminate that background and suggest clues to the simpler mysteries of industrial behavior. Everywhere about us we may discover important uniformities of human nature, which we may classify as types of instinct or aptitude or interest, and these class-conceptions may be useful tools. Differences in taste, ability, and endurance among individuals are perhaps still more obvious; and their causes and consequences are matters of the first importance. Now we are to delve mainly in the foreground of labor relations, in search of information about incentives; and we shall have to develop a more economic and business-like vocabulary.

**Purposes of the Parties: "The Public."**—Let us consider first how the special interests of the conventional three parties to labor relations—employer, employee, and the public—affect our problems of work and pay. Members of "the public" (*i.e.*, persons who are bystanders, with reference to a given trade in a given market) are concerned, first, as consumers. They are thus interested in low labor costs so far as these may lead to low prices on the goods which they want to consume. They are also anxious to avoid interruptions of the flow of goods, through strikes or other strife; also they have selfish as well as unselfish interests in combatting unemployment. And finally, as citizens, we may prescribe and enforce some minimum standard of living for all families, by such means as poor relief, charity, and minimum wage and other "labor legislation." To some extent we can control this standard of living by influencing *wages*, properly so called; but it is rather easier to operate directly on the poor family's *income* by subsidizing it out of charity or from open or concealed taxation.

**The Employer and His Labor Costs.**—The employer is rationally most concerned, in his labor policy, with minimizing his costs (direct and indirect) within limits set by demands for quality in his product, by legislation, and by such public opinion as in the long run affects his conscience or his trade. It is fairly commonplace that low *labor costs* are not always achieved by low *wage rates*, for any number of reasons.

**“Economy of High Wages.”**—(1) In what circumstances may high wages be economical? First, if the manager is skillful, he may “skim the cream” off his labor market, attracting and holding people who average higher in ability and industry than do the workers of his competitors. This particular “economy,” of course, is relative, not absolute; not all employers could obtain it at once. It is a pretty question whether Mr. Ford’s wages, which have been in various times and occupations relatively high, do obtain for him specially able men. He is fond of saying “No”; that any and every employer may follow this policy and make it pay. But it is well known that when wages are relatively high at Ford’s or at any other establishment, the labor turnover of such an employer falls; good men do not leave readily; and probably competition among employees to avoid layoff or discharge gradually sets a pace which only better than average men can stand.

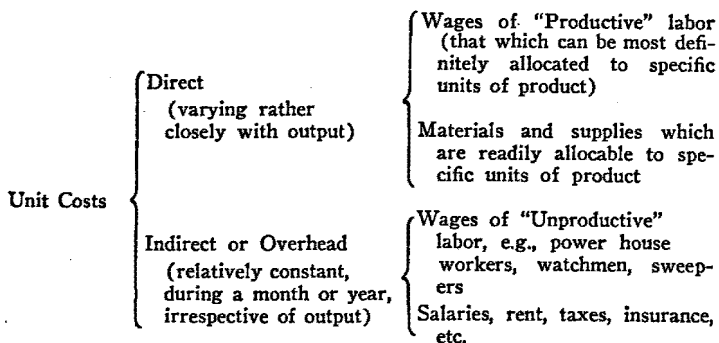
(2) It is argued, however, that there are at least two avenues by which high wages may become economical for *every* employer—through physiological and psychological effects on the men. If a worker is half-starved, he can do only poor work; higher wages give him better nourishment and more vigor. This line of reasoning, carried to an illegitimate extreme, has been ridiculed as the “steam engine theory of wages,”—it is supposed to say, without setting sufficiently modest limits, that the more wages-fuel you put into the man, the more valuable work you get out of him. Doubtless we have here a potential source of efficiency which is much less important in our time than in Owen’s and Brassey’s. Our lowest-paid groups, to be sure, are statistically shown to suffer from inadequate diet and high sick- and death-rates; but it is questionable whether

much higher wages alone would raise the efficiency of these workers, far enough and soon enough to repay all employers.

Such is the physiological argument; now for the psychological. It is urged that higher wages may raise the worker's efficiency by increasing his ambition, by giving him an outlook of hope in place of despair as to his economic future. Quite likely a "saving wage" (higher than a mere "living wage") may sometimes have this effect; but it is difficult to say in specific cases whether the disposition to save and get ahead is the result or the cause of high earnings. At any rate, these two arguments are not likely to weigh heavily with the individual employer, who is usually in a position to insist that his worker's productivity be demonstrated before the wage bargain has been in effect very long.

**Overhead Costs and Wages.**—(3) The employer's wage policy, and labor policy generally, has important bearings not only on his direct labor costs but on his *indirect or overhead costs*. In turn, the modern growth of the latter elements probably accounts in part for the trend toward "payment by results" noted in Chapter 5. We must analyze this factor rather carefully; in part because it contains a third argument for "Economy of high wages."

First, a few exercises in the relevant accounting vocabulary will be useful. Costs are classified into various categories intermediate between the two poles called *direct* (or *variable*) and *indirect* (or *constant, overhead, burden*).



Direct costs are those which are most easily allocated or assigned to specific units of output; e.g., the textile factory's expense for wool or cotton is a direct material cost of its cloth, and the wages of its spinners and weavers constitute direct labor cost, of the yarn and cloth respectively. Direct costs thus tend to vary rather closely with the rate of production, for every yard of cloth or pair of shoes or standard part thereof requires about the same amount of material and of "productive" labor, and the proprietor is commonly able to buy both of these ingredients only if, as, and when he needs them. Many business expenses, however, are necessarily incurred for materials and services which may be stretched somewhat elastically over more or less product, such as costs for heating and lighting the premises, rent, taxes, insurance, materials like paint for maintenance, obsolescence (depreciation in value due to competition of later and improved facilities or products)—all these are largely within the realm of indirect or overhead material or service costs. Then of course there are numerous "unproductive" personal services, like those of janitors, watchmen, time-keepers, technical specialists, advertisers, and especially executives and supervisors, which ordinarily are not purchased in any close proportion to the current output of the business. When the expenditures of this indirect or overhead sort are divided by output for a slack season, the overhead cost per unit of product tends to be high; in a busy period it is low.

There are not many items of expenditure which are completely constant for either total production or for the unit of a given line of product or part-product; most are somewhere between these extremes. Thus it is the duty of a supervisory official to keep direct labor up to snuff (for its efficiency varies somewhat from day to day, which means that unit cost for direct labor varies—except when it is paid a straight piece rate); and it is also this supervisor's duty to keep an eye on the indirect costs of his department, like repairs and auxiliary workers, and to vary the latter, so far as practicable, according to the current production or operating schedules. Also a given item may be direct or indirect cost, depending on the nature of the bargain made with the supplier of the item. Payment of



a straight piece rate for factory work or straight commission for selling, is quite obviously direct cost, since it varies closely with production or sales; while a straight monthly salary for the same sort of service would likely be considered overhead cost, even though it were adjusted pretty closely to the individual's production or sales in the long run. The indirect labor cost for lower-paid work, such as sweeping and time-keeping is more nearly direct than the higher salaries, if the former workers may be laid off more readily than the latter.<sup>1</sup>

A homely illustration of the differing behaviors of these costs is furnished by a private automobile or motorcycle. The motor fuel, oil, tires, and certain repairs are mainly "prime" or direct costs; they vary rather closely with the miles driven. But there are also very important overhead costs, such as garage rent, insurance, interest paid or foregone on purchase price, taxes, and above all the obsolescence depreciation. If the owner drives his car only 2,000 miles a year, the direct cost per mile is about the same as if he drove 20,000 miles; but with more miles to divide into the overhead items, the overhead cost per mile for a 20,000-mile season is not greatly in excess of 1/10th of what it is for a 2,000-mile season. And in this case the overhead is so large that the net cost per mile, all items direct and indirect considered, of the much-driven car might be but 1/5 as high as that of the little-driven car.

In many business establishments, also, the indirect or overhead costs are nearly as high as, or higher than direct labor.<sup>2</sup>

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<sup>1</sup> Compare J. M. Clark, *Economics of Overhead Costs* (Chicago, 1923).

<sup>2</sup> A table is given in P. S. Florence's *Economics of Fatigue and Unrest*, p. 134, based on early Federal Trade Commission accounting investigations in several industries, which purports to show that although in coal mining the overhead cost is only some 20% of the direct labor cost, in manufacturing plants the total of all true overhead charges is likely to be from one to three times the *direct* labor cost. In New York book and job printing, the overhead as defined by the trade association averages about equal to shop payrolls—see D. R. Craig, *The Economic Condition of the Printing Industry in New York City*, Ch. 5 (1925).

The firm of Mavor & Coulson, to which I make numerous references elsewhere herein, state that the ratio of their "oncost" (overhead) to total cost increased from 32% in the busy year 1920 to 40% or more in active years after 1927. "The increased proportion is due chiefly to increases in the scale of salaries, to enlargement of the staff necessitated by the higher

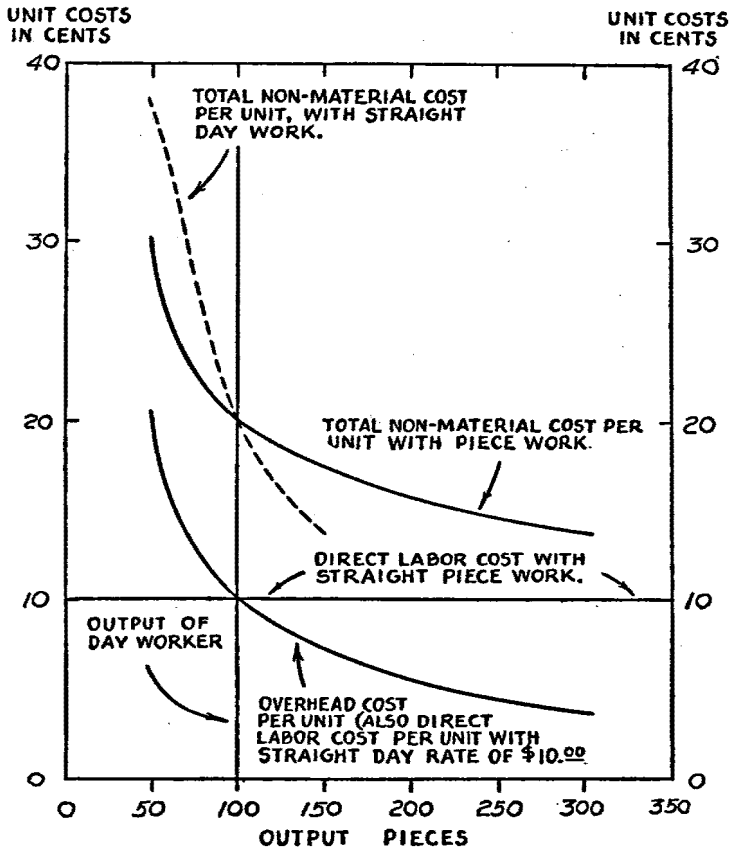


Figure IV. Chart Illustrating Table on page 61. Also showing curves of Cost with Straight Day Work.

The general responses of unit costs to varying outputs are schematically shown, under simplified but not grossly improbable assumptions, in the accompanying table and in Figure IV.

standard of efficiency in organization, the provision of new departments such as accountancy, publicity, purchasing, metallurgical chemistry, planning, records, time study, improved shop facilities and services."—*M. & C. Apprentices' Magazine*, Summer, 1933, p. 60.

(Variations in terminology, as to definitions of overhead and direct labor costs, to some extent vitiate comparisons among firms and industries.)

BEHAVIOR OF COSTS WITH VARYING OUTPUTS—HYPOTHETICAL<sup>3</sup>

Relative Output	Straight Piece Worker's Earnings	Direct Labor Cost per Unit	Total Overhead Cost	Overhead Cost per Unit	Total Non-material Cost per Unit
(1)	(2)	(3)	(4)	(5)	(6)
50	\$5.00	\$0.10	\$10.00	\$0.20	\$0.30
100	10.00	.10	10.00	.10	.20
150	15.00	.10	10.00	.067	.167
200	20.00	.10	10.00	.05	.15
250	25.00	.10	10.00	.04	.14
300	30.00	.10	10.00	.033	.133

The variations in relative output, from 50 to 300 or 1 to 6, may seem absurd; and yet the outputs of the best piece workers doubtless often reach three times or more the common level of straight day workers in the same occupation and industry (not, perhaps, in the same shop). Also the output of the *ordinary* day worker (taken as 100 in this table and chart) may sometimes be twice as great as that of the *poorest* day worker; and moreover variations still more extreme than these often occur within a single shop, because the worker may be paid for very low production due to shortage of materials or other causes beyond his control. The total overhead cost is taken as \$10 (a day), i.e., is equal to direct labor cost when output is 100 and wage is \$10.00. The table works out variations in costs on the over-simplified assumption that the overhead cost is completely invariable, whatever the output. Such a condition would seldom or never be met in fact, although a uniform direct labor unit cost is more or less closely approached by any straight piece wage.

The table and chart show that, under these assumptions (including straight piece rate for direct labor), as production increases six-fold, unit cost decreases to something under half the initial rate—from 30 cents to 13½ cents. In the chart

<sup>3</sup> Assuming a day wage of \$10.00, 100 units of output as the average performance of a day worker, a piece rate of 10 cents derived directly from the foregoing data, and overhead cost as constant at \$10.00 (equal to direct labor cost at this day worker's efficiency).

it is further shown that the curve of overhead unit cost is the same as that of direct labor unit cost with a straight time wage of \$10 substituted for a straight piece wage. Under this new assumption (fixed time-wage), total non-material unit cost varies most rapidly (and inversely) with the rate of production, because both direct labor and overhead costs are constant. The dotted line which traces total unit cost from 40 cents at 50 units of output, to  $13\frac{1}{3}$  cents at 150 units of output, refers to this extreme assumption. In practice, of course, the direct labor costs bear all manner of relations to rate of production, due to varying combinations of the day work and the piece work principles of payment; and overhead costs may be relatively smaller than we have assumed, or they may be considerably larger.

It will very often happen, therefore, that the employer's unit costs are lower for the higher-output employees than for the lower-output workers. It is the more likely to happen, the higher the overhead in relation to the direct labor cost. Growth in overhead cost increases the management's incentive to speed up production, and development of the arts connected with measurement of the worker's accomplishment also increases the possibilities of increasing the rate of output by wage incentives. To these factors we may attribute much of the modern trend toward payment by results.

Of course there are some countervailing tendencies. Sometimes the employer cannot economize on overhead costs by means of high production, because he cannot sell such production remuneratively. Again, a higher rate of production, beyond some point, increases spoilage and lowers quality; but ordinarily the most capable workers, adequately stimulated, can turn out better quality than the less capable, as well as a much larger quantity. Also a low-wage policy may seem profitable to an employer, if it appears that he can get a supply of low-paid help by enthusiastic promises of future advancement,<sup>4</sup> and can obtain remunerative results before they become discouraged and leave his employ. Certainly low costs and high profits

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<sup>4</sup>What Germans call *Zukunftsmusik*—"Music of the bright future."

do not follow automatically from any and every sort of high wage; yet in many instances the unit labor cost, and still more the unit total cost, could actually be reduced by arrangements which would enable the superior employees to increase their earnings. Before any employer cuts rates because his workers are "making too much," in relation to outsiders, he should consider carefully whether the services he receives are correspondingly better than those of the other laborers whose earnings he is comparing with the earnings of his own people.

**Wage Tactics Toward Low Costs.**—The employer's major strategy for low costs, so far as they may be achieved through a labor policy, is conducted through various minor tactical objectives. Several of these may be outlined here. Obviously our manager wants to secure more than the mere physical presence of the employee, though sufficiently poor management will obtain little more than just that. By suitable administration an efficient management seeks, first, to secure for each job-class enough workers with sufficient actual or potential *capacities*. The hiring rate is one means. Second, incentive engineering is also necessary if the workers' potentialities are to be adequately *developed*. Training the employee for his first job is only a beginning in this process; though it too involves nice wage problems. Personnel authorities like Scott and Clothier insist that the "square peg in round hole" slogan of placement is deceptively static, for it suggests that the vocational problem for a given worker may be solved once for all. Actually the human pegs are always changing shape, so that if the most is to be made of them they should be followed up continuously, to see if further development and new placement (including promotion) will pay. Third, workers should be induced to give, not merely their physical presence and minimum application to the job, but their whole-hearted efforts to *do the things the employer wants done*. He wants as large output as is consistent with economically high quality, he wants other promotion of good will for his business, he wants good feeling within his ranks and so on. Specific wage elements or bonuses are increasingly given to focus attention on such matters—for

quantity, quality, missionary work, and cooperation, for instance.

So we might go on, emphasizing employer-objectives like low labor turnover and a free hand in management; as these matters have very real connections with incentives. Increasing degrees of all such factors yield, first increasing, then diminishing to negative, financial returns. The management attempts to find the point at which further units of labor supply, reduction of turnover, freedom in management, etc., would not be worth the cost. This optimum point, of course, shifts frequently, in response to fluctuations in the labor market and in many other forces.

**The Employee's Objectives.**—To conclude our discussion of purposes, we must consider this question: What are the earmarks of a good incentive-situation, from the standpoint of the employee? Here again we need to distinguish between *actual* wants (which are often mistaken or short-sighted yet must be dealt with) and *rational* wants. The worker, like the employer, often over-emphasizes immediate wage rates, though in an opposing direction. Whereas the employer should be most interested in his labor cost, the employee should be most concerned with his *annual earnings*, including consideration of all incidental attractions of his job, such as real opportunities for advancement; and he should make a proper discount for any sacrifices which the job involves. High wage rates (per hour, per piece, or per week) are often found in connection with unstable employment; in building, in mining, and (until recently, at least) in the automobile industry, for example. Another discount should be made for special hazards of occupational disease or accident. Construction laborers, electric linemen, longshoremen, and workers exposed to abrasive dust or poisons, illustrate this point.

The list of incidental advantages and disadvantages of a job might be elaborated almost indefinitely along lines suggested elsewhere in this book, but two further matters appear to be of general importance; working hours and pace. The hours may remain constant and the worker may increase his

total or daily earnings by speeding up; or the average weekly hours worked may decrease, as the pace is quickened, and the hourly earnings may increase. In either case the increased earnings are desirable in themselves, but the cost in terms of effort and health may sometimes be excessive. The high earnings which are received for prolonged overtime, for instance, are often too dearly bought. High piece rate or bonus earnings also may cost too much extra effort, at least to the less fit workers involved.

More closely relevant to wage matters than these are three special wants of the worker, viz.: a "fair wage," a simple wage system, and a share in "control" of the work and pay arrangements. The worker's idea of a fair wage might be expressed in a paraphrase of the old accounting adage about inventory prices: enough to cover cost of living, or market rate of pay, whichever is higher. Most of us agree in principle that a fair *wage* is simply the full competitive rate which the work will bring in the market and time where it is offered.<sup>5</sup> As citizens or philanthropists, of course, we may attempt to make sure that no family's *income* falls below a certain provision for each person actually in that family. In the following chapters we shall also study the numerous difficulties which beset any one who tries to find what "the going rate" actually is, for a given bit of labor; and I shall indicate what hope is offered in this direction by the modern technique of job analysis.

*Simplicity* has long been recognized as a desirable characteristic in a wage scheme. Straight day work and straight piece work are easy to understand, and each makes relatively easy the employer's clerical work on payrolls and other accounts. The more complex wage formulae appeal to many engineers and cost accountants, but they baffle the simpler minds of wage earners. People do work, to be sure, under the most fantastic formulae, so long as their total earnings appear passably satisfactory, even though the outsider perceives that their earnings increase less than proportionally to their output

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<sup>5</sup>See A. C. Pigou, *Economics of Welfare* (1st ed.), Pt. III, Ch. 13, for an elaboration of the economic conception of "fair wage"; also Marshall's Introduction to L. L. Price's *Industrial Peace*.

and effort. Such a situation gives the "labor agitator" a special opportunity to arouse resentment; and, as will be further shown in Chapters 13 and 15 it may otherwise be costly to the employer. The criterion of simplicity, however, may well yield in some degree to other requirements in the way of efficiency, such as special bonuses for quality, or for low records in errors and spoilage. Day work is doubtless the simplest system of all, but it is not in every situation the best all-around scheme.

**Trade Unions and Wage Methods.**—The desire for fullest possible *freedom and control*, on the part of both employer and employee, is perhaps not logically distinct from such other objectives as have been mentioned. This freedom is wanted chiefly as a means toward the main objectives of low labor cost and high annual earnings. But to practical people "control" often appears a separate matter. The "open shop" employer may say he is willing to yield all that his workers ask except their demand for "interference," for the right to "tell him how to run his own business." He dreads having his hands tied (as it appears to him) by union agreements, working rules, and the judgments of union officials. Labor advocates, on the other hand, often say they are willing to accept piece work or production standards or other efficiency devices, considering that wages in the long run must depend on labor productivity; but they are unwilling to leave detailed administration of all these matters completely in the hands of the employer. Many miners, for example, are more content with payment by the ton, when their union provides bargainers and checkweighmen, than when they have merely the choice of taking what the employer offers or quitting. The noted British economist, G. D. H. Cole, stated an extreme form of this view:

Clearly, as long as the workers are unorganized and unresisting, the employer can impose upon them, if he so desires, very onerous conditions. He can, by fines and inducements, by rigorous supervision, or by the remorseless "sacking" of those who do not suit him, make the lives of his employees a burden. He can fix both rates of wages and piece work prices or basis-times [time allowances] at his own sweet will, and can control with almost absolute precision the actual earnings of his employees from week to week.



To such conditions organization furnishes the inevitable answer. The workers combine to secure, instead of earnings capriciously or at least arbitrarily determined by the employer, standard rates and established prices for their work. They combine also to resist speeding-up and overstrain, and to make the conditions in the factory more tolerable.<sup>9</sup>

Like other ardent union sympathizers, he much underrates the effect of competition among employers in holding wages *up* toward the "fair" market price, and exaggerates the potency of unions to pry them higher. Theory and evidence on this point are discussed in Chapter 10 and elsewhere below. Of course not all workers demand "control" to this degree, but most of them are at least potentially skeptical of the idea that the existing competition among employers fully safeguards the workmen's interests. This attitude is almost completely parallel to that of the business man who prefers to have his own lawyer and auditor check the contracts and accounts proffered him by other proprietors with whom he is negotiating.

The positions of various trade unions, American and foreign, on methods of wage payment are somewhat unstable and heterogeneous. Many unions have tolerated, and some have insisted upon, piece work or other types of payment by results. These workers have thought that they could thus obtain the individualist advantages of greater earnings by greater skill and effort, often with the additional prize of milder supervision and freedom as to their hours of work; and they have believed that their organizations safeguarded them from the employers' supposed tendency to cut rates progressively and thereby to make the men work harder and harder for only temporary and occasional increases in earnings.

Ordinarily a piece work or bonus plan is more acceptable if coupled with a guaranteed minimum time rate, and participation by employees in task-setting, than without these safeguards. In many cases, however, the conservative and collectivist ideas of unionists cause them to resist any sort of payment by results, even when technical conditions are favorable. A leading American printing union, for example, after long

<sup>9</sup> *Payment of Wages*, p. 25 (1918).

experience with piece work, in 1925 was prohibiting it after expiration of contracts providing for it.

The driving tactics of some employers are partly responsible for such attitudes; but doubtless the main factor is the workman's well-founded apprehension of unemployment. The printers would probably be much less concerned with their expressed objections to piece work but for the more or less sub-conscious notion that higher productivity per man-hour is secured by piece work, which apparently means less man-hours of employment available to the body of qualified workmen. (This "lump of labor" philosophy is especially appealing in any time of rapid technical change and growing percentage of unemployment. Rapid technical change also tends to make obsolete old measures and standards of output; and puts new burdens of innovation on employer who proposes new standards.)<sup>7</sup>

<sup>7</sup> Very likely a strong union's "minimum" time rate may often become a dead-level for all men employed, as is popularly supposed; but that there are at least some important exceptions to this proposition is shown by the firmly-entrenched New York book and job union printers. In that situation, for many years, "premiums" were paid to especially competent men. Surveys in 1922 and 1926 revealed that, among all crafts, some 45% were "premium men." The amount of such premiums were nearly all from \$1 to \$10 a week; the regular scale for compositors being \$50 in 1922 and \$54-55 in 1926. (Information from New York Employing Printers' Ass'n.)

On ideas and practices of American unions, see, for example, D. A. McCabe, *Standard Rate in American Trade Unions* (Johns Hopkins studies, 1912); and M. Woll, *Wage Negotiations and Practices* (Am. Fed. of Labor, 1925). In 1927, at its annual meeting, the Federation made a "Declaration" of what purported to be a new wage policy, concluding:

"The American Federation of Labor is the first organization of Labor in the world to realize the importance of the factor productivity in economic society. It no longer strives merely for higher money wages; it no longer strives merely for higher real wages; it strives for *higher social wages*, for wages which increase as measured by prices and *productivity*.

"This modern wage policy lifts the movement to an absolutely new level. For higher real wages meant only: betterment of the economic position—while higher social wages mean: betterment of the economic and *social* position of the worker. The modern wage policy guarantees an active but stable development of industrial society." These notions were elaborated in a series of research pamphlets published by the Federation in 1927.

In the November 1930 issue of the *Monthly Labor Review* of the U. S. Bureau of Labor Statistics will be found a rather comprehensive survey (pp. 128 ff.) on "Time and Method of Payment of Wages Provided for in Collective Agreements"; also (pp. 176 ff.) tables of hourly union rates, for a number of years, of "the principal [well-organized] time-work trades—bakery trades, building trades, chauffeurs, teamsters and drivers, stone trades, laundry workers, linemen, longshoremen, and printing trades—in 67 important industrial cities." See also several references, below, to wage policies and practices in Soviet Russia.

## CHAPTER 5

### GENERAL INTERACTIONS OF WORK, SUPERVISION, AND METHOD OF PAYMENT

The factors discussed above interact with another highly important set of conditions, which we may collectively entitle the nature of the work. Outstanding in this group are the factors repetition or variety, and character of supervision. Usually these forces will play a large part in determining the methods of wage payment and other incentives which are most suitable; but there are also other influences which should not be ignored. Prejudices, personalities, and historical accidents are powerful. If we should study the parallel industries, merely in the English-speaking countries, for example, we should find rather striking differences as well as resemblances, even in the unionized sectors. The machinists' unions in Great Britain, for example, appear somewhat more tolerant of time study and payment by results than do those of this country; doubtless because in Britain the unions have been strong enough to exert some control over the installation of these methods, and yet not strong enough to win the strikes which they have waged over them. For railway train crews, on the other hand, which are strongly organized in both countries, the mileage basis of pay seems to be more popular here than in England.

Within a single large concern, moreover, we are apt to find several methods of payment, aside from the traditional division between wages and salaries. In Chapter 13 below, we shall comment on various wage-incentive schemes, several of which are used simultaneously in the Westinghouse shops, for example. If we took account of all their operations—office, sales, research, transportation, etc.—the systems used by this one concern would be still more numerous. Such a situation results from attempts to fit the wage method to the fundamental natures of work, workers, and supervision; and also

from variations in the ideas or prejudices of the supervisors and workers affected. Few large employers are so strongly attached to the straight time basis of payment as Mr. Ford, who apparently has nothing to do with bonuses, piece rates, or other payment by results; and yet he was a leader in the movement to standardize the prices, to automobile owners, of their repair jobs.

**Varieties of Work; Their Influence on Method of Payment.**—Human efforts and services, rendered primarily for pay, are classified by economists into three major types: work, saving, and risk-bearing. The incomes which are supposed to sustain and motivate the supplies of these services are, respectively, wages, interest, and profits. The saving of capital presents problems so peculiar that it is quite beyond the scope of this book; but the other two activities mentioned are so interwoven that we shall deal with risk-bearing or entrepreneurship to some extent.

From the standpoint of what the worker does, regardless of who employs him, we may recognize several main levels of work, running from those mental operations and decisions which call for some one of, or combination among, such factors as initiative, responsibility, rare ability, and much training, down to labors which are more largely physical and are likely to be done under closer supervision.<sup>1</sup> In the simplest case we have here a military or "line" hierarchy: general manager at the top, superintendents under him, foremen under superintendents, rank and file workers under the foremen. But usually there are also specialists, such as engineers, artists, treasurers, auditors, office managers, personnel directors, and the various types of research workers, who do not fit neatly into this line scheme. These "staff" people are experts on their own phases of the work in many line departments; and the scarcity of their skills requires that they be given pay and status similar to those enjoyed by the line executives. Ordinarily, however, they can actually exercise authority over only a few people; they must usually get their decisions into effect by persuading the line

<sup>1</sup> Compare J. A. Hobson, *Incentives in the New Industrial Order*, Ch. 2.

officer, in charge of the department where the work is to be done, to issue suitable orders.

Thus far we have assumed that these people are all employees of the stockholders of a business corporation. But notice that most of these types of work are also carried on, to some extent, by workers who are their own bosses—who are *employers* or *self-employed*. We can easily find independent practitioners among accountants, mechanics, stenographers, engineers, window-washers, and so on. The principal managers and superintendents, also, if they can find capital or backing, may leave this concern and set up businesses for themselves, wherein their own work will be similar to that of their present salaried positions. The relations of employers and employees contain innumerable issues of “freedom” and “control”; but in any case the financially-responsible employer or entrepreneur must assume some business risks which the same individual, working as an employee, would not assume. If, as entrepreneur, he is shrewd and lucky, he will make more in profits than he could in mere wages or salary. In many sorts of profit sharing plans, as Chapters 16 and 17 will show, workers do, in effect, invest part of their labor efforts and become to some extent entrepreneurs in the businesses where they are employed. Practically, no job is without some economic risks to the worker as well as to the employer; and so any one who takes a job becomes in some degree an entrepreneur in the whole project.

**Wages and Salaries.**—When any one is employed he usually receives pay, which may be called a wage or a salary. The latter term came into the English language through the Norman Conquest,—it is the French term which was used by the newly-dominant class, and it readily acquired a higher-toned flavor than the old Anglo-Saxon *wages*, which the common employees in England continued to receive. Nowadays the mere wage-earners, who are usually manual and non-supervisory workers, are often referred to as “hourly basis” employees, since they commonly have to be content with work and pay for only fractions of days if that suits the employer’s convenience.

They are distinguished from the salaried or "daily" or "monthly basis" workers. The modern French term *employé* is not quite synonymous with the English *employee*; the former refers only to the white-collar or salaried type of employed person, who in the German tongue comes under the designation *angestellten*. The manual wage-earners are called in French *ouvriers* or *travailleurs*; in German *arbeiter*. "Salary" connotes comparative assuredness and regularity of income, since salaried workers are seldom laid off for a few hours at a time; on the other hand, they are not paid for overtime so commonly or proportionately so highly as wage-earners. In economic theorizing all incomes secured by work, even most or all the fees of independent practitioners, tend to be lumped under the term wages.

**Varieties of Payment by Results.**—Methods of wage payment are strung between the two poles of plain time work and straight piece work, in innumerable combinations which invariably involve both these bases (time and output) in some degree. We are now to explore some of these variations in a preliminary way, beginning with a little survey of ramifications of the principle of determining earnings by measurement of output—or, as the British say, "payment by results."

Praises are sometimes sung of piece work, on the ground that it makes the worker in effect his own boss—sets him up in business for himself. This interpretation seems a grim joke to many persons, who think of the piece worker as a "sweated" wage slave, able to earn only a miserable pittance and probably required to obey all manner of factory regulations as well. Some American trade unionists of the 1830's and '40's, on the other hand, whose bargaining power was strong because the attractions of cheap land tended to make wage labor scarce, and whose individualist philosophy told them it was only right and fair that each worker should be paid in proportion to his industry, asserted that the "piece price" basis of payment gives the worker a higher and better status than a day wage basis.<sup>2</sup>

<sup>2</sup> See Norman Ware, *The Industrial Worker, 1840-1860*, p. xiv (Houghton Mifflin Co., 1924).

In form the piece worker is a sort of dealer in labor, and sometimes in substance he is. He may be a foreman or sub-contractor, for example, hiring labor on his own responsibility and paying it out of the price he receives for completed units of work done by his gang. Whatever remains, if anything, is his own profit or earnings of management. Such arrangements come down out of a very distant past. Any building contractor who furnishes the larger tools with which his men work, but not the materials, exemplifies the principle. The "domestic" or "putting-out" system was often a forerunner of the factory system. The shoe or clothing merchant, for instance, would let out contracts to head craftsmen, working perhaps in their homes; the merchant furnishing all materials and the craftsman finding such workers as he could at whatever bargain he could make. The merchant would pay a predetermined price for the work in completed shoes or clothes. This system still prevails in various places, for instance in glove-making. It permits the contractor or sub-contractor to "set up in business for himself" with comparatively little capital; yet ordinarily he assumes some risk, for his workers may be legally entitled to their pay first, out of the price he receives. In more recent times many contractors working by this system in the garment trades have been said to run "sweatshops"; and some people suppose that the contracting-out system necessarily leads to "sweating" or enslavement of the poor creatures who are hired by the sub-contractors. If we consider analogous cases among professional men, however (who hire their assistants at straight salaries, while the partners divide the "profits" left from all fees collected), or among small building contractors, we must realize that the supply and demand situation, the behavior of prices, and the prosperity and knowledge of the workers, exert much more effect on their wages and working conditions than does the classification of their employer—be he merchant, manufacturer, contractor, or sub-contractor.

In another variety of the sub-contracting system, the chief employer furnishes shop and equipment, as well as material; he also keeps time and pays off all workers. He contracts with

various head-workers for work to be done at a piece rate. The head-workers are expected to find assistants at whatever bargains they can make, which assistants are paid, out of the piece rate earnings of the sub-contractors under whom they work. In this way the sub-contractor has a very strong incentive to keep down wages and keep up output of the workers under him. Locomotive shops in this country have employed such a plan even lately; and in England this so-called "butty" system has long been rather common. It is out of favor with most managers as well as with professional labor advocates today, as it seems to put too much pressure on the small boss for getting out quantity of output at low wages, which often leads to poor quality of work, misuse of equipment, and ill-feeling among the labor force as a whole.

The worker with little or no equipment who is employed casually by such clients as he can find, at a piece rate rather than a time rate,—for example newsboys, bootblacks, commercial stenographers and typists, real estate brokers, house-furnace-tenders, chimney-sweeps, scissors-grinders, window-washers—these exemplify payment by results, not infrequently under conditions of considerable independence. In the aggregate such work "gives employment" to a great many people.

The practice of "giving tips," which originated in ancient class-distinctions and contains some repulsive elements on that account, persists in part because it contains some qualities of payment by results. The person giving the tip often makes it (or its amount) contingent on quality of service; and so there may be some tendency for the more efficient servants to secure the highest earnings. This tendency, however, is held in check by indiscriminate giving and by pooling arrangements among recipients. The nominal wage is doubtless always lower where tips are expected, than in similar establishments where they are not. The national park hotel and camp companies, for example, in circulars for prospective summer employees, have specified both the wages and the estimated receipts in tips. In a few "Ritzy" places, tips average so high, relative to ordinary wages in the occupations concerned, that the proprietors in effect participate in the tips.



Finally, there are innumerable wage plans which involve some sort of "bonus"—a very elastic term. Any sort of bonus, however, pre-supposes a basic wage or salary; the bonus is an additional payment if certain conditions are met. Ordinarily, though not always, these conditions are such that the worker who receives a bonus has given more valuable service than the worker who obtains only the base rate—especially is this true of bonuses for extra quantity or quality of product, for regular and punctual attendance, for service without errors or accidents, and so on. A bonus which increases, beyond rather narrow limits, with mere lengthening service for the employer, however, is not always clearly correlated with total value of worker to employer.

A common and rather special usage of "bonus" refers to a wage which varies directly with measured output, beyond some minimum production at which, or below which, only the basic time rate is paid. This type of payment is often called "premium bonus," and a bonus curve or table shows earnings at varying rates of production. It differs from pure piece work, not only in that increase in earnings may not always be proportional to increase in output, but in that each worker's bonus is computed on the base of *his own time rate* ("base rate"), which may be different from the rate of a neighbor who at the moment is doing exactly the same sort of work.

The principal formulæ used for relating output to payment, from the pole of straight time work to the extreme of straight piece work, are discussed in further detail in Chapter 13 below.

**Measurement and Quality in Relation to Payment Methods.**—The straight time basis of pay (i.e., "day work" or "straight salary"), combined with suitable supervision, is generally used under any or all of the following circumstances:

1. If the product is unstandardized or imponderable;
2. If the worker has to contend against fluctuating resistances too inconvenient to measure and allow for;
3. If the volume of output is largely beyond the worker's control; or
4. If quality is supremely important.

The first two of these conditions signify that measurement of the worker's net accomplishment is difficult or impossible. The product of a janitor or a teacher, for instance, resists measurement strongly; and in many cases where the apparent product is easy to count, the working conditions make the difficulty of producing a unit highly variable. Coal mining is a case in point, on account of different thicknesses of seams and other obstacles; so also typesetting and copying, when the material to be copied varies in legibility or vocabulary or arrangement. The third condition listed above means that the apparent output may be standardized and measurable, but the process is so nearly automatic and mechanized that it is almost invariable in pace—in electrical and chemical industries, for example. Here it is not the fluctuations of resistance to the worker which bars satisfactory operation of payment by results but rather the lack of such fluctuation.

A measurement method, nevertheless, may fall far short of perfection, yet with all its crudity may serve as a practicable basis for an output wage. Piece rates and bonuses have, in fact, been widely used in coal mining, printing, and typing, in spite of the difficulties mentioned. New indexes of accomplishment by workers are continually being found; and each of these gives an impetus to payment by results in effect if not in form—for the wage may be reckoned entirely on a time basis, yet be adjusted frequently with reference to these partial measures of this timeworker's productivity. On the other hand, a worker who is normally paid by a straight piece rate will often have a guaranteed minimum time rate, to protect him against those occasional lacks of opportunity to make reasonable earnings on piece work which will occur in the best regulated shops. Local adjustments may be made in the piece rate, if conditions depart too far from the initial assumptions.

If an objective measurement of output is available which is not too crude, such as number of words typed or tons of coal put on to cars, the output basis of payment has several attractions to both employer and employee. The former generally realizes that his workmen will be likely to produce faster under payment by results than when their output is not measured or

closely estimated and recorded. This faster rate of production, as we have seen, means lower unit overhead costs; also piece workers often require less "bossing"—less constant and aggressive supervision. This latter feature is also an attraction to the employee—he likes the greater freedom,<sup>a</sup> and of course he likes the higher weekly earnings which an output wage may enable him to make.

But what of the great factor *quality* of work? Is it affected by the wage method? In many instances quality is so important, and is so hard to determine after each unit of work is done, that the employer thinks it best not to apply the pressure for quantity of output which is involved in most types of piece or bonus work. He will hire these workers on a straight time basis, will appeal to their craft pride, and probably will also supervise them carefully. Or possibly he may limit the amount which a piece worker is permitted to earn in a day, on the theory that he is thereby safeguarding quality. Often, however, some system of quality and spoilage and scrap bonuses, combined with the payment for *quantity* or results, will safeguard quality more economically than a plain time wage, even if the latter is accompanied by good supervision. Of course any arrangement for payment according to output is based on some sort of quality standards and inspection; such workers are paid only for pieces which pass inspection. The wages of the inspectors, and of the clerks and other functionaries who administer the payment scheme, the working capital tied up in "work in process" which is waiting to be credited to the piece workers, —these add up to sizable percentages of the direct labor cost, in any system of payment by results; and so in some degree they nullify the savings in other supervision and in overhead cost.

**Repetition; Influence on Pay.**—Is there any work with *no* quantitative requirements? If such employment exists, it is

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<sup>a</sup> Which is qualified by the employer's desire to work his plant as nearly to top capacity as is commercially practicable. Thus, a piece worker who wants to work irregularly, making low or mediocre average output, may be unacceptable to an employer if the overhead costs are high.

extremely difficult to find, even among the most highly skilled arts. When the work is highly variable, like a pattern-maker's, then the employer may indeed encourage craftsmanship by paying a straight time wage, or even a salary, and by allowing great freedom in detail; yet in the long run such a worker must impress his superiors as turning out *enough* work to be worth his pay. Frequently his boss can compare his performance with that of another worker, doing similar work. If the work is repetitive in the long run, even though each job must be done very carefully and perhaps requires days or months to complete, then some sort of production standards are apt to be worked out by time study or other statistical methods. After this step is taken, while the worker may not be flustered by payment according to immediate results, yet he will not hold his job or his rate of pay if he consistently falls below the standard. Thus there is a tendency to set standard times for repair jobs on even the finest automobiles. We are brought around to the proposition, therefore, that *definite standards of both quantity and quality are likely to evolve out of large-scale operations*—in a word, from *repetition*; and these standards are apt, directly or indirectly, to be used as a basis of remuneration.

Repetition of jobs, however, is not of itself sufficient to warrant the expense and diplomacy involved in establishing payment by results, unless there is a considerable volume of such repetition. A private secretary's work, for instance, involves much repetition of dictation, typing, and filing, for all of which it would be technically feasible to set time allowances or task times. But it is not often economically feasible, largely because there are too few secretaries employed under a single management or under sufficiently uniform conditions. In large offices, however, it is not very uncommon to fix production standards and to pay the typists, billers, and what not, accordingly.

In many cases, also, an output wage is used for occupations in which no large volume of repetitive work is done *within any single establishment, but in which the aggregate of repetition is large*. If the work and its conditions are suffi-

ciently similar wherever it is done then production wage incentives may emerge even when the operating units are small. Such is the case in the barber trade, where journeymen are quite commonly paid in part according to receipts from the customers they serve—say 40%, with a guarantee of at least \$20 a week. These rates, subject to some variations by bargaining, have gradually established themselves; and numerous parallel cases may be found in small-scale industries. Even in agriculture there are often local rates for at least harvesting (so many cents per bushel or pound), and for fairly uniform staple work like plowing and weeding. Fluctuations in difficulty of getting out the unit of output may often be allowed for by local mutual agreement. Payment by results is feasible only when a relatively standard product, practicably inspected and counted, is turned out on a *large scale in the aggregate*, and under conditions sufficiently uniform so that a certain skill and effort in the worker will produce approximately similar output wherever applied. These conditions do not usually obtain in small-scale selling; here is probably a main reason why salespeople are paid most closely in accordance with the dollar-volume of "their" sales in the larger establishments.<sup>4</sup> Seldom indeed, in any case, can conditions be so thoroughly standardized, for payment by results, that there will not be "fat" and "lean" jobs (yielding more or less than average earnings for a given effort by the worker). It is often part of the foreman's diplomatic functions to deal out "fat" jobs equitably among his piece workers.

**Repetition vs. Monotony.**—Though the connection between payment by results and repetitive work is rather intimate, yet some easy inferences along this line must be avoided. On the one hand, not all narrowly repetitive jobs are paid on the output basis; for example, all or nearly all of Mr. Ford's employees are paid on the straight time basis, without many time-rate classes among the short-cycle occupations. And of course not all work that is paid according to output is short-cycle or

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<sup>4</sup>See Chapter 15 below.

narrowly repetitive. The American locomotive engineer, for example, is often paid according to his mileage, yet nobody considers him a robot. Beware, then, of concluding that the increasing sweep of payment by results implies a *corresponding* increase of short-cycle tasks and increase of "monotony in industry." Some sort of repetition of tasks, to be sure, by the individual or his group, is essential to the success of payment according to output. But most wage-work in all times has been sufficiently repetitive to make measurement of the worker's output feasible, if the charge for the industrial engineering required could be assessed on enough units of output. Old jobs like those of janitors, cleaners, carters, pick and shovel workers, are continually being put on to an "efficiency basis" of payment by large employers; and could be so paid in small establishments if they would cooperate for the purpose of providing measurements and standards. Quite possibly the fact that narrow routines are usually more favorable to payment by results than varied jobs, and the circumstance that payment by results is usually a more powerful stimulus to efficiency than straight day work, furnish special motives to modern employers to subdivide tasks further than they would without this prospect. Inquiries into the extent and causes of payment by results may well go hand in hand with researches into the sources and numbers of robot-men; but to a considerable extent they are distinct phenomena.<sup>5</sup>

**Production Control and Wage Methods.**—It was remarked above that employers often favor payment by results, on the grounds that it reduces overhead cost per unit by speeding up production, and simplifies many problems of supervision. Why, then, does Mr. Ford, whose overhead is tremendous, use only straight time rates? It may be partly due to prejudice or personal idiosyncrasy (for some other large motor manufacturers still make extensive use of piece work and production bonuses);<sup>6</sup> but part of the answer is to be found in the strict

<sup>5</sup> Relations among short-cycle tasks and boredom of workers are discussed further in Chapter 20 below, and surveys of the extent of output wage methods are discussed later in the present chapter.

<sup>6</sup> See page 282 below.

supervision—driving, perhaps, in some cases—and “production control” which have been developed in recent times by industries of the Ford type. The time worker who loafs on the job is soon revealed and dispensed with. The famous lines of automatic conveyors, and similar flow-organizations, with which each human cog must keep pace willy-nilly, do not occupy by any means all the Ford men; but much of the other work in such establishments also is repetitive, at least in large cycles, and prompt schedules everywhere are maintained by the planning system (partly in order to keep down those expensive items, “inventory of work in process” and floor space). The engineers who wrote *Waste in Industry* were evidently much impressed by these phenomena; and they remarked that production control will sometimes promote efficiency better than piece work and bonuses.<sup>7</sup>

Production control and an output wage, however, appear in most cases to be capable of supplementing each other—to be complementary, rather than competing, devices. It would seem that neither can be employed unless the scale of similar operations, either within single establishments or within whole industries, is large enough to make feasible the preliminary studies and the other overhead expenses which are required to put each into successful operation.

**Statistics of Payment Methods.**—It might be interesting to study such quantitative evidences as could be found, of the extent of various types of repetition work, by industries and regions, and their historical trends. Florence, discussing his table analyzing occupations in a mass-production metal plant which he had opportunity to study intensively during the War, expresses the view that “the most regularly and frequently repeated operations occur” within five of his classes, which five

<sup>7</sup> P. 26 (McGraw-Hill, 1921). Compare C. C. Balderston, *Group Incentives*, p. 111: “A substitute for paper control is provided by power conveyors. This mechanical control eliminates many of the tickets and other forms which otherwise would be necessary to bring the materials and tools to the point where they are needed at the proper time. In addition the steady movement of the conveyor tends to pace the operators who work along it. If materials are delivered to the end of a conveyor as they are needed, and if the operations are properly balanced, the production control problems are eliminated in that department as long as the conveyor runs smoothly.”

accounted for about 40% of all employees in the factory; that "monotonous work does not occupy such a large proportion as is usually thought"; and he thus summarizes his notion of the trend of the last couple of centuries: "The tendency has been to develop the quasi-skilled or semi-skilled occupations, at the expense of the non-skilled and highly skilled occupations that involve either heavy muscular work or a long apprenticeship."<sup>8</sup> If we aspire to broader and more precise views of such tendencies, we shall find that the statistical difficulties (especially in ascertaining to what extent we are dealing with comparable bases of counting, in successive years or decades or other intervals) are perhaps even greater in this sort of enterprise than in other types of statistical study of occupations.

DISTRIBUTION OF WORKERS BY SYSTEMS OF WAGE PAYMENT, IN CERTAIN AMERICAN MANUFACTURING PLANTS, 1923, 1928, AND 1935<sup>a</sup>

	1924		1928		1935	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Time wages .....	431,539	56.1	367,454	47.3	394,250	56.3
Piece wages .....	281,342	36.6	287,586	37.0	154,763	22.1
Other incentive systems.	55,811	7.3	122,336	15.7	151,686	21.6

The case is not quite so bad with respect to the relative prevalence of the several systems of wage payment. I have not run on to any comparisons, extending over long periods, which seemed well-founded; but at least several recent surveys may be cited. These queries are usually addressed to industrial (largely manufacturing) establishments; and it is mainly the larger units which are able and willing to give the information.

The investigations of the National Industrial Conference Board appear to be the most comprehensive as yet available for the United States, but more exhaustive information on this matter will doubtless be secured by our national government's Bureau of Labor Statistics within the next few years. The accompanying table gives a summary of the replies secured by the Conference Board to three inquiries in the years specified.

<sup>a</sup> *Economics of Fatigue and Unrest*, pp. 64, 65 (1924).

<sup>b</sup> National Industrial Conference Board, *Systems of Wage Payment*, p. 9 (1930); *Financial Incentives*, p. 17 (Board's Study No. 217, July, 1935).



These data came from differing numbers and sizes of respondents in the years named,—apparently from 1,005 plants in 1924, from 1,214 in 1928, and from 631 in 1935; and they are more typical of large than of small establishments. In 1935 the Conference Board also made a survey covering 2,452 "business establishments," (2,075 of them manufacturing) with more than 4.5 million employees, which showed that nearly half the companies made some use of piece rates, and nearly one-third premium or bonus systems.<sup>10</sup>

Considerable variations exist among industries, apart from those resulting from the greater tendency of small than large establishments to use time rates exclusively. Thus, in the 1935 survey just referred to, 11 clothing manufacturers with 9,520 wage-earners reported only 15.7 of these paid straight time wages; while in the 32 automotive plants with 84,624 workers, 83.4% were on day rates. The abrupt change which occurred in automobile plants in 1934 and 1935, when group piece work and bonus plans were sweepingly abandoned in favor of a return to day rates, will be commented on in Chapter 14 below. It was not a return to old-fashioned day work, for time study and production schedules and standards were by no means abandoned; hence the actual efficiency of each group each day is still compared with the norm set for it by time studies. It thus becomes equivalent to what the men's clothing union has called "week work with production standards." One of its attractions to the employee, as compared with any piece work or bonus plan, is its higher guaranteed hourly rate for the time that he works. And the good worker is supposed to be stimulated and rewarded by a suitably high hourly rate.

Various other surveys might be cited, bringing out some other factors which influence the choice of wage payment.<sup>11</sup>

<sup>10</sup> Study No. 221, March 1936, p. 12.

<sup>11</sup> See, for example, surveys reported by C. W. Lytle, in his *Wage Incentive Methods*, pp. 3, 4 (Ronald, 1929); by Yale professors, in *United States Daily*, April 17, 1931; and by S. Mavor, with reference to metal trades in the Glasgow district, in 1928 (see his paper "Payment by Results," etc., in *Transactions of Institution of Engineers and Shipbuilders in Scotland*, 1930). Mr. Mavor found that, of about 30,000 metal workers around Glasgow, some 56% were paid by "plain time" (i.e., day work); 24% were accustomed to piece work; and the remaining 20% were bonus

Among nations, the highest percentage of wage-earners paid by results seems to be in Soviet Russia. In industrial enterprises there (meaning manufacturing and mining, apparently), employing 16 wage-earners or more (or not less than 30 workers, if without mechanical power), it is reported that 57% of all man-hours worked in 1928 and 1930 were at piece work; and in 1934 no less than 69%. In the latter year the proportions were not greatly different among major industry-groups, such as coal mining, chemical, and other manufacturing.<sup>12</sup>

The percentage of employees who are counted as piece or bonus workers is likely to be appreciably higher than the per cent of all man-hours which are paid for directly on some output basis; because often a workman is shifted from piece or bonus work to day work, usually because there is no work available for him just then, on which piece rates or bonus standards have been set or on which the conditions of equipment and so forth are up to standards presupposed by the output wage.

Some other aspects of wage methods, including comparative hourly earnings of similar workers under the various methods, are suggested by the research of Frain, which will be examined more closely in Chapter 12 below. He collected data, in 1927 and 1929, from 43 Philadelphia metal plants, with reference to earnings of 1,456 men in seven "standard machine tool occupations"—such as drill press, lathe, and milling machine work. Fifty-two per cent of these men were on piece work, 22% on bonus, and 26% on straight day work. It appears that in 13 of these plants only the plain time or day work method was used for such operators; and in general these establishments had the smaller numbers of workers in the occu-

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workers. A pamphlet on *Methods of Wage Payment*, by the Committee on Industrial Relations of the National Metal Trades Ass'n (Chicago, 1928), reports a survey in which a field man visited 500 shops of members. Nearly 46% of the 672 plants covered by such visits or questionnaires used the time basis of payment exclusively; and in the others, about half the employees were paid by results (usually piece work or 50-50 bonus). About 27.5% of all workers in all 672 concerns were paid by "incentive" wage plans.

<sup>12</sup> Data from State Planning Commission of USSR, reprinted in U. S. Dept. of Labor, *Monthly Labor Review*, Feb. 1936, p. 347.

pations surveyed—presumably they were, in general, the smaller plants.

Frain gave attention to the hourly "basic" rates applying to the various piece and bonus workers, which amount to guaranteed minimum hourly earnings. He found, as might be expected, that the base rate for a bonus worker was often lower than the hourly rate of a similar day worker; hence, the bonus worker was expected to earn a substantial bonus over his own base rate. He also discovered "a tendency for rates and earnings to be about 10% higher for piece workers and about 20% higher for bonus workers than for time workers."

It is usually assumed, of course, that employees paid on an immediate output basis will earn, say, one-fourth to one-half more than the hourly day rate which applies locally to their occupation. Such an expectation can no longer be entertained quite so confidently as of yore, now that managers are able to measure currently the outputs of more groups and individuals, and revise frequently their time rates of wage or salary by reference to the individual's or the group's production. In this newer situation the method of payment is immediately and nominally on the plain or straight time-worked basis; yet in effect it approaches rather closely to payment by results. We shall enlarge on this matter in Chapter 15, below, with special reference to wage methods in retail department stores. A survey cited there found, among 145 such stores in 1929, that 41% used the straight salary basis of compensation for salespeople (and these tended to be the smaller stores); 3% used straight commissions on sales chiefly; and the remaining 56% used some combination of salary and commission.

#### **Limitations and Combinations of Payment by Results.—**

A few other forces which tend to limit the extension of piece and bonus methods may be briefly noticed. It was remarked above that one factor making for return from bonus to day rates is the desire of the worker to have as high a guaranteed rate of earnings as he can get. This desire, in turn, is partly based upon the common experience of working hard, under handicaps not contemplated when the standard was set, such as

refractory material or ill-adjusted equipment; or of being shifted to day work at a base rate which gives only meagre earnings. These difficulties, when recognized, can be reduced by more adequate base rates. Another objection often urged against piece work or bonus is that such methods are alleged to provoke restriction of output by the worker. It is true that such restriction always lurks near any piece or bonus system, and is a major problem of its administration; but it is not at all clear that piece or bonus workers are more given to "soldiering" than are day workers, in general. Probably this impression arises from the circumstances that the outputs of piece and bonus workers are nearly always more definitely measured than those of day workers; and that more work is nearly always expected of the former than of the latter. Under either type of payment, the efficiency of the wage-earners is a direct reflection of the efficiency of the supervisors, including the setters of production and time standards. We must remember also, as suggested in Chapter 4 above and elaborated in Chapter 8 below, that a major provocation to restriction of output by workmen is their exposure to unemployment and underemployment—they are frequently tempted, even without their own realization, to nurse jobs along, to make the work furnish them as much employment as they can.

It is also argued, in the words of Professor Sumner Slichter, that "because of difficulties of measuring the total usefulness of employees, under the existing state of technique, measurement of individual output is impossible or impracticable in the case of one-third of the jobs in the manufacturing industries,"<sup>13</sup> and in a larger fraction of most other industries. Slichter therefore emphasizes the need of developing interest in work by group incentives of a non-financial sort. The latter objective is undoubtedly worth study, as will be shown especially in Chapter 20 below; and perhaps it may be attained in some degree for all workers. But this trend may go on simultaneously with a great extension of payment by results meth-

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<sup>13</sup> *American Economic Review*, Vol. 15, p. 94, Supplement (March, 1925).

ods. It is not unlikely, in fact, that many workers will be best off when working under a skillfully devised scheme involving four bases, namely: (1) guaranteed time wage rate; (2) material reward for his individual efficiency, according to ratings by his superiors, or samplings of his output, if no better measure is available; (3) material reward based on the group's efficiency, by group bonus, profit sharing, and so on; and (4) immaterial interest-incentives. Numerous establishments now make use of all these at once.

**Summary.**—In this chapter we have made a preliminary survey of the principal determinants of wage methods. We find that the plain time basis of remuneration (i.e., "day work" or "straight salary") is favored by the following conditions, among others: (1) few workers carrying on similar and repetitive operations, under sufficiently uniform conditions, in the district; (2) a product or a service which is especially difficult to measure; (3) special stress on quality of output; and (4) the simplicity and low first cost of its administration. These conditions are more likely to obtain in small than in large enterprises. In the larger establishments half or more of the workers tend to be paid, part of their time, at least, on some output basis rather than by plain day work. Payment by results appeals to managers by its automatic stimulation of effort in the worker; and the employee also prizes the somewhat milder personal supervision which is likely to accompany this general type of wage method. The wage-earner, however, likes still more, at times, to get his guaranteed base rate as high as possible; and this desire, if other conditions reinforce it, may cause day work to be used, as in many automotive factories, instead of bonus payments. But even in such a case, time study and other production control devices are still likely to be favored by efficient managers. Though the worker may be nominally and immediately paid on either a straight time or a straight output basis, his incentive situation may actually be a complex of material and immaterial elements, especially if his time-rate is frequently adjusted in accordance with some valid measure of his individual worth to the employer.

## CHAPTER 6

### FOUR ESSENTIALS OF ANY WAGE

It is convenient to organize our discussions of further details, in principles and methods of wages, by reference to four essentials which are to be found in every wage or salary situation. Each of these may vary with considerable independence from the others. In this brief chapter the general natures and interrelations of these staples are indicated; then each will be given one chapter or more to itself. The four items are:

1. The accomplishment or achievement, or amount of work actually done, by a given worker—quantity, quality, versatility, cooperativeness, and so on, all taken into account;
2. The standard task time, or time allowance, either explicitly set or implicit in his pay;
3. The base rate or time rate of pay (hourly, weekly, etc.) used or implied in his employment; and
4. The formula by which the foregoing items are combined to determine his earnings for any pay period.

All these matters refer to a given unit of time—such as an hour or a day or a week or a year.

1. The *amount of work accomplished*, or the *achievement*, or the *output*, or *production*, of a given worker in a given time is the most familiar notion in the world, yet scientifically it is extremely baffling; for in most or all cases it defies wholly accurate measurement. With respect to supervisory and varied jobs, such as the superintendent's or the janitor's, this proposition is obvious; and so such workers are hired mainly on the straight or plain time basis—so much per hour or month or week. Many other workers, however, are actually paid by a piece rate or bonus; can it be maintained that their production

is not precisely measurable? We must concede that in such cases a workable basis of measurement must have been hit upon, yet we may easily show that in any case the process falls somewhat short of being completely accurate and fair. The worker's versatility and potentialities for future development, his cooperativeness with supervisors and fellow-workers, for example, affect his net worth to his employer, but such matters are most difficult to express quantitatively. Because of such difficulties, and for still other reasons, there is a good deal to be said for the communistic argument that we should ideally abandon the attempt to distribute incomes according to "productivity," and should dispense them equally to all persons or at least according to some other scheme than the recipient's supposed output. This communist philosophy to a certain extent underlies the preference which trade unionists often express for a standard day rate in place of a piece rate or bonus. Economic theorists of all schools, indeed, recognize that, since most production is a joint process, in which various types of labor, capital, etc., cooperate, the ascertainment of how much of the value of a product is rationally "imputable" to this or that productive agent is a very baffling problem.

But practically there is now much to be gained from the study which we shall take up in Chapter 7, of problems of measurement of the worker's productivity or accomplishment; which study inquires what measures are currently available, and how progress may be made toward further accuracy in such measurement. Measurement, as the term is used herein, includes estimation.

2. The *standard task* is also a quantity of work of given quality, and some sort of *task time* or *time allowance* is set for a given quantity of output, of given quality. These expressions represent the two major dimensions of the same thing. This standard rate of work is not necessarily the rate at which any actual worker *does* work; it is rather that sort of "fair day's work" which is *assumed as the basis for payment*. In any piece rate, for an output which can be relatively definitely measured, there is necessarily an hourly task implied. A piece rate can be

derived only by some such computation as the following: Workers of the character required, working at piece work intensity, will be available only if they earn an average of at least 50 cents per hour. At such intensity they can turn out an average of 20 units per hour; here is the standard task: 50/20 gives  $2\frac{1}{2}$  cents as the piece rate. If this rate or "price" is established, the average earnings might be 50 cents per hour, but any individual piece worker's actual earnings in a day depend solely (so long as he is a "straight" piece worker, without hourly guarantee) on the number of acceptable pieces he turns out, multiplied by the piece rate,—with no reference whatever to the time he spends at work. If, under the conditions assumed above, he turns out 40 units per hour, he earns \$1.00 instead of the assumed standard of 50 cents.

Other expressions, used in industry, which are equivalent to "task" are "standard time," "time allowed," "100 per cent efficiency"; and special wage schemes are likely to carry yet other terms. The "B" or "point" of the Bedaux system, for instance, and the Haynes "Manit," mean standard output per man per minute. The task cannot be defined once for all, but only in units of output in a given job, so long as conditions remain sufficiently constant. "A fair day's work" is a similar though cruder conception, with a flavor of ethical fitness thrown in. Work standards, like most if not all others, are not immutable. They are adopted by human agents, usually supervisory agents of the employer (sometimes with the advice and consent of employees' representatives), and are continually subject to readjustment in the light of experience, especially as processes and specifications and quality of workers change.

Again let us remind ourselves that the time worker on varied or intangible work, who would not usually think that any standard time allowance or task applied to him, is also paid by a process of comparing his actual accomplishment with a standard accomplishment deemed fit for a standard wage or salary. This standard is often even hazier than the boss's estimate of the worker's actual production; yet supervisors inevitably have a notion of some minimum of effort and skill below



which the time worker will be discharged; also a maximum above which he will be considered for wage increase or promotion.

3. A *time rate of pay or base rate* is explicitly used for a day worker and for a salaried person—so much money for each hour or week or month during which acceptable work is done, and the manner in which a time rate is implicit in a piece rate was brought out in the calculation of a 2½-cent piece rate, above. After a piece rate has been set, to be sure, it may persist for years—even a great system of piece “prices,” like those of the old textile trades in the “old countries”—and neither employees nor employers may give much thought to the implied time basis of payment. But when a brand-new piece rate is being set, for work greatly different from any other for which a satisfactory piece rate is known, then recourse must be had to the conception of earnings per hour which the rates, on the average, are expected to yield—on which the piece worker can “make out.” Comparisons should be made, also, whenever new piece rates are proposed, between the hourly earnings they may be expected to yield and hourly earnings being made in other occupations, comparable as to skill, effort, and cost of living.

4. The foregoing elements in any pay-situation are combined by some *formula or system or plan*; i.e., according to some “method of wage payment,” in order to compute the individual worker’s *earnings* in a given pay-period. There are two outstanding families of such formulæ—time work, and piece work in the broadest sense. The formulæ of straight day work and straight piece work are each very simple. In straight time work, the worker’s estimated accomplishment must be up to the employer’s (usually variable) standard of required efficiency, so long as the person is allowed to work; and then the time he works, multiplied by his time rate, gives his earnings. In the case of straight piece work, the relation of standard output to standard time-earnings for such work has been determined once for all (so long as the piece rate holds); and in any

pay-period, the straight piece worker's earnings are determined merely by multiplying the number of pieces he has turned out by the rate per piece. (Selling goods on the straight commission basis is equivalent to straight piece work, in this respect.) Various other, more complex, formulæ we shall notice in Chapter 13 below. The other elements—accomplishments, standard task, and base rate—will be considered, in order, in the intervening chapters.

## CHAPTER 7

### MEASURING THE WORKER'S PRODUCTIVITY OR MERIT

**Importance and Difficulties of Work Measurement.**—In the preceding chapters it was suggested several times that the measurement of the employee's total value to his employer presents many baffling problems. To cite only one difficulty among many, the employer often considers it necessary, in effect, to pay during one period for services which he expects to be rendered during later periods. Such is ordinarily the case with learners; and often with experienced and competent people, during dull seasons. In general, the products of specialists and supervisors and executives are most difficult to measure, and so employees in these categories are usually paid straight salaries; yet much work which is highly skilled is sufficiently repetitive and standardized so that measurement for purposes of "payment by results" is practicable, and on the other hand much of the commonest and cheapest labor is so varied and unstandardized that it is done for a straight hourly wage. Whatever the job, it is pretty sure to offer ample opportunities for reasonable differences of opinion as to how much the worker, during a given pay-period, has contributed of the various performances and qualities desired by the employer. Even if his task is so simple that there is hardly any problem of quality and waste, there are likely to be questions as to: how much overhead cost is incurred, by reason of the rate at which he works; his relations with fellow-workers and supervisors; what capacities he seems likely to develop in the future; and so on. Thus it is desirable that all parties in some degree should (1) analyze the various ways in which the employee can be valuable to his employer; (2) realize that not all these types of worth can be accurately measured; and (3) attempt progressively to find better indexes of achievement and superior combinations among them.

In the present chapter we shall examine some of these problems which are involved in the query, How much work has this person done (or evidenced competence and readiness to do), during the pay-period? We shall postpone, so far as convenient, for consideration in following chapters the closely related issues: How does the said performance compare with the employer's standard for the job? Is such standard, under the circumstances, reasonable? What wage or salary is this standard efficiency in this job worth, here and now? As elsewhere in this book, we shall be concerned, for the most part, with "rank and file" wage-earners and with lower-salaried office and sales people, working for employers who are not subsidized or tax-supported; but some hints will appear on corresponding problems connected with higher-salaried specialists, supervisors, and executives; and a few particulars will be cited, which indicate how these problems have appeared and been handled in governmental organizations. The major phases of our inquiry in this chapter will be (a) objective indexes of accomplishment; (b) subjective indexes, with special reference to rating scale technique; and (c) the problem of coordinating and weighting the various indicators to arrive at a net estimate or index of the employee's efficiency.

**Subjective and Objective Measures.**—At this point it will be well to examine these general concepts a bit, and to make a tentative and summary classification of some principal sorts of indexes which are relevant to our present purposes. Estimates, indexes, and other forms of measurement of personal services rendered (or made available to the employer), like all other measurements, vary from subjective to objective extremes,—from simple judgments of more or less, better and worse, made by an individual judge on the basis of his unaided senses, to measurements which are little or not at all affected by fluctuations in the "human equation" of the measurer. The subjective end of this range may be illustrated by the general impression which a supervisor or fellow-worker might report, that "Mary Jones is a good typist"; whereas a systematic count of the typestrokes and errors in Mary's output, in relation to a

study of the relative difficulty of the vocabulary, of the equipment, materials, and so on, would approach the objective extreme. From this point of view the methods hitherto used for estimating the quality of work done may be classified as follows:

#### SOME MEASURES OR INDEXES OF ACCOMPLISHMENT

##### I. Objective

- A. The individual's performance, as indicated, e.g., by
  1. Continuous records, measuring or reflecting
    - (a) Quantity of his output (or dollars' worth of sales)
    - (b) Quality
    - (c) Economy or waste of materials, power, light, etc.
    - (d) His length of service with the employer
    - (e) His suggestions
    - (f) Records of attendance and punctuality
  2. Sample measurements, recorded systematically; e.g.,
    - (a) Counts, inspections, audits
    - (b) Proficiency examinations
    - (c) Other objective items of his personal history, thought to be significantly correlated with his productivity for this employer
- B. His group's performance—quantity, quality, economy, etc.—these are indirect indexes of accomplishments of individuals in group

##### II. Subjective

- A. Rating scale techniques—attempts to objectify subjective judgments
- B. Informal judgments of supervisors and others

Is there any ground for presuming that objective measures in this field are superior to subjective,—are more accurate and useful? A little reflection will show that theoretically this antithesis is a misconception; that in the end subjective judgments must be employed, and objective indexes are of service only as aids to judgments—they cannot be substituted completely for judgments. It is a principal function of the supervisor to take into account many elusive factors like adaptiveness and cooperativeness, in order to arrive at a net conclusion as to what use each of his underlings has been to the employer, and of what use each is likely to be in the future. It is easy, in general terms, to decry an inflexible routine based on objec-

tive items; to denounce it as unduly "mechanical" treatment of persons, who have the most variable personalities.

Nevertheless it is also important to realize that in a practical sense employees, as well as managers, often choose to narrow the scope of supervisors' judgments by confining them within a routine of reference to objective factors; and objective or quasi-objective indicia are frequently used as partial or sole bases of wage or salary computations, or promotions, or both. Why? Because the judgments and decisions of supervisors and executives, with reference to employees under their control, are notoriously affected by passion and prejudice, as well as—occasionally—by favoritism and nepotism which is scarcely the more tolerable if it is unconscious rather than corrupt. In their reactions against these evils people sometimes go so far as to regulate relative payment and even promotions almost exclusively by reference to some one objective factor such as length of service or seniority.

The absurdities to which any mechanical scheme of this sort leads are patent enough, and fortunately we do not usually have to choose between such a plan and wholly uncontrolled subjective judgments. In most situations any of a number of "merit systems" would be much better than either of these extremes. By "merit system," in this connection, I mean a routine which tends, not to abolish opportunities for foremen and other officials to exercise their judgment, but rather to insure, so far as possible, that such judgments are made in the full light of authentic and relevant facts. In the remainder of this chapter we can notice only a few of the problems and methods which are involved in the attempt to apply this principle in the face of the innumerable differences in size of organization, traditions, and other conditions which make for variety in managerial policies among the various industries and services.

**Objective Measurements and Indexes of the Individual's Performance or Merit.**<sup>1</sup>—The most objective indexes of an

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<sup>1</sup> A good discussion of these matters may be found in A. Ford, *A Scientific Approach to Labor Problems*, Chs. 4-6 (McGraw-Hill, 1931).

individual employee's accomplishment vary a great deal, as to how nearly completely they measure what he has done that his employer wants done,—or rather, how satisfactorily they measure this achievement, by comparison with other indices, such as the foreman's subjective opinion. Thus, the number of tons which a coal miner gets out measures pretty well his service to the employer, so long as the difficulty of the work remains about constant; and resort to this basis of payment is also indicated by the technical circumstances of coal mining, which make it especially difficult for a supervisor to ascertain by other means how effectively the men under him are working. For somewhat similar reasons traveling salesmen and canvassers are commonly paid largely, if not wholly, by reference to the dollars' worth of goods sold. The latter index, however, is unsuitable as a sole measure of the salesman's production; for complete reliance on it will tend to make him "over-sell" some customers and to neglect missionary efforts in quarters which are immediately unpromising but potentially valuable.

With reference to measurement of the physical product turned out by an individual worker,—or, if you choose, attribution of product to him—modern technology shows conflicting tendencies.

On one hand, devices for automatic recording are rapidly being multiplied and cheapened. The old-time piece or bonus worker had to accumulate his output in grosses or some such standard quantities, in trays which facilitated counting and inspection; and he would receive a ticket for each accepted batch, which was evidence of how much work he had done. This practice involves an appreciable cost to the employer in the delay and the capital tied up in pieces waiting to be counted,—especially when the worker hides away a reserve of completed parts, so that the employer will not know how fast he is able to work, and to serve as protection against a rainy day.

But nowadays automatic equipment tends to count and even inspect the work as fast as it is completed; so that it goes forward immediately to the next operation. A little "cyclo-meter," for example, was developed long ago to measure the mileage traveled by a bicycle; now it may be found attached

to a typewriter, counting the strokes. If we should visit the factory where this counter is made, we should be surprised at the variety of applications which mechanisms of this type have found. Units of weight and volume also lend themselves to automatic registry; and continuous charts are made by electrically operated devices, which indicate how well temperature, electric currents, and many other inanimate factors have been controlled by the human factors in charge of them. The efficiency with which each boiler in a power house is operated may be gauged, to some extent, by indexes like fuel consumed in relation to steam pressures and energy delivered, analyses of ash-residue, and charts showing temperature and constitution of gases going into the smoke-stacks. Many truck drivers carry metal monitors wherever they go, which record not only the mileage driven but the clock-times when each bit of mileage was made. Street railway cars often carry instruments which make records, for example, of the amount of coasting done by each motorman, in relation to his total mileage; here is supposed to be an index of the economy of his operation, for such coasting, when properly done, is a means of saving power.

Naturally many of these mechanical, electrical, and chemical indicators are practicable only in rather large establishments, especially while each is being pioneered. And naturally most of them are not entirely fool-proof or cheat-proof; some human supervision is required to see that they continue to correlate with the worker's real efficiency.

**Sample Measurements of Individual Efficiency.**—The foregoing discussion has referred mainly to continuous and relatively complete recording of quantitative and qualitative aspects of the individual worker's performance. In case such continuous counting is especially expensive and awkward, however, more economical results may sometimes be secured by sample tests of individual efficiency. Instead of the continuous line of the automatic record of the furnace's temperature, we have then a jagged line like the chart of a hospital patient's temperature. This latter analogy must immediately be qualified by noticing that, whereas the sick patient has little or no



volitional control over his temperature, and hence samples taken at quite regular intervals will do, our employee's efficiency in many cases may best be sampled at odd intervals, so that he is not too confident just when he will be checked or audited.

A variation of this principle, which may be found especially in some public employments, is an individual's merit rating so far as it is based upon the marks he obtained in the most recent trade, mental, academic tests or examination he has taken. A stenographer, for example, who is already employed in this organization, might be either required or allowed to take a standard set of tests occasionally; and her performance in such tests would afford some presumption as to the character of the service she is able to render at each time she takes the examination.

Most people at present, however, would accept more confidently, as samples of the worker's efficiency, indications which emerge directly out of his actual work. A retail shop, or an association catering to it, for example, may hire professional shoppers who pose as ordinary customers, and thus report to the higher management of the store how its merchandise and salespeople compare, in their experience, with the goods and services offered by their competitors. This common practice has an element or semblance of espionage which makes it of rather limited applicability; but official and uniformed inspectors might make sample counts and tests with reference to many types of workers, somewhat as do the auditors or "controlleurs" of many transport companies, particularly in Europe. These inspectors enter cars or trains at odd times, and check up on the conductor's records and receipts with reference to each passenger. Examinations of banks, by government officials, have relied to some extent on this surprise principle. Very likely the notion of sampling could be extended considerably further in work measurement, with the result that individual merit would be more promptly and surely rewarded, at minimum cost of administration.

**Accomplishment of the Group.**—As was intimated a few paragraphs above, this tendency toward more or less auto-

matic records or indexes of the individual workman's rate of production (quality and economy taken into account) is considerably offset by another trend in modern industry,—the trend toward measuring outputs of *groups* but not of the individuals within those groups. The practices and results connected with group bonuses and piece work will be discussed at some length in Chapters 14 and 15 below, where it will appear that these schemes have encroached much more upon day work than upon individual piece work. In those cases where the individual's efficiency can be gauged continuously with sufficient accuracy and economy, such individual measurement is likely to give more adequate motivation and satisfaction than will a group measurement; and when the group is large, a bonus or piece rate based on the group's achievement is a very weak stimulus toward industry and care in the workers.

Another force tending to restrict the use of both individual and group measurements for immediate wage payment, in modern industry, is the growth of interlocking production schedules, so that there is some pressure from the employer's side toward "dead level" performance by his men—he may seem to want neither more nor less than the standard rate of production from each of them. I think this sort of phraseology exaggerates the tendency in question, but at any rate the idea is rather plausible. Unusually slow workers are not likely to stay long in a Ford shop; and the unusually capable people may not have entirely adequate opportunities and incentives to do their best. On the principal production lines in such establishments will be found more than one person, perhaps many, performing each sub-operation; and there are usually sufficient variations in the mechanical as well as the human factors so that the rate of working is not quite rigidly set for each person by the conveyors and schedules. If one member of the team gets behind, others may help out; and if all get behind, a relief man—probably a group leader—comes in to assist them. But this sort of day work is strikingly different from the old-fashioned sort. In the modern plant, though records of individual outputs may be few or non-existent, the outputs of groups are systematically scheduled and recorded, also the

man-hours put into each group of operations. These measurements, however, in many cases are not used for either individual or group payment by results; all the workers may receive straight hourly wages, though to some extent their wage rates may be adjusted to actual or supposed individual merit.

For brevity we may speak of measuring the productivity of a group, but actually it is true of groups as of individuals, that what they accomplish for their employer can never be perfectly measured. In either case our measures are mere *indexes* of quantity, quality, economy, cooperation, and so on; and experienced judgment is required for interpreting such indexes. A greater range of indicators of values are used with reference to the individual than with reference to groups. Such factors as punctuality, length of service, and versatility, for example, are more or less objective data which throw light on the individual employee's worth, but which have little if any use for measurements of a group's efficiency. Complaints and commendations by users of the product or service, or by inspectors or other fellow-workers, however, may be charged or credited to groups, in some circumstances; in others, to single persons.

**Subjective Measures; Rating Scales.**—Such objective indices of the worker's achievement as we have been considering enable piece workers, and many commission and bonus workers, to demonstrate their abilities by direct means and not merely through the general impressions their activities create in the minds of their bosses. But in most cases the objective measurements have to be supplemented at times by the said mental impressions of bosses; and, as we have frequently remarked above, there are many types of work for which comprehensive objective measurements are either impossible or too costly and troublesome to be worth while.<sup>2</sup> Watchmen, jani-

<sup>2</sup>I say *comprehensive* objective measurements, because some sorts of objective indicators of accomplishment may be found for practically any worker. The helper's output, for instance, is reflected by the production of the craftsman whom he assists; the teacher's by his experience, training, and publications; the general manager's by the financial results he shows. But these are all fragmentary indications; they need to be supplemented by human judgment, in order that each person's net achievement may be esti-

tors, messengers, stock keepers, clerks, supervisors, and professional people of all degrees, will sufficiently illustrate the point. So we come to a consideration of endeavors which have been made to objectify subjective judgments; to make them better informed and more reliable and valid. This is a matter of procedures for obtaining improved subjective ratings or reports from persons deemed best qualified to judge him, relative to each employee. These reports, and also more objective data, may be combined into what government bureaus call a merit or efficiency rating for each worker.<sup>3</sup> Just now we are concerned only with the subjective reports; we shall take up the question of evaluating all the evidence about each person in the concluding part of this chapter.

The idea that formal and systematic procedures of any sort are capable of improving personal judgments is not accepted by all experts in the field, as we shall see; but most of these specialists seem to believe that substantial improvement is possible by establishing, for supervisors, a routine involving these two points: (1) analysis of the worker's acts and capacities into component traits; and (2) requiring each supervisor to record his judgment concerning each trait, for each person in his charge, at specified intervals.

**Rating Scheme of "Midwest Manufacturing Co."**—These ideas may be illustrated by reference to the following scheme, used in a plant which we may call the "Midwest Manufactur-

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mated as soundly as possible, in the light of the materials he had to work with, the difficulties encountered, and remote as well as immediate goals with reference to which he was striving.

<sup>3</sup>"The legislative, executive, and judicial appropriation act for the fiscal year ending June 30, 1913, carried the following provision:

'Sec. 4. The [United States] Civil Service Commission shall, subject to the approval of the President, establish a system of efficiency ratings for the classified service in the several executive departments in the District of Columbia based upon records kept in each department . . . with such frequency as to make them as nearly as possible records of fact. Such system shall provide a minimum rating of efficiency which must be attained by an employee before he may be promoted; it shall also provide a rating below which no employee may fall without being demoted . . .'" A Bureau of Efficiency was established within the Commission, by Presidential order, in 1921. From this Bureau's General Circular No. 6, on Efficiency Ratings (1922), the foregoing quotation was taken.

ing Co.," with about 5,000 wage-earners, mostly men, using mass-production methods: <sup>4</sup>

QUALITIES DESIRED IN THE EMPLOYEES. The foremen decided upon eleven qualities desired in an employee. They also assigned a weight to each quality to indicate its relative importance.

Qualities	Maximum Rating Value
1. Does he follow instructions willingly?	5
2. Is he clean and orderly?	5
3. Does he work from whistle to whistle?	5
4. Is his attendance good? Does he report when absent?	5
5. Does he take care of company property?	5
6. Does he work well with others?	10
7. Does he do good work?	25
8. Does he do his share?	20
9. Has he made good suggestions?	5
10. Can he work on other operations?	10
11. Does he work safely?	5

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Elaborations and definitions of these traits were worked out over a long period in foremen's conferences, in which the plant manager usually participated; and the whole scheme is explained in a printed booklet to every employee. Each foreman has a portable loose-leaf notebook, in which there is a page for each of his men, containing headings for these traits and ruled for the days of the month. He can thus make note promptly, by standard symbols, of unusually good or poor performances of individuals; and can review these notes when he makes his ratings at the end of every month. He is supposed to rate all his men on one factor at a time, the minimum mark in each, for men he is willing to retain, being 60% of the

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<sup>4</sup> *Helping the Foreman Build Better Industrial Relations*, p. 4 (Univ. of Michigan, Bureau of Industrial Relations, 1936). The reader who is interested in the historical development of rating scales, in psychological research, educational practice, industry, commerce, military and civil governmental service, may consult various articles in files of the *Personnel Journal*, including F. F. Bradshaw's *Revising Rating Techniques* (issue of December 1931), which contains an extensive bibliography. See also H. C. Link, *Employment Psychology*, Ch. 23 (Macmillan, 1920); and Scott and Clothier, *Personnel Management*, chapters on rating scales and "The Development of Incentive."

"maximum rating value" shown in the above table. This plan, therefore, objectifies the foreman's judgment of each man by encouraging and enabling him to make detailed written records for the man's work-history.

"In rating 'care taken of company property,' for instance, "foremen consider whether workmen conserve or abuse equipment, supplies, power and other expense items within their control. Requisitions for indirect labor and supplies and monthly cost records are available as aids to foremen in judging this factor. Foremen are asked to record cases of unusual care in the conservation of tools and supplies. . . . The seventh qualification refers to quality of workmanship and reduction of scrap to a minimum. Foremen are instructed to be especially careful not to hold against a man any scrap caused by factors beyond his control. Inspection reports are used in rating this quality."

Each foreman in this plant has not less than ten nor more than 50 men in his charge.

Some rather unusual features of the scheme are these:

"Supplementing his note book, each foreman has a set of rating cards which contain spaces for twelve monthly ratings. After he has completed each rating of his subordinates he posts the assigned credit points for each quality to this summary record. He retains these cards for his own use. His superior and the Personnel Department do not review the cards in detail, but they satisfy themselves that the ratings are completed within prescribed time limits.

"Each employee is privileged to see his rating card upon request. This feature is relied upon to promote fair ratings. In the first days of each new month some workmen ask about their ratings before foremen have completed them.

"When a foreman prepares a written recommendation for wage increase or promotion, he lists upon it the most recent ratings of the employee concerned. This action emphasizes the intent of the company to make such changes on the basis of merit. In recommending layoffs, the same clerical procedure is followed, but in such cases merit considerations are modified by seniority on the job, length of service with the company, marital status and number of dependents."<sup>5</sup>

Before we turn to some perplexing problems which are inherent in any systematic reporting of this sort, let us notice a few features in which the system just cited might possibly be improved. A useful rule for such schemes is that they should not be burdened with items which are sufficiently re-

<sup>5</sup> All the above quotations are from *Helping the Foreman*, pp. 4-6.

ported by more objective records. From this standpoint one point or more in the above plan may be questionable, particularly No. 4, on attendance—the foreman probably should not be required to take care of this clerical routine,—perhaps he does have clerical assistance with it. No. 3, however, “Does he work from whistle to whistle?” is quite properly a matter for the foreman’s own records and impressions, as it refers to what happens after the employee “clocks in” and before he “clocks out.” Another possibility is a clerical procedure, showing on each employee’s departmental and central records on what jobs the man had worked, and how well, even for very short periods; such a routine might take care sufficiently of Item No. 10, “Can he work on other operations?” We should not forget, however, that one of the prime purposes of a rating scale is to remind the rater of a number of important qualities which he should consider in arriving at a total judgment on each of his workers. From this standpoint it may be expedient to put on to the rater some bits of work which cheaper clerks could do. Another questionable feature of this scheme is the fixed weighting of the factors—it may, as we shall see, be plausibly accused of pretensions to a precision which it does not possess.

**Limits on Validity of Ratings, Relative to Techniques.—**Numerous limitations on the accuracy and usefulness of such reports or ratings have been pointed out, sometimes by means of elaborate statistical research like Rugg’s study of the officer-ratings in the Army during the war. It may be argued, for example, that any person is most likely to make a candid report on another person only confidentially, on condition that the ratee shall not know just what report each rater made upon him. Such confidential treatment is important in checking up outside references given by an applicant for a job or a promotion; but with respect to reports by supervisors within an organization, the practice of our “Midwest Manufacturing Co.” exemplifies the current tendency to emphasize the function of such reports in informing the ratees about the points of strength and weakness which their supervisors ascribe to

them, almost as much as the function of informing the management about the work and qualifications of individual employees. Such reports, however, obviously give rise to many resentments and arguments between raters and ratees. The total friction between managers and men, to be sure, may in the long run be less if a sound reporting system is energetically maintained by the management than if it is not; but so long as such systems are exceptional rather than usual, these unpleasant reactions menace their smooth operation, and supply, as we shall see, a major talking-point for critics.

Some of the more fundamental difficulties which have troubled all who have done serious and sustained work with rating reports are these: (1) the tendency of a rater to mark each ratee similarly (high or low or average) for each trait,—in effect repeating his total judgment of the ratee (this tendency has been called the “halo” in rating); (2) the differing standards of different raters—some tend to mark all their people high, others to mark all low; (3) expert opinions differ greatly as to how the various traits should be specified or phrased, which are worth rating for each type of work; and (4) it is very difficult to determine what should be the relative importance or weighting, among whatever traits are rated. The last of these problems will be considered in the latter portion of this chapter, along with the similar problem of comparative importance among objective facts about the employee. The others may now be somewhat clarified by comparing a few other rating procedures with that of our “Midwest Manufacturing” friends.

**The Probst System.**—A scheme which has obtained considerable currency, especially in large American municipal government circles, is that devised and used by Mr. J. B. Probst, chief examiner of the Civil Service bureau of the city of St. Paul, Minnesota.<sup>6</sup> Like most other experimenters with rating techniques, Mr. Probst tries to make the reports of

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<sup>6</sup>J. B. Probst, *Service Ratings* (Chicago: Bureau of Public Personnel Administration, 1931). This book, and other literature, are available from Probst Rating System, St. Paul, Minn.



different raters as objective and independent of the moods and dispositions of the raters as possible; for his reports are all collected by the central personnel office, and the cumulative records there are important determinants of changes in salaries and positions of all employees. Foreman Smith, therefore, should not be able, if he desired, to mark all his men high and thereby give them an advantage over the workers under pessimistic Foreman Brown, who marks all his people low. The "Midwest Manufacturing" plan, it will be recalled, avoids at least part of this difficulty by decentralization; it does not try to compare one foreman's ratings with another's, except that when a foreman recommends a man for promotion or discipline, he has to submit his last few ratings of that man. Also, like most other experimenters, Mr. Probst asked for reports on each employee, not merely from the worker's immediate supervisor but from that supervisor's boss; and if possible he secured still a third supervisory report on each ratee.

One novel element in the Probst plan may be indicated by the first 12 items on his principal blank form (by 1936 he had standardized somewhat varied forms for fire, police, educational, and labor employees,—besides the earlier "general" form):

- |                          |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Lazy                     |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Slow moving              |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Quick and active         |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Too old for the work     |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Minor physical defects   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Serious physical defects |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Indifferent              |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Talks too much           |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Too blunt or outspoken   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Too much self-importance |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Good team worker         |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Not a good team worker   |

And so on through about 100 phrases (including those applying only to ratees who are in supervisory or executive positions), each one referring to a trait which is supposed to be relatively objective, in the sense that most persons acquainted with the ratee's work would not be much in doubt whether each

phrase does or does not apply to it. Each reporting supervisor gives his opinions on these matters simply by making an X, in his own column of boxes, at the left of each phrase which he thinks applicable to the work of the employee whose name is on this sheet.

The abbreviated specimen list I have exhibited above illustrates very inadequately the care with which Mr. Probst has avoided giving the supervisor any suggestion that he is to decide *how much* of a given trait the worker displays. He says, in fact, that "ratings are determined principally from outstanding traits or qualities—qualities that are either above or below the average." I must add that the printed instructions tell the reporting official that he need not check any particular number of items. "Do not guess; if you are not reasonably sure that the employee possesses the trait or quality, . . . do not check that item at all." Another paragraph in the directions says, "Some items, such as 'pleasing and mellow voice,' 'Active' and 'strong,' 'Good headwork in emergencies,' and a few others, should be considered only if they are deemed essential or desirable for the particular position"; and the author points out further that the supervisor who marks each report in effect varies the weights of the items in accordance with his opinion of their importance for the job. "An office boy might well be checked *generally uses good judgment* for certain acts which would be far from *good judgment* if done by a civil engineer, a chief accountant, and many others."<sup>7</sup>

The Probst reports are scored into A, B, C, D, E (and plus and minus) grades by empirical formulae which are so complex that a special slide-rule is used where large numbers of persons are being rated. Some of the items count negatively, and the weights vary from 1/10 to 3. The different reports on each employee "nearly always produce identically the same [letter] rating," Mr. Probst says,—and apparently not merely because the second marker has the first one's markings before

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<sup>7</sup> *Ibid.*, p. 81. See pp. 24, 25 for reproduction of the Probst report form, from which I quoted several items above; and especially pp. 22-34 for an account of the experimentation by which the traits and phraseology were developed by Mr. Probst.

him. An instance is cited of five reports on the same man, checked respectively for 10, 12, 16, 21, and 27 items, all of which reports scored to the same letter rating.<sup>8</sup> Without any adjustment for hard and easy markers, the charts of distribution of scores for various cities and occupational groups show remarkably similar approaches to a constant symmetrical probability curve—about 5% A's and E's respectively, somewhat over 50% C's, and 15% to 25% B's and D's.<sup>9</sup> These groups are mostly large, and so it is conceivable that many over-lenient and over-harsh raters are concealed within them; yet the main features of the scheme, mentioned above, seem well calculated to minimize this difficulty and also the "halo"-effect.<sup>10</sup>

**Evaluation of Evidences of Employee's Merit.**—We have reviewed a few of the innumerable objective and subjective indicators of a worker's achievements and qualities, from the standpoint of his bosses; and now finally we must face the question, How may these fragmentary indicators be best combined, to show how much John Doe is worth? To show whether he should be preferred to Richard Roe, for promotion or layoff? Frequently, perhaps usually, the various signs may be unanimous in stamping Doe as one of the poorest or best members of his group; but in a considerable proportion of cases it will be necessary to decide somehow how far a good mark in one characteristic ought to offset a bad mark in another. We may regard this problem as one of weighting, for a "simple" or "unweighted" average of measurements is

<sup>8</sup> *Ibid.*, p. 29.

<sup>9</sup> *Ibid.*, Ch. 6, pp. 43 ff. The statistics are based on reports relative to some 10,000 persons.

<sup>10</sup> In 1936 the Detroit Civil Service Commission was using a service rating report blank made up of 105 phrases somewhat like Probst's, but arranged in 35 sets, with worse-than-average items in one column, average in a second and above-average in a third. The scoring system is simple and in accord with civil service traditions; "Ratings may range from 50 per cent for a very poor grade to 100 per cent for a perfect grade." The scheme is like the Probst system (which had some use in Detroit) in that each of two supervisors checks phrases in his own column of boxes, and that the rated employee is privileged to see his rating.—*Instructions and Information, Detroit Municipal Service Rating System.* (Civil Service Commission, City of Detroit; mimeographed, no date.)

merely one form of weighting these indices. The fundamental alternatives are:

- (1) Allowing and requiring each executive to "decide each case on its own merits," without any regulations about weighting; and
- (2) Establishing some sort of formula or rule as to how heavily each index should count.

This same executive's general opinion of the employee, at the time a decision has to be made, might be given a definite weight in such a formula, along with other elements like attendance, length of service, measured output, and recent efficiency reports and ratings.

The nature of this problem may be clarified a bit further if we consider at greater length what sort of validation is possible of a given rating technique. Mr. Probst's system will serve well for illustration, since it has received unusually broad experimentation and statistical treatment. It is true, as he says, that many illogical rating plans have persisted in use for some time, because it is impossible to prove whether the ratings they yield correspond in high degree with the real deserts of the rated employees. And another way of stating the same point is that, for all we know to the contrary, many very good rating systems have been unused or discarded, because their merits could not be convincingly demonstrated.

Several statistical techniques, however, are available for securing a strong presumption as to the degree of validity of a rating scheme. Among these are the various measurements of "reliability," meaning the degree in which the same rater tends to rate the same people in the same order each time he marks the forms. This factor is ordinarily measured by a coefficient of correlation, and a scatter-diagram will show graphically in how many cases there is how much disagreement between two rankings of the same persons. Similar calculations may be made with reference to more direct indications of validity—e.g., comparing the ranking of the employees which is yielded by one supervisor's ratings, according to a given system, with the average ranking of the same people made by all execu-

tives who know them and their work, without reference to this particular system (or perhaps to any system at all). The inaccuracy of these criteria, to be sure, is the chief reason why rating schemes are tried; nevertheless, the numerous high correlations which Mr. Probst cites make up an impressive exhibit.<sup>11</sup>

**Probst Ratings vs. Measured Production, in a Business Office.**—The immediately foregoing discussion has related to ratings in governmental employment, but in fact a very interesting, though inconclusive, test was made of the Probst scheme in a business office, with reference to 49 employees who were being paid some sort of piece rate or bonus for measured production—they were mostly operators of Hollerith, Moon-Hopkins, and various other office machines.<sup>12</sup> Each operation, of course, had a standard of efficiency set for it (very likely by time study); and so the 49 operators could be ranked from first to 49th places according to the "per cent efficiency" each achieved in her own work. The highest percentage of this sort was 248, the lowest 117. The ranking of these same people in the Probst ratings is also given in the table, so that we could compute the correlation between the two if we chose. Apparently it is not very high; at any rate the discussion is mainly concerned with reasons for disparities between these two indicators of the employee's worth. One girl, for instance, was fourth from the top in the efficiency-in-production ranking, but 44th in the Probst scale. All three supervisors had checked, for her, "Resents criticism or suggestions," "Needs considerable supervision," as well as four other unfavorable items; and one or two of the reporters had checked still other unfavorable comments for her. Contrari-wise, the checkings for some of the slower workers showed important compensating virtues in accuracy, dependability, team work, and so on. The sugges-

<sup>11</sup> *Op. cit.*, pp. 41, 55. His arguments to the effect that "more accurate results" are secured when the two or three supervisors check the same sheet than when they check separate sheets independently (Ch. 7) would be more convincing if sustained by more statistical evidence. The present Detroit municipal procedure is similar to Probst's on this point.

<sup>12</sup> *Ibid.*, Ch. 8.

tion was made by the experimenter in this case that the output wage system might be responsible for irritability and "neurotic" behavior in some of the employees. He might well have raised the query whether the standards of efficiency were such that it was substantially easier to make a high production mark on one machine than on others. His contention that the production records, though very valuable indices, do not completely reveal the absolute or comparative values of the various workers to the employer, is true but not new. Nevertheless experiments like this should be accumulated, as they tend to make clearer the nature and importance of the limits of production-counts as indicators of the employee's total achievement for the employer.

**Merit and Demerit Systems.**—Some further light on the problem of evaluating objective and subjective indexes of the employee's efficiency is thrown by schemes which note upon the employment record debit and credit points for various types of conduct, according to a schedule with which all parties are supposed to be familiar. Such schemes have been commonplace for generations, especially in military and railway services. Early in 1936, for example, a press report announced an overhauling of the United States Postoffice system, in the following terms:

#### POSTOFFICE DEPARTMENT CHANGES MERIT SYSTEM

Postmasters were recently ordered to cancel all demerits as of March 31, and start with the new merit-demerit system. Under the old system, each demerit was cancelled at the end of 12 months after being covered into the employee's efficiency rating.

Under that system, a man having 500 demerits in a year was subject to reduction in pay. A man having 700 demerits in a year might be removed.

Under the new system, the demerits will be kept separate from a man's efficiency rating, and the man will be given an opportunity to offset demerits with merits, starting anew at the beginning of every fiscal year. . . .

Offsetting a 10-page schedule of demerits, the new system offers a page of merits with which an employee may balance his demerits. These include credit for speed and accuracy in throwing cards; detecting fraudulent money orders before payment; attaining an effi-

ciency rating of 95 per cent or higher for any period; information leading to arrest for theft or depredation of mail or funds; jeopardizing personal safety to protect mail, funds, or government property; perfect punctuality record for six consecutive months; suggestions for improving the service or effecting economies; sustained excellence of service record through freedom from demerit charges for six consecutive months; voluntarily assuming charge of or rendering assistance in the protection of mail found abandoned or involved in an accident to an airplane, mail train, or other mail conveyance.

It might be supposed that such systems are suitable only for very large organizations, but such is not quite the case. Not so long ago sales management periodicals gave prominence to various "point systems" of compensating salesmen; and in one way or another the idea of a schedule of payments, or (in effect) fines, for specified classes of acts turns up quite frequently in personnel management. The Armored Service Corporation, operating armored trucks for conveyance of payrolls and other valuables, with less than 200 people on its payroll, maintains a merit and demerit system (applying to under 100 people) which includes the suggestion scheme which is described on pages 409 ff., also a safety-bonus program.<sup>18</sup> Demerits are assessed, for instance, one per minute of delay, in case of failure to telephone the dispatcher when the truck is sufficiently behind or ahead of scheduled time; 100 for "violation of an order issued for the protection of life or property," and so on. Following are some of the observations with which the plan was introduced to the employees:

**PURPOSE:** (1) To provide a systematic cumulative record for each employee's development and standing. . . . (4) To eliminate some of the guess work and errors in judgment that occur when memory alone is relied upon to determine eligibility for promotion. . . .

**ADVANTAGES:** (1) Creates an incentive for the employee to go out of his way to do something for which there is a specific reward. (2) Avoids argument as to the unfairness of the punishment when it is known in advance approximately what the prescribed penalty will be.

(3) Eliminates the necessity for "Bawling Out," "Bull-dozing," and other forms of "Using the Whip" in an effort to correct minor routine violations or errors. . . .

<sup>18</sup> See D. Rose's article in Executives Service Bulletin of Metropolitan Life Insurance Company, December 1934.

**DISADVANTAGES:** (1) It encourages the Personnel Manager to rely too much on the automatic functioning of the system, thus possibly overlooking a man whose efficiency is of such a character that it cannot be mechanically translated into merits. . . .

**MODIFICATIONS:** (1) To overcome disadvantage No. 1 and provide promotion for a man who has not had the opportunity to accumulate the required total merits, an arbitrary number of merits may be given for any evidence of "Cooperation," "Initiative," "General Attitude," etc., even though these intangible classifications have not been provided for in the standard scale. Such arbitrary or "Promotion" merits must be approved by the General Manager as well as the Personnel Manager. . . .

**SUMMARY:** It must be always kept in mind that no mechanical system can possibly record some of the most important human characteristics. Therefore a merit and demerit system must be used only as one factor in determining the value of an employee and not relied upon as an infallible measuring stick. . . .<sup>14</sup>

Although "any action resulting in the capture of a criminal" was rated for 100 merits, actually "When Inspector Finley killed a bandit and frustrated a hold-up, the reward was a substantial promotion in rank and pay instead of the routine 100 credits." Another employee, on the other hand, wounded a person whom all in the company believed was a gangster in action; but since there was insufficient legal evidence to show that the wounded man was actually engaged in crime, and he was therefore able to retaliate, the sergeant could not be rewarded for his act.

**In What Ways Have Efficiency Ratings Failed?**—The foregoing remarks might well be interpreted as tending to show that rating scale technique is an important device for "giving credit where credit is due" among individual employees,—at least that it is potentially important, in large governmental bureaucracies if not elsewhere. People who take this view may find it paradoxical that a recent comprehensive and searching monograph, epitomizing the extensive subsidized researches of a private, non-partisan, and expert Commission of Inquiry on Public Service Personnel declares that "notwithstanding

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<sup>14</sup> Field Bulletin of July 14, 1933. I am indebted to Mr. Durant Rose, Vice President and General Manager of the company, for all this material.



the seeming scientific accuracy of efficiency-rating systems, none of them has proved successful in practice."<sup>18</sup> This author cites testimony from a number of expert witnesses, including Mr. Probst; most of this testimony being given at hearings held by the above-named Commission in 1935. The following excerpts will indicate the drift of Mr. Wilmerding's arguments:

Two apologies are made for the failure of these systems by the proponents of the efficiency-rating idea. The first is the admission that some systems are statistically weak; the second is the charge that supervisors sabotage the scheme in general.

Mr. Probst is then quoted, admitting that some rating systems are unsound; also that many supervisory officials do not conscientiously mark even the best blank forms; and furthermore, that supervisors shrink from arguments with employees under them about unfavorable ratings. Hence, says Wilmerding, "In view of the widespread prevalence of sabotage, one should in all fairness ask whether the blame does not rest with the efficiency-rating scheme itself.

"In the first place, one must question the practical wisdom of a system which reduces departmental officers to the status of bookkeepers. The making of promotions is one of the most important parts of departmental management, and any attempt to supplant individual judgment by a mechanical rating system is bound to be suspect. If the results of the system do not square with the opinion of the supervisors, the supervisors will consider the system at fault, and if the results do square they will consider it a work of supererogation.

"In the second place, the effect of the conscientious use of rating systems on departmental morale must be measured."<sup>19</sup>

As the last quotation indicates, Wilmerding is considering these ratings primarily from the standpoint of procedure for making promotions. That we have not got too far off our track of measurement of work for purposes of payment, however, may be shown by reference to the Act of Congress cited

<sup>18</sup>L. Wilmerding, Jr., *Government by Merit*, p. 169 (McGraw-Hill, 1935).

<sup>19</sup>*Ibid.*, pp. 170, 171.

on page 102, which says that sufficiently low efficiency ratings are to be grounds for demotion or dismissal.

But as we read further in Wilmerding's excellent volume, we find that his strictures are really meant for routine formulae. He has little more use, apparently, for "mechanical" net numerical or letter ratings than for an inflexible practice of promotion by seniority. "Some use," he tells us, "should be made of annual or semi-annual service reports. Where the number of candidates for promotion is large, it is well to have a means of comparing readily their several qualities.

"To be effective, these reports must be kept simple. It will be sufficient if the major qualities of competence are listed and if the individual is marked as being above, equal to, or below average in these qualities. The object must be to aid and guide the judgment of departmental officers; not, as in the case with efficiency ratings, to supplant judgment."<sup>17</sup> He cites with approval a British civil service proposal that ten qualities should be marked in this way, namely: "knowledge of branch and of department, personality and force of character, judgment, power of taking responsibility, initiative, accuracy, address and tact, power of supervising staff, zeal, and official conduct." I should say that Wilmerding has given insufficient recognition to the progress which Probst and others have made in methods of analyzing the ways in which a worker may acquire or display "merit," and in objectifying the marking of the various traits. His plea, however, for simplicity in the procedures and records connected with such gradings, and especially his contention that they are not, alone or in mechanical combination with objective factors like seniority, an adequate ground for determining what pay or position the employee—especially the high-grade employee—deserves, must strike sympathetic chords in most of us.

**How Many People Can a Supervisor Rate?—**One set of difficulties in our problem of measuring achievement springs from the great variability among supervisors in their personal familiarity with the work of people in their charge. And one

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<sup>17</sup> *Ibid.*, p. 174.

great cause of such variation is the different numbers of subordinates for which different bosses and straw-bosses are directly responsible. Other things equal, ratings or reports by one foreman for each of fifty men will not command as much confidence as ratings by a similar foreman of only ten men. There is reason to suspect that a disease which afflicts most large organizations—business, governmental, and other—is allowing executives to attempt to supervise directly too many people.

Major L. Urwick has written illuminatingly on this matter. After making qualifications for some other variables, such as the spatial area over which the control has to be exercised, he says "The ideal number of subordinates for all superior authorities appears to be four. At the lowest level of organization, where what is delegated is responsibility for the performance of specific tasks and not for the supervision of others, the number may be eight or twelve. The number of levels in any organization should be a minimum sufficient to permit of this distribution of subordinates."<sup>18</sup> According to this school of thought, most modern armies have exemplified the principle thus advocated, as a result of natural selection and survival of fittest; moreover those civil organizations which have utilized it have been most efficient. These generalizations and comparisons are bold; perhaps too sweeping. Conveyors and other routines may extend the supervisor's powers of observation and control; and moreover we must bear in mind that a "foreman" in industry is often comparable to an army captain; for the former has assistant foremen and group leaders who transmit his authority to the "rank and file," and transmit information about them to him. Nevertheless it is clear that some "failures" ascribed to work-measuring techniques may be due more fundamentally to the inability of the supervisors to become as familiar with the accomplishments of their people as good managerial practice requires. An overloaded fore-

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<sup>18</sup> "Executive Decentralization with Functional Coordination," *Public Administration*, October 1935, p. 5. Compare the same author's *Management of Tomorrow*, Ch. 4 (London: Nisbet, 1933); and P. S. Florence, *The Logic of Industrial Organization*, pp. 119 ff. (London: Kegan Paul, 1933).

man or divisional manager cannot make sound ratings of his men, but neither can he apply fairly to them any other basis of reward and promotion.

**Summary.**—At the outset of this chapter it was suggested that people on both sides of the employment contract would do well to analyze the ways in which the worker can be useful to the employer; to realize that few, if any, of these types of worth can be precisely measured; and to attempt progressively to find better indices and superior combinations among them. We have reviewed some of the principal sorts of objective indicators, such as measurements of quantity and quality of output, length of service, and attendance records; and have noticed both their limitations and their appeal by comparison with subjective indices. If the principal output of the worker, and the conditions of the work, are sufficiently standardized, the pay and even the promotion may be regulated by measurement of such production; and otherwise bonuses or merit and demerit points may be managed so that some part of the pay is determined by objective factors. Usually, however, a great deal of scope is and should be left for the judgments of managerial officials, with reference both to base rates and promotions. These subjective judgments can be objectified in some degree by means of rating schemes, which assist the supervisors to consider all traits of their people which are properly relevant to the work, and to record their appraisals of each such trait in each worker, at regular intervals, "in cold blood." Routine systems of points and weights for the rating traits, as well as for more objective items, like the worker's suggestions, are serviceable up to a point; but authority should be readily available to deal with cases in which the normal routine gives a rating which several supervisors believe to be well out of line with the employee's real merit. All these indicators are tools for supervisors to use; they cannot compensate, except in minor ways, for unduly low quantity and quality in the managerial ranks.

## CHAPTER 8

### THE STANDARD TASK OR TIME ALLOWANCE; LIMITATION OF OUTPUT

Whatever means be available for measuring how much work the employee does in a given period, this quantity must be referred to some sort of standard performance, in order to ascertain how much more or less pay he deserves, by comparison with what is being paid for exactly the standard efficiency. In the present chapter we are to consider this second one of the four "essentials" involved in determining the hire of the laborer; and to simplify the discussion I shall deal mainly with repetitive manual tasks, in which the individual's accomplishment is most readily measured. First we notice the chief characteristics of modern time study for task-determination; then we explore some complications which are produced by restriction of output by employees. The reader should bear in mind that, although these problems are most clearly apparent in repetitive manual work, in which each individual is paid by a piece rate, or output bonus, very similar issues are inherent in all other employer-employee relations; and that, as the worker's productivity comes to be measured more precisely, by means such as were discussed in Chapter 7, the standard task or stint for such workers is thereby also made more objective and definite.

**Time Study for Task Setting, or Determining Time Allowances.**—Many methods have been used for setting tasks, or production standards, in repetitive work; and various names have been given to each method. The general type of procedure which is fast becoming predominant throughout the world, however, owes most to F. W. Taylor's *Scientific Management*; though we shall presently notice some departures from Taylor's methods, and of course people interested in the finer

points of such practices would emphasize many controversies among the experts. I use Taylor's term "Time Study" as the generalized designation for this sort of investigation—some writers prefer phrases like "job study," or "job research"—because it is convenient to use the term "job analysis" for another type of study, which will be examined in Chapter 11 below. The time study processes with which we are just now concerned are aimed at determining, for a given operation in a given plant, a standard of achievement which may be expressed in either or both of two ways, namely: (1) in units of acceptable output within a given time, say an hour or a week; and (2) in units of time "allowed" for a given unit of output.<sup>1</sup> After this standard is set, the worker's accomplishment in a given period of work on this job may be expressed as a "percentage of efficiency," e.g., if he turns out 110 units in a period for which 100 units is the standard, his performance in this period was at 110% efficiency.

Much emphasis has been properly given, especially by Frank and Lillian Gilbreth and the numerous people influenced by them, to *motion study*, in this connection. Taylor also had stressed the danger of too hastily setting production and time standards, without sufficient preliminary "tuning-up" (in the idiom of our own day) of the equipment and methods concerned,—without *standardization* of materials, layouts, job instructions, and so on, by means of careful study; and this point can scarcely be over-stressed. Motion study, in its most natural sense, is one important phase of this standardization, which also includes research to determine what are to be regarded as normal equipment, specifications as to quality, division of labor among workers, and so on.

Time study for task setting, then, involves two principal phases: (1) improvement and standardization of the conditions of the job; and then (2) determination of a standard task time, based upon those conditions. The latter phase, in

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<sup>1</sup>"Time allowance," in British usage, seems equivalent to "task time" in American practice; and to "norms" in Russia. Yankee industrial engineers think of "allowances" as added, for fatigue, setting up, etc., to the observed times.

turn, may be analyzed into two essential parts; namely: (a) training the observed worker or workers thoroughly in the standard methods, giving him or them adequate time and incentives to develop skill and economy of effort; and (b) recording the times required, after such skill has been developed.

**Illustrative Data.**—Some of these procedures may be concretely illustrated by reference to the accompanying Figure V, and some problems may be opened up by criticism of the practices which it implies.<sup>2</sup> It refers to the making of a "core," or inside mould, out of sand in an iron foundry.

Such a sheet as this naturally is prepared only in the final stage of task-setting—the subphase which I designated as (b) in the last paragraph but one, above. The materials and equipment had presumably been studied and standardized before this time study was made; we shall consider presently whether the operator was sufficiently trained or cooperative. The standard materials, equipment, and methods are rather inadequately specified on this sheet, but anyhow it illustrates, by its five "sub-operations" ("Assemble parts and dust with parting sand," etc.), the general notion which is emphasized by most specialists, that each job should be analyzed into elements whose times are separately studied. It shows, also, the common practice of recording these elemental times in tenths or hundredths of a minute, by means of a stop-watch. The specialist who makes these records, of course, stands near the workman whose performance is serving as the model. A fuller and better record would show actual clock time at the end of each sub-operation throughout, so that every bit of time must be accounted for, from start to finish of the sample cycles of such sub-operations.

<sup>2</sup>For explanations and illustrations of methods recommended by experts, see various texts on time study and other phases of industrial engineering. Several are cited below in this chapter, and R. H. Lansburgh's *Industrial Engineering* (Wiley, 2nd ed., 1928) may also be mentioned.

The sheet shown in Fig. V above was given me, when I visited the foundry, along with another referring to a machine shop operation; and my discussion refers to policies which are indicated by both, and thus not likely to be inferred merely from inaccuracies of copying. A model of recommended time study data, such as that given by Lansburgh, would be considerably more complex than Figure V.

<b>TIME STUDY</b>													
PART NAME AE-3A Cylinder Head.			USED ON				PART. NO. AE-3A						
OPER. NAME Make Box #5 Core.			NAME Wood Core Box.				OPER. NO. 1.						
BOX OR FLASK NO.			NAME Wood Core Box.				MACH. OR BENCH NO. CB-270						
NOTE SPACE			NO. PCS. PER BOX OR MOULD 1				AVE. TIME 2.45			EST. TIME 1.78			
			PRICE PER 1 PIECE (1 MAN) .029 PER BOX.				EST. TIME 1.78			ALL'D TIME 2.00			
			PRICE PER 1 PIECE (MOULDER)										
			PRICE PER 1 PIECE (HELPER)										
			NO. HELPERS USED										
			SPEC. PRICE										
AT RIGHT HAND SIDE ABOVE; TIME AND PRICE WILL BE SHOWN FOR ONE PIECE, NOT FOR BOX OR FLASK													
NO.	SUB OPERATIONS	1	2	3	4	5	6	7	8	9	10	AVE.	EST.
1	Assem. parts & dust with parting sand. Fill box half full #4 sand. Insert 4-8 pwt. nails along boss of core box.	.50	.58	.70	.50	.56	.30	.35	.30	.40	.50	.47	.40
2	Add more #4 sand and lay three 3/16"x11" wires in center of core and add more #4 sand. Lay two more 3/16"x11" wires crossing in the center of box.	.30	.45	.45	.30	.55	.30	.40	.30	.30	.30	.36	.30
3	Fill box with #4 sand and pack with hands. Strike off and trowel.	.65	.68	.60	.55	.70	.53	.60	.57	.85	.60	.63	.38
4	Lay plate on the box and roll over. Rap with leather mallet to loosen core and remove part # , & , of box.	.80	1.40	.95	.55	.69	.50	.60	.95	.69	.67	.78	.50
5	Carry to rack.	.20	.22	.37	.20	.20	.21	.15	.15	.20	.20	.21	.20
	Ave. Time 1 Core Box.	2.45											
	Est. Time 1 Core Box.	1.78											
	1 Barrow sand=57 Cores=3. Min.	.04											
	Allowance per 1 Core.	1.82											
	Plus 10% Fatigue.	2.00											
	2)460(230 Pcs, per 8 hrs.												
	Totals Shown for Time in Minutes →	2.45	3.33	3.07	2.10	2.70	1.84	2.10	2.27	2.44	2.27	2.45	1.78
OBSERVER Brad		RATE SET BY REA		APPROVED BY REA		DATE 7-16-20.		STD. RATE PER HOUR FOR THIS CLASS OF WORK					

Figure V. A Time Study Made in 1920 in an American Foundry. (See text for criticisms.)



The computations which appear below the list of sub-operations may be interpreted thus: The average time taken to prepare one core box, in these ten cycles, was 2.45 minutes; but the time study man "estimated" that a reasonable standard time, before consideration of fatigue or other such allowances, would be 1.78 minutes. To the latter figure is added, first, .04 minutes as one core's share of the three minutes required, every couple of hours, for the operator to get a barrow of sand. This addition gives a sum of 1.82 minutes, to which .18 minute or 10% is added as a fatigue allowance, and the task time is set at 2.00 minutes per core. Assuming 460 minutes' work at this rate in an 8-hour day (probably 20 minutes to the day would be required for getting ready and cleaning up the work-place), the standard daily output is given as 230 cores. In the upper central space appears the resulting piece rate of ".029 per box," which appears to imply standard hourly earnings for the time the worker spends in the foundry of  $83\frac{3}{8}$  cents per hour, i.e.

$$\frac{230 \times \$0.029}{8} = \$0.83\frac{3}{8}$$

**Defects in Figure V.**—What are the more obvious faults in this sample? One is that no effort was made to "throw out," or account for, any "abnormal" elemental times. I italicized the 1.40-min. entry in the second column; it sticks out from its fellows in the line referring to sub-operation No. 4 like the proverbial sore thumb; and there are numerous other instances of great relative variations between minimum and maximum times recorded for the same sub-operation. Abnormal times are to be expected in every final time study, and it is part of the observer's job to determine whether each such item is due to an error by the observer himself, to slackness in the operator observed, or to some delay which must be expected occasionally by reason of as-yet-uncontrolled irregularities in materials, machine operation, or the like. In any case each such abnormal elemental time should be marked and accounted for by a footnote.

Figure V also indicates some more radical and fundamental defects in the time study procedure in the plant where it was

made. The widely different times taken for the same sub-operation are probably symptomatic of imperfect skill or cooperation, or both, on the part of the workman who is being observed; and the management attempts to compensate for these factors by "estimating" as necessary, the minimum observed time or even, as in sub-operation No. 3, a period shorter than any time which was actually observed. Ordinarily a final time study should show, by the large preponderance of modal or identical times taken for the same sub-operation, that the operator had become thoroughly habituated to the standard equipment and method, and was not unduly exerting himself either to make time or to kill time.

**Subjective Elements in Task Time Setting.**—Supposing that the conditions have been effectively standardized, and the operator fully accustomed to them, then the observer has little difficulty in determining the time required by *this operator*. (The times required for setting up, and for dissembling, apparatus for a batch of repetitive operations which might be either small or large, should be determined separately from the repetitive cycle itself.) But, before the standard task time or time allowance can be actually set for all members of the occupation in that shop, several adjustments have to be made. These adjustments involve (1) judgments concerning the degree of skill and effort of the operator or operators timed; (2) judgments about normal fatigue and interruptions during a whole working day; and (3) judgments as to the wage which will have to be paid for production at a given standard of efficiency. In an important sense, to be sure, the question of working capacity is independent of the question of pay; yet it is clear enough that, within limits, the higher the standard of output is set, the higher is the wage which the employer must expect to pay for achievement of his standard.

Opponents of this sort of industrial engineering emphasize the possibility that the task time will be based upon the performance of the most skillful operator obtainable, working at a killing pace. These objectors are apt, moreover, to suggest that, if payment is to be by results, the norm or standard of

output should be derived simply from the average of past outputs of the workers involved.

To these propositions there are several answers. With reference to the pace required of the observed worker, the tenor of Taylor's writings and probably of most other time study practitioners is indicated by the following passage from one of Taylor's disciples:

The experienced observer, acquainted with the character of the work, . . . soon learns to recognize with certainty any tendency on the part of the operators not to do their best and to make due allowances for the resulting inefficiencies, etc. Unusual ability and excessively rapid movements, . . . that is, dexterity and speed of action which could not be maintained without causing physical exhaustion, are also apparent to the trained observer and are properly discounted by him, for the desired task time is the one that can be equalled by workers following instructions and working at a reasonable pace—a pace which can be kept up from day to day without undue exertion.<sup>8</sup>

These authorities, following Taylor, have preferred to observe the work of a "first class man" in the occupation, rather than a merely average worker. They have usually not had a very clear conception of the probable frequency-distributions of people, as to ability and endurance; but they have counted on the fatigue and other allowances, as well as short-cuts which the workers are likely to discover after the rates are set, to safeguard the second-rate workman; and moreover they have wanted to discourage the poorer operatives into quitting. Since there are no objective measures of fatigue in which many people have confidence, and no standard distribution of abilities and endurance which will fit groups of all sizes and occupations, we have here many opportunities for controversy and bitterness.

Such opportunities would not be much less, and might be even greater, however, if the principle were adopted that the standard task for the future should be the average performance of the past, in the occupation and shop. In this case those workmen who had been the greatest loafers in the past would

<sup>8</sup>D. G. Merrick, *Time Study for Rate Setting*, p. 5 (1919). Compare the remarks of Taylor, quoted in Chapter 2 above; also, for example, discussion of these problems in Lowry, Maynard, and Stegemerten, *Time and Motion Study*.

secure the easiest standards; there would be no detailed specifications as to job-content at the time the standard was set, and hence great difficulty in showing when such content changed sufficiently to justify a new task time; moreover the management would not have as much incentive to "tune up" the equipment and methods in each job, as it has when such tuning up is done by the time study specialist as a preliminary to task setting.

On the other hand, as will be emphasized presently, one of the real obstacles and costs involved in an original installation of time study for determining job standards is the new pressure it puts upon both supervisors and rank and file to follow more closely routines which are, or seem to be, arbitrarily prescribed from above.

**Other Functions of Time Studies.**—Although improvement of equipment and methods and wage setting are doubtless the principal objectives of such job study as we have been considering, it serves some other important purposes too. Prominent among the latter are planning and scheduling operations and prompt detection of lapses in efficiency. Special industrial engineering or standards or methods departments build up files which show standard task times for all staple operations and sub-operations; and of course they know the current hourly wage rates for the various types of labor involved. These data enable them to quote prices to prospective customers, closely related to current labor costs; to schedule work upon the orders in hand efficiently; and to make inquiries quickly when it appears that the efficiency of a given group is falling below standard. In ways like these time studies are used in many shops and departments where only straight time wages are paid.

**Restriction of Output by Workers.**—A few paragraphs above, it was suggested that, if job standards are determined only by past averages, "those who have been the greatest loafers would secure the easiest standards." Are we to understand that time study is a means of exposing the loafers, of preventing unreasonable limitation of output by work-people? Tay-

lor emphasized this objective rather strongly, and he answered this question in the affirmative—provided the time study is properly conducted. There are good reasons for believing that the job research methods which he pioneered are important means for dealing with this old and perplexing social problem, but the problem seems even more complex than Taylor realized.

It is no doubt true, as Taylor argued, that two principal motives of willful restriction of output by employees are (1) "natural laziness," and (2) opposition to real or supposed efforts of bosses to cut rates or task times continually and thus to "speed up" the workers to the detriment of their health. And, as he further argued, suitable methods of time study have some tendency to assure these workers that task times will not be changed unless and until substantial changes are made in the job's content; and if they feel such assurance, "natural laziness" will be overcome in most of them by the desire to earn high wages. The human animal, to be sure, has a great tendency toward "rationalization" of subconscious notions and prejudices; and it is not uncommon to find workmen, who have worked for years in plants with exceptionally good labor relations, talking as if all bosses were speeding up all workers all the time. In some degree, too, the spirit of contest or game readily develops—the workers try to "defeat the opponent" by preventing job-setters from finding how much they can do.

Other important aspects of the problem include the well-nigh universal tendency to try to enhance the value of what we have to sell by restricting its supply, and the worker's fear, often only too well-founded, of "working himself out of a job." Labor advocates are apt to reply to the charge that labor restricts output by averring that employers are always trying to arrange agreements and regulations to remedy the "overproduction" and "ruinous prices" which chronically seem to afflict them. The NRA was a magnificent example of this tendency. Two wrongs, perhaps, do not make one right. And, with reference to the employee's inclination to nurse work along so that he and his fellows may avoid layoff as long as possible, of course no universal and simple formula is ade-

quate. In a depression many people work harder in the endeavor to avoid being chosen for layoff; while, in a boom, labor discipline may be difficult to enforce because fresh supplies of labor are hard to get.

Nevertheless, it seems probable that in this dread of lay-off and unemployment, which scourge falls on many wage-earners even at the height of a boom, we have the chief explanation of restriction of output by workers. It is a source of conflict which is extremely difficult to eradicate, since few employers can give lasting guarantees against any unemployment of any of their workers, and under the best of unemployment insurance schemes, most workers would rather hold their jobs than go on to the limited out-of-work benefits. Yet many employers could do a great deal more than they have as yet, toward reducing the instability of their own forces; moreover they can show their people many substantial evidences that "ca' canny" workers in general are less rather than more secure against this great evil than are those who work efficiently; for the former handicap their enterprises in the competition for sales of products which form the life-blood of employment.

**Statistical Tests of Output Restriction.**—An exceptionally valuable discussion of limitation of output by workmen is contained in one chapter of *Industrial Fatigue and Efficiency*, by Dr. H. M. Vernon, an outstanding British investigator of problems connected with "industrial fatigue," during and since the War.<sup>4</sup> My Figure VI, taken from that chapter, shows the distributions of piece earnings of nearly 500 experienced hand riveters in a single shipyard, over four seasons within three years. The dotted lines are symmetrical probability curves presumably with the same means and standard deviations as those of their companion curves. Vernon proposed the hypothesis that "The biggest [potential] outputs being eliminated [by willful restriction of production], the frequency curves will become truncated on one side, and the degree of truncation will afford a measure of the limitation practised." He considered that the maximum degree of restriction of output among these

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<sup>4</sup>New York and London: E. P. Dutton Co., 1921, Ch. 7.

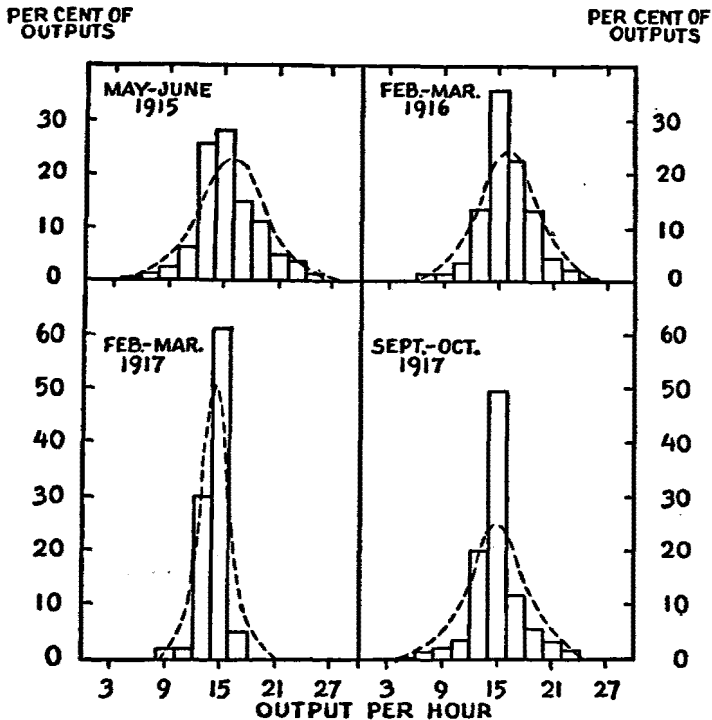


Figure VI. Outputs of Some 500 Riveters in British Shipyard. (After Vernon) Solid lines show distribution of actual earnings; dotted lines are probability curves.

riveters occurred in February-March 1917, when the curve is most skewed, and negatively; also when the (relative mean deviation) coefficient of variability was 10.9%, whereas in a majority of the samplings it was 20% to 23.6%.<sup>5</sup>

<sup>5</sup> Comparison of the two left-hand curves in Figure VI shows graphically the significance of the relative mean deviation coefficient of variability, which is 10.9 for February-March 1917 and 23.6 for May-June 1915. The more closely the single items approach uniformity in size, i.e., the closer they all cluster about the average, the lower is the percentage mean (or standard) deviation. Vernon's table, p. 128 of his book, giving data for eight samplings of earnings of these riveters, indicates that the average hourly output per man remained nearly constant over the four years. This average was lowest (14.37) in February-March 1917, and highest (15.81) in May-June 1915.

In numerous instances where groups of say 50 people or more work at a common occupation under closely similar conditions, with a reliable single objective measure of output, the curve of individual outputs thus supplies some important hints as to what sorts of factors may be shaping this curve. It was shown in Chapter 2 above, however, that no curve can be taken too seriously as normal for any and every sort of human accomplishment. Only too often the people who make poor showings are hampered by facilities which are of poor quality or not in good order; and not infrequently there is a concentration of individuals in the highest-output groups because of some mechanical or other external limitation which prevents the few best workers from fully demonstrating their powers. There may be few or no outstandingly poor records, if the personnel methods tend strongly to select, for work in the shop, only average or better workers.<sup>9</sup> And, of course, variations in experience and in health and strength in any given group may not follow the "normal" symmetrical curve. When the individual outputs are nearly or quite equal, for most of the workers and for many successive days, then the presumption becomes exceedingly strong that voluntary restriction is the principal cause of such uniformity or "stereotyping."

Vernon's chapter contains also an instructive example of the damage which may be done when time rates are too high, relative to piece rates:

The workers at this yard were paid at a piece rate, but they were likewise guaranteed a somewhat liberal minimum wage, whatever their output. Before the war, when there were plenty of men available, this system worked fairly well, for if a worker persistently failed to earn his guaranteed time rate, he could be discharged. During the war, however, the demand for shipyard workers, and especially for riveters, became greater than the available supply, and the men now controlled the situation. They found it easier to receive their guaranteed time rate than to try and earn their piece rate, and at one period scarcely a riveter earned the money he was paid.

The mean output in November 1915, had sunk to 8.3 rivets. The guaranteed time wage was abolished about that time,

<sup>9</sup>Such points are well discussed in P. S. Florence, *Economics of Fatigue and Unrest*, pp. 218-224.



whereupon, within two months, mean output rose to 14.8 rivets—an increase of 78%. “Other things” were doubtless not all equal in the two periods. Perhaps the British Government’s action to increase productivity by guaranteeing that all piece rates in government work should be maintained throughout the war, and by securing from trade unions relaxation of their working rules for the duration of the war, occurred simultaneously with this change in method of payment.

**Trade Union Policies re Task Setting.**—It was pointed out above that F. W. Taylor considered that competent time study would pretty well solve the problem of restriction of output by workmen; and when we add that tasks have been set by time study chiefly in establishments where trade unions had little or no influence, many readers will be confirmed in their notion that such unions are enemies of industrial efficiency. Taylor engaged in many controversies with American labor organizations, throughout his working life; and they were victorious over him in securing, in 1912, the first of a series of “riders” attached to Government appropriation bills, providing that none of the money thus appropriated should be spent on stop-watch time study for task setting. Thus this part of the “Taylor System” was thrown out of our Government’s armament plants. The matter, however, is much more complex than these circumstances alone indicate. On one hand, very few, if any, trade union rules are directly or consciously aimed at mere restriction of output; and on the other hand, there is abundant evidence of limitation of production by unorganized workmen, who appear in many cases to fool very clever time study men as to how much they are capable of doing.<sup>7</sup>

It appears more nearly correct to say that trade unions are often able more successfully than unorganized workers to carry out policies which appeal to union and non-union men alike—so long as the individual workman’s own ox is not

<sup>7</sup> See, e.g., S. B. Mathewson, *Restriction of Output Among Unorganized Workers* (Viking Press, 1931); F. J. Roethlisberger and W. J. Dickson, *Management and the Worker* (Harvard Business School, Bureau of Business Research, 1934); A. Ford, *Scientific Approach to Labor Problems*, Ch. 8, esp. p. 79.

thereby gored; and that both unionist and non-unionist are able to rationalize these practices and quite honestly feel insulted if any one suggests that they are restrictive in any anti-social sense. Thus, jurisdictional or demarcation claims of unions are defended on such grounds as their alleged tendency to assure competent workmen; seniority rules by reference to their ancient lineage and their checks upon favoritism of bosses; and restrictions on quantity of output by allegations that harder work would menace some workers' health.

**British Unions and Efficiency Measures.**—British employers sometimes cite with approval statements by Samuel Gompers and others to the effect that American industry is much less affected by restrictive measures than European. So far as labor union rules and practices are restrictive in effect, there may have been some truth in this comparison, so long as unions were in general less powerful in our nation than abroad. A few illustrations will show, however, that the problems and efforts to deal with them are very similar on both sides of the Atlantic.

In March 1915, Mavor & Coulson, Ltd. (Glasgow machinery manufacturers, employing some four to six hundred operatives, to which firm references are made elsewhere in this book) began metal processing on 4.5-inch high explosive shells. By July the male trade union machinists or "engineering" craftsmen were taking 14.17 minutes for one of the machining operations, and they continued very near this level during the following six months. But in October inexperienced and unorganized women were put upon a nearly identical job, and by April 1916 these female workers were taking, on the average, only 4.35 minutes per operation, and sometimes even less than one minute. Part of the skilled men's difficulty, apparently, was that before the war the firm's business had been largely or wholly in special and variable orders; repetitive mass production, which was a much larger factor in the plant after as well as during the war, was a new experience to all. At any rate, it was not until some three or four years after the war was over that the high earnings of women and unskilled workers, at rates set by time

study, brought the trade union men to accept such methods for their own work.<sup>8</sup>

Some particulars of the rate-fixing practices in this shop afford further international comparisons. One clause in the trade union agreement, which doubtless applies to all such employers about Glasgow, requires that piece or bonus workers must, on the average, have opportunity to earn at least a stipulated percentage (for some years,  $33\frac{1}{3}\%$ ; during the depression 25%) more than the standard or minimum day rates for their occupations. On this account, when Mavor and Coulson make any time study, they immediately add, say,  $33\frac{1}{3}\%$  to the observed time for the operation; and on not a few operations they also add from 10% to 40% for fatigue and personal allowances. Hence the time finally allowed (task time) in some cases comes to nearly twice the total of observed elemental working times; and the average bonus earned on all bonus work in the shop normally runs to 50% or more. Such a high differential in earnings between day work and piece or bonus work brings in its train problems of equity, to zealous workers on jobs which are not suitable for standardization and payment by results.

One type of inefficiency, mentioned by Mr. Mavor as being exposed and corrected by time study, shows how a workman might be unjustly accused of restrictive intent:

In this example the reduction in time taken, and in cost, and incidentally the enhanced earnings of the workman, were mainly due to the observer stopping the job at the right time, and so avoiding unnecessary labor in finishing. It is unfortunately sometimes necessary—when his labor of love is being wasted—to prevent a highly skilled man from expressing his pride of craft in high finish. The job re-

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<sup>8</sup> See "The M. & C. System of Time Study and Rate Fixing," a paper read by Mr. Sam Mavor in October 1932, before the Institution of Engineers and Shipbuilders in Scotland. See below, Chapter 15, for further particulars on the extent of restriction of output revealed in some operations, just before task times determined by time study were made effective in the M. & C. shops. Mr. Mavor collaborated with Prof. J. Hilton and others in a valuable survey, entitled *Are Trade Unions Obstructive?* (Gollancz, 1935). Little attention is given therein to time study or other methods of determining task times, but numerous trade union policies are examined in one leading industry after another; and the general impression is given that the anti-social practices which exist are comparatively minor and curable affairs. See also S. Webb, *The Restoration of Trade Union Conditions* (Huebsch, 1917).

ferred to had for a number of years been paid under the Rowan system, and the time taken never varied more than half an hour from  $38\frac{1}{2}$  hours. The work had been done by a very reliable man, who was regarded as exceptionally conscientious and industrious. When the job was time-studied, it was stopped by the rate-fixer observer when 17 hours had been spent on it. The workman protested that the job was not nearly finished, but was informed by the rate-fixer, who knew the purpose of the part, that further finish was quite unnecessary, and would add nothing to the value of the job.<sup>9</sup>

**"Speeding Up" and Learning, in Relation to Job Standards.**—"Workmen, when they are liberally paid by the piece," observed Adam Smith, "are very apt to over-work themselves, and to ruin their health and constitution in a few years."<sup>10</sup> And the charge is often made that time study and other efficiency devices wear out the worker prematurely by a more and more excessive pace. In particular, Vernon and other students have suggested that the piece rate and bonus schemes of Taylor and Gantt, whereby payment per piece increases when the standard output is reached, is especially likely to menace the worker's health by tempting him unduly.<sup>11</sup> Though there is testimony from credible and relatively impartial witnesses, like Mathewson and his associates, to the effect that authentic instances of overwork are rather rare in contemporary American industry, it is a problem which deserves, and is receiving, much further investigation. In part, at least, it must be dealt with by means of individual physical examinations; for any policy which amounts to restricting the work of all members

<sup>9</sup>"The M. & C. System," etc., *loc. cit.*, pp. 46, 47.

<sup>10</sup>*Wealth of Nations*, Bk. I, Ch. 8.

<sup>11</sup>A recent fad in Soviet Russian labor management is "progressive piece rates," which out-Herod the Herod of Taylor-Gantt differential rates:

"A worker is regarded as a Stakhanovite who succeeds in maintaining a 150% production of his daily norm. In the Freser Plant the following incentives are offered. For fulfilling the daily plan from 101% to 115% the worker receives a price  $1\frac{1}{2}$  times that of the piece rate for every detail completed above 100%. For every detail produced between 115% and 130% he receives a price double the ordinary rate given up to 100%. The fulfillment of a given plan by 130% nets for the worker an increase of  $2\frac{1}{2}$  times on the ordinary rate for every detail turned out above 130%. In accordance with this scheme hundreds of thousands of roubles are paid out by the plant."—*Monthly Review*, issued by USSR Trade Delegation in Great Britain; London, June 1936, p. 347. See Chapter 19 below, for further particulars of the "Stakhanoff Movement."

of a group to a point which is safely within the capacity of the weakest person who might enter it is scarcely defensible or practicable.<sup>12</sup>

More reasonable, doubtless, is the policy of setting an upper limit for production in any day or halfday, which is supposed to be only safely within the capacity of the *majority* of the workers; which policy appeals also to the employer, if high quality in the job is important to him. This scheme, however, does not protect the weakest worker; moreover it tends to make the shop unprogressive, by furnishing inadequate incentive to the work-people to devise those small improvements which are within their capacity and which will be further discussed in a moment.

The reports of well-meaning amateurs, and of experts who have axes of their own to grind, as to which workers are or are not being unduly speeded up naturally must be discounted. Most jobs are ordeals, during the first week or so of work in them, to people accustomed to quite different conditions. Also we must remember that this problem of finding a stint which, as Taylor put it, the regular worker can "thrive under," year in and year out, is by no means confined to jobs which are time studied or otherwise paid by results. Undoubtedly a deplorable number of day workers, under the supervision of "hard-boiled" and driving bosses, need such protection quite as much as any piece worker. Very likely the best protection many of them could have would be better placement examinations, so that they could be prevented from squandering what vitality they have in jobs to which they are unsuited.

**A "Company Union's" Proposals.**—The employee's attitude toward job studies is much affected by his confidence, or lack of it, in the persons who make them. Trade union and other employee representation machinery in the long run is indispensable, for a continuing audit of the standardizing and task-setting processes from the common worker's point of view. It is even more necessary, for the protracted arguments and ex-

<sup>12</sup> See comments and citations in Chapter 2 above, on fatigue and individual differences in endurance.

planations which are required to induce workmen to accept cooperatively a device like time study, when it has not been used in the shop before.

The following extracts from proceedings of the "company union" joint committees of the American Multigraph Company (Cleveland), in 1923, show that many aspects of our problem had been intelligently discussed:

Wages and Rates Committee reported handling several grievances in Milling Machine Department. Resulted in following recommendations:

Your Committee recommends that, where it is proved conclusively that an operator cannot make at least 25 per cent extra time, the job or jobs be reported to the foreman and then re-timed. . . .

That more time be consumed by the timer in setting rates. For example, if it has been the custom to set rates on the basis of running 20 or 25 pieces, this should be increased to 100 or more pieces. . . .

Where a fast worker is on the job, the timer allows from 25 per cent to 40 per cent which assures the slower operators at least 25 per cent. . . .

Records show that the timer first rates the operator, then rates the foreman on the same job, the final rate being set after the average for both men is determined. This method is used if the timer is of the opinion that the operator is working at less than a normal speed. . . .

That, where an operator thinks that any job can be run at a higher speed or feed without causing spoiled work or tools, he or she should suggest same to the foreman, and if said foreman approves of the change, then the operator should be permitted to run the job as suggested and receive the benefit thereby. . . .

Where the operator finds that he can improve the method and increase production by a change of tools, then such change may be put through the regular suggestion route and considered by the Engineering Committee of Congress.

**Rewards for Suggested Time-Cuts.**—Notice that the last two paragraphs quoted propose alternative methods of dealing with a single important problem. Workers will often discover or invent improvements in ways of doing their jobs; in fact, it is normally to be expected that the more apt among piece or bonus workers will progressively discover little short-cuts, even in jobs which have been well standardized by a capable time study man; which new methods, if adopted whole-heartedly, would enable them progressively to increase their earnings for

a given amount of time and fatigue. Experienced men, hired into many an establishment, may start with an output of 50%, or 60% of standard, and require several months to work themselves up to or above the standard;<sup>13</sup> moreover, workers already experienced within a plant, whose jobs have been re-standardized and re-timed, may be genuinely appalled at the new standard time allowance, yet presently, to their great surprise, find themselves making high bonuses. Some of these gains in output are pretty sure to be due to little changes in conditions introduced by the management, but some are attributable to the skill and dexterity of the operators.

When a definitely improved method is disclosed to the management as the invention of one worker, the management is usually willing to reward him; but of course unwilling to continue indefinitely to pay his fellows at the old rate for work done by the new and quicker method. One possibility, as the Multigraph Committee said, is to continue the old task time for the suggester but to re-time the job for others; Mavor & Coulson tried this policy for several years. They now find it more satisfactory to reward the suggester by a lump sum, and to re-time his job for all.<sup>14</sup> At best, however, the worker will often keep such ideas to himself, even though he might frequently increase his own earnings by putting them into practice. He will dread the suspicions of his fellows, first, that any change of method and re-timing may force them to work harder for less money; and second, that any increase in efficiency may increase the hazard of unemployment for all.

**Old Trade Union Policies.**—Trade unions have been rather slow in working out constructive tactics with reference to methods of setting task times, but some progress is evident. All unionized employments contain some sort of production

<sup>13</sup> Such was the case with forty compositors whose efficiency records were studied by H. D. Kitson. See his "Output of Workers Under a Particular Wage-Incentive," *University Journal of Business* (Chicago, Vol. I, Nov. 1922, pp. 54-68). Compare *ibid.*, Vol. I, pp. 467-470. This study is also reported by Kitson in a bulletin of American Management Ass'n, Production Executive Series No. 9 (1925).

<sup>14</sup> See Chapters 18 and 19 below, for further discussion of suggestions from employees.

standards, if only a few unwritten provisions as to who may be hired and fired for a given job. In the old piece work industries elaborate scales of "prices" were evolved, with the unions sometimes employing more or less expert "rate-fixers" of their own.<sup>15</sup> The general idea of intra-plant shop committees, or "shop stewards," as instruments of trade union policy, is now fairly orthodox among trade unionists; and these committees are especially suitable agencies for the problems we are now considering. They are in a position to utilize the services of trade union officials who may have a broader view of wage matters than most working members, and whose jobs do not depend upon the mood of any one employer.

Such efforts will perhaps enable the unions accepting or favoring individual output-wages to improve upon the traditional policy of identical piece rates among all establishments in a given trade and area, notwithstanding the differences in ease of producing a piece, among these establishments. Such a "standard rate" was supposed both to protect the workers from unwarranted "nibbling" or rate-cutting by individual employers, and to protect the union-shop employers by imposing the same labor costs on all. The low piece rate employer was often regarded as a "sweat-shop" proprietor who paid less for given skill and effort than his competitors; and trade unionists did not recognize sufficiently that this policy, too mechanically applied, is unfair to the more progressive shops, whose better equipment and organization enable the worker of given competence and energy to turn out more pieces than he could in the poorer plants. The policy thus tends both to handicap the unionized sector of the industry, and to produce inequitable differences in earnings among workers within it.<sup>16</sup>

<sup>15</sup> G. D. H. Cole, *The Payment of Wages*, Appendix F, gives some illustrative British piece work lists in coal mining and shoe manufacture, and cites other lists. He rightly urges the unions to develop officials more skilled in the theory and practice of wage administration.

<sup>16</sup> E. W. Morehouse, in *Quar. J. Econ.*, Vol. 37, pp. 257-290 (Feb. 1923), relates how an arbitrator in a unionized men's clothing market insisted that lower piece rates should be allowed to the better-equipped plants, so that encouragement should be given to progressiveness of management. Compare A. Bezanson, *Earnings of Upholstery Weavers*—discussed briefly in Chapter 12 below.



**Union-Management Cooperation in Task Setting.**—A number of ventures have been made in the general direction of collaboration between trade unions and their employers toward increased efficiency; and sympathetic engineers, in and out of the Taylor Society, have exercised influence with trade union people. In a good deal of the literature about this movement, to be sure, no mention is made of time study or indeed of production standards of any sort; and the railway shop unions, who have received the greatest publicity with reference to their union-management cooperation,<sup>17</sup> have remained strongly opposed to any piece work or bonus payment—at least for individual men. But of course such fundamental matters as working pace and restriction of output must have been discussed frequently in most or all of these cooperative committees. And, even before 1920, some significant beginnings appeared in joint control of industrial engineering—in garment shops of Cleveland, with the late Robert G. Valentine as a key-man; in paper mills, under the leadership of Robert B. Wolf. Somewhat later, for example, another engineer, Geoffrey C. Brown, persuaded at least one local of a plate glass operatives' union to work with some of the newer management methods. "No attempt was made to install any form of piece work or bonus system. All other elements of modern production control including an adequate time-keeping system, a perpetual stores inventory, a cost system, advance scheduling of orders through manufacture, time study, etc., were, however, successfully introduced," reported Mr. Brown.<sup>18</sup>

More recently the problems of production standards have become front-page newspaper material in references to our textile industry, in which day work seems to have predominated over piece or bonus work. Employers insisted that their looms and other machinery had been greatly improved and semi-skilled labor set to auxiliary tasks which weavers formerly had to do for themselves; hence weavers must operate more and

<sup>17</sup> See Chapter 19 below.

<sup>18</sup> "Scientific Management and Organized Labor Today," *Bulletin of the Taylor Society*, Vol. 10, pp. 132 ff. (June 1925). The appendix to this article includes discussions of Mr. Brown's paper by various persons, including a number of trade union officials.

more looms; and similarly, tasks were re-assigned to other classes of skilled labor. Labor advocates referred to this movement as "The Stretch Out"; employers called it "Labor Extensions;" and during the NRA the matter was referred to cotton, woollen, and silk "Work Assignment Boards" for study and control.<sup>19</sup> Presumably the problem was most acute in our northern cotton and rayon mills, which were being very seriously undermined by southern factories, paying much lower wages.

"The Naumkeag Experiment."—In 1929, several years before the NRA was born, in the Pequot Mills of the Naumkeag Steam Cotton Company (Salem, Mass.) was established a "Joint Research" arrangement for dealing with these controversies.<sup>20</sup> The union, which, I believe, enjoyed a "closed shop" in the Pequot Mills at the time, proposed this scheme after the management had given notice of larger job assignments,—with somewhat higher pay for workers retained, but with a good many people demoted or dismissed. Presently an industrial engineer was hired, to be responsible to a joint committee of management and union representatives. One effect of all this was to delay action on the work assignments until about a year after the employer had proposed that such revision should take place; but, when weavers finally were assigned some 20 or more looms (with higher wages) in place of the ten or twelve they had been tending, the change appeared to be accepted with much better grace by the workers than might have been expected if it had not been preceded by joint research. Other similar readjustments were made, as job studies advanced; and the plan was widely heralded as opening a new era in industrial relations.<sup>21</sup>

But the devil soon reappeared. The industrial depression

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<sup>19</sup> See, for example, J. W. Nickerson, "Work Assignment," *Annals of Am. Acad. of Pol. and Soc. Sci.*, Vol. 184, pp. 54-61 (March 1936). Mr. Nickerson, who was the employers' representative on the silk board, pays a high tribute to his colleague, the labor representative.

<sup>20</sup> See R. C. Nyman, *Union-Management Cooperation in the "Stretch Out"* (Yale Univ. Press, 1934). Report of a field study assisted by Prof. E. D. Smith and Yale Institute of Human Relations.

<sup>21</sup> See, for example, *Taylor Soc. Bull.*, April 1930.

deepened; nearly 10% of the people had been let out of jobs by the "stretch outs," and shorter and shorter time was worked by those who remained; neither the rank and file of unionists nor the front-line supervisors had been very closely in touch with the job studies; such factors as these led to an agreement between union and management, late in 1931, to discontinue the joint research and let the "Technician" go. Worse followed worse; and when, in the spring of 1933, the management pressed for a resumption of joint research (as it seemed to the operatives, merely as a cover for further "stretch outs"), a bitter "outlaw" strike developed, in which the union agent who had originally proposed the joint research scheme was ostracized by his people.

This case, which has been recorded with quite unusual care and impartiality, may be but a straw which does not show the direction of any predominant wind. The adversity of business conditions confronting the Pequot Mills, growing worse steadily for four full years after the scheme was launched, might well have wrecked the best-conceived plan; but other unfavorable factors are also apparent. The chief of these, I gather, was the circumstance that no time study, and perhaps few other "scientific management" procedures, had been used in this mill before; so that upon the "Technician" sponsored by the union agent fell the double and impossible burden of quickly demonstrating to the executives and supervisors, as well as to the wage-earners, that his methods were sound. Taylor was fond of saying that the essence of scientific management is a "mental revolution" in employers and their staffs. Probably this revolution must be well begun on the managerial side before there is a reasonable chance of its inspiring organized labor.<sup>22</sup>

<sup>22</sup> Mr. Mavor describes the initial stages at his plant thus: "This [shell shop] department gave to the staff opportunities of education in repetition machining, and time study on the lines inspired by F. W. Taylor's work was soon initiated, not in the first instance for the measurement of work or for rate-fixing, but solely for detailed analyses of the adjusting and cutting movements in machining, for the tuning-up of the operations. The great value of the system as a tool of management—apart altogether from rate-fixing—was immediately apparent. At first the staff received the innovation with an attitude of detachment, and regarded it with indulgent tolerance, but the value of the system in getting results soon attracted their serious atten-

**Put a Uniform on the Time Studied Worker?**—Mr. Henry S. Dennison contributed a chapter to Mathewson's book on *Restriction of Output*. This chapter, entitled *What Can Employers Do About It?*, contains the discerning treatment to be expected from this liberally-minded industrialist, who has consistently supported scientific management on an international scale, since its earliest days, and ends on the following note:

Can we under the best of circumstances expect Miss B or Mr. C to work under the eye of the time study man with freedom and without resentment? Under the best circumstances aren't they bound to feel that if they let themselves out, many of their good friends who work about them may have to work harder for the same money or get less money for the work they do? What can possibly weigh on the other side to counterbalance this inevitable feeling?

Isn't it likely, then, that eventually to solve the ultimate problem arising from the need of setting standards, it will be necessary to have a work laboratory as we now have a chemical laboratory, in which would be a special crew of workers each of whose idiosyncracies could in time be known and measured against average? They would come in time to be selected for smoothness of action and probably, also for their ingenuity. Standard methods and standard times would be developed by them in conjunction with the stop-watch man and the slow-movie men and all the rest. . . . We cannot properly call a motion analysis scientific if taken upon a subject whose individual rates of re-action we do not know.

This special laboratory crew would have special psychological advantages. They would be somewhat removed from the group whose rates or standards they were helping to set. The reaction of other employees toward them would be somewhat as ours is now towards the policeman: we should deeply resent either spying or efforts at control of our actions by a man named Jones, but if the town puts him in a blue uniform, with brass buttons and a proper cap, we respect him for the exercise of his proper functions.

Two limitations on this sort of procedure, however, are put forward by Mr. Mavor. First, the workman will feel better satisfied, and will actually be better protected, if the final time study is made of the man or woman whose time allowance

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tion and willing cooperation."—"The M. & C. System," etc., pp. 13, 14. Remember, too, that Mr. Mavor did not try to hurry his trade unionists into acceptance of these methods. Time study appears to have been first applied to rate-fixing or task time setting in 1919; and only about three years after that were the union men brought round to participate in its advantages.

is to be set, working under the real conditions to which the rate will apply. Second, as Mr. Mavor puts it, "In a repetition job an ordinary semi-skilled worker with the prospect of earning high bonus, may by practice acquire manipulative dexterity that would make the expert demonstrator's time look foolish." But the proposal that the person who is timed is the person who will presently be working under that time allowance is not economically applicable to the common case where a single standard is to be set for a number of workers, each turning out the standard product under conditions as similar as possible; and so this suggestion does not really face the problem of judging in what relation the capacity of the person timed stands to the capacities of his fellows, and of neutralizing this worker's misgivings as to how his pace, under observation, will affect the fortunes of his friends.

**In Brief.**—By way of recapitulation, we may discern logically two main parts in the problem of establishing a standard task for a given job-class; namely, (1) determining how the job is to be done, so long as the task applies; and (2) determining how long it takes a representative worker to do that job. As we have seen, these two main factors involve many subsidiary issues of equipment and methods to be made standard, relation of capacity of observed workers to other workers, proper fatigue and delay allowances, and the wage which is proposed for a day's work in which the output averages just the standard amount or "100 per cent efficiency."

Historically viewed, these matters fall into several epochs. F. W. Taylor applied the stop-watch to improve job methods and establish more accurate standard task times; later the Gilbreths elaborated various techniques of motion study for further improvement of methods and reduction of fatigue; and our present era sees industrial medicine and hygiene trying to develop measurements of fatigue and ill health in relation to work-pace and other conditions, also statistical analyses applied to individual differences and to all the other matters. Taylor's irritation with trade unionists led him to say that time study is no more fit for collective bargaining than is the astronomer's

determination of the time of sunrise,—forgetting that there is no question of which sun to time, and no question whether the sun, while being observed, is working at a fair and healthy pace. So our era is also one of employee-representative-auditing of job-standard-setting procedures, which should be initiated, on a well-considered plan, by the management.

These problems are not essentially changed by any mere change in method of payment, but they do assume somewhat different guises under the various methods. The standard task must be more explicit for any scheme of payment by results than for plain time work; and unless there is to be some repetition of the work under standard conditions, it does not usually pay to work out an exact task time. Experience with careful time study methods, however, enables a management more effectively to set informal standards for temporary use, and to form sounder judgments on the productivity of its day workers.

If space permitted, the following propositions might be elaborated, though they seem almost axiomatic. The controversial issues are made much less serious by any measures which tend to make the workers spontaneously interested in their work, or otherwise disposed each to do his best without worrying much over what other people do and get. (See page 86 above, and Chapter 20 below.) Contrariwise the difficulties are aggravated when either employer or employed overreaches the other, insisting on a bargain which the other must for the time accept, but which is so one-sided in advantage that its recoil will more than cancel the gain.

## CHAPTER 9

### THE BASE RATE: COMMON LABOR

This chapter and the three which follow are all devoted to the third essential feature which is explicit or implicit in every wage or salary contract: the time rate of payment. First, we are to consider briefly the theory of wages of common labor; then (in Chapter 10) the differentials for skilled and scarce work. At first the analysis is qualitative; we are rehearsing some arguments as to what are the principal determinants or influences, in various specified situations, which tend to affect wage rates; but in Chapters 11 and 12, we shall take up some elementary quantitative analysis of time wage rates and their determinants.

**Technical vs. Economic Views.**—Before launching ourselves into more detailed study of the “laws of wages,” however, it may be well to indicate what sort of offices these economic principles can and cannot perform.

People who specialize on technical matters related to work and wages are apt to underestimate the need of economic analysis of time rates of pay and hourly or weekly earnings, by reason of misconceptions of which the two following will serve for illustration. Frederick W. Taylor, the “Father of Scientific Management,” thought his methods were capable of determining wage rates with complete, scientific objectivity. Yet the most painstaking research on Taylor’s problem of how much work a “first-class man” can turn out in an hour throws no direct light on the question of how much this man should be paid for that hour’s work. It is a further and relatively a distinct task to determine what standard time wage is to be paid for a given task or for such-and-such work through a given period of time.

This hourly base rate will naturally be set with some reference to the local labor market. If, for example, the "time allowed" or task time set for a given quantity of output is about the time that is being taken for such a task by the average workman in that market, who is employed on straight day work, then the man who finishes the task in just the standard task time might not expect hourly earnings higher than those of straight time workers. If, on the other hand, the task or standard output per hour is set for a much faster pace than the ordinary day worker usually maintains, then the employer would be very foolish to expect to pay only the day worker's hourly wage for the high hourly output which he had called standard. Taylor, of course, realized perfectly that unless the workers who produced at his high standard pace could count on earnings well above those which were secured by ordinary day workers in the same occupation, there would be no use in making his time studies. He did not fully realize, however, that he had not found objective means for determining the hourly rate of earnings which is most suitable for each degree of skill and accomplishment.<sup>1</sup>

My second illustration of a technical man's over-simplification of the economic problems involved is supplied by Eric Farmer's pamphlet, *Time and Motion Study*.<sup>2</sup> Farmer was able to show, experimentally, that motion study could increase output and at the same time reduce fatigue; also that his workers cooperated cheerfully in the motion studies because they were guaranteed against piece rate reductions. He intimates that scientific management could usually avoid labor difficulties by this simple expedient of guaranteeing no revisions of piece rates or time allowances. But notice that when his workers had become proficient in the improved method, they were able to earn higher wages than they and similar people could earn

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<sup>1</sup> Taylor apparently believed he had determined scientifically the maximum differential above the ordinary day rate of his occupation which his "first-class worker" might earn without being spoiled by too much prosperity. This maximum, for pig-iron handlers anyhow, should be about 60% above the common day rate, Taylor held. See F. B. Copley, *F. W. Taylor, Father of Scientific Management*, Vol. II, pp. 42, 53 (1923).

<sup>2</sup> Great Britain, Indust. Fatigue Res. Bd., Rept. No. 14 (1923).



in other plants and jobs, *for the same grades of skill and effort*. Clearly this is an unstable situation, which few employers can afford to continue indefinitely.<sup>3</sup>

Motion study and training cost the employer something; and it need not be financed wholly out of the savings in overhead cost which result from higher production per worker. The gains tend in the long run to accrue to consumers, and more immediately to serve as profit incentive to the employer. It may be expedient to guarantee the old piece rates or time allowances to those workers who were on the job when the overhauling was begun; but for newcomers, at least, new allowances are bound to be set, and the question is apt to arise, whether the new method calls for a different level of skill or effort, or both, than the old. This brings us to the theory and practice underlying determination of appropriate base rates or hourly earnings; which matter, for the sake of relative simplicity, is discussed in the present chapter primarily with reference to common or "unskilled" labor.

**Value of Labor Dependent on Scarcity.**—In our preliminary theorizing we shall assume that both employers and employed are "economic men," at least to the extent that keen and well-informed competition prevails within each group. Soon, however (in Chapter 10), we take some cognizance of concerted action on each side, through labor unions, large companies, and employers' associations. And in Chapters 11 and 12 we shall consider some methods of dealing with other bits of "economic friction" in this field, particularly the numerous instances in which payments which are ostensibly wages and salaries become in effect gift or graft, through benevolence, or ignorance, or favoritism of the wage and salary setters.

Nothing has economic or business-like value unless it is

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<sup>3</sup>The same point is illustrated by the "Stakhanoff Movement" in Soviet Russia. (See page 134 above, and Chapter 19 below). The first reports emphasized that piece rates were not to be cut, as a result of the great increases in output per man-hour which reorganization of production *à la* Stakhanoff promised to achieve; but presently it appeared that many "norms" or production standards were being raised—especially where they had been very slackly set, and where outputs were greatly increased by rationalization of equipment and methods.

scarce, which is to say unless more of it is demanded (by people able and willing to pay) than will be freely supplied without price. Scarcity, relative to demand and supply, must be distinguished from absolute rarity. The services of street preachers and orators, for example, are rather rare absolutely; at least much rarer than those of common laborers; yet the said orators can seldom live by their talk, since there is little commercial demand for it. Now, the conditions of supply and demand are continually shifting, so that some things become scarcer and higher in price while others are tending in the opposite direction; the value of any one type of commodity or service does not remain fixed, relative to all others, for long. Common labor, for example, after 1914 advanced in value more rapidly than did many types of skilled. We must see, then, what sorts of influences are at work on the demand for and supply of labor, according to various narrower and broader senses in which these terms may be applied to labor.

**Demand for Labor.**—With reference to demand, we can start with the proposition just stated, that always there are some types of service rising in popularity, while others are declining. In recent years, to illustrate further, there has been a rapidly rising demand for beauty-parlor specialists, and a declining want for people skilled in handling horses. This condition makes workers harder to get, in the first case, and jobs harder to get, in the second case. The result is that wages tend to rise in the former occupations and to decline in the latter,—actually, no doubt, until opposite sorts of over- and under-supply exist, at which time the pendulum will swing in the other direction.

A second proposition about demand for labor may begin with the platitude that, with given methods of production, equal numbers of people are not wanted in the various occupations; there are fewer places for executives, for example, than for common laborers. This condition is not dependent entirely on technical circumstances, however; it is considerably the *result* of wage-differentials. If people capable of executive types of work become relatively more abundant, and

manual workers became relatively scarcer, the ratios among supervisors and routine and self-directing workers would gradually change in response to these modifications of supply (and of rates of pay). Earnings of executives are not higher than those of laborers because there is demand for a larger absolute number of managers than of common workers, at a given price. It is rather because the executives are *relatively* scarce: the number of such leaders who could immediately be placed might perhaps not be absolutely larger at any lower price, yet competition for the limited supply of men who are believed to be capable of superintending our largest enterprises enables these fortunate people to command high remunerations.

**Wages and Productivity.**—A given bit of labor is immediately demanded by an employer, but more fundamentally it is the consumers of the product who are the source of this demand. And most consumers of the bulk of products are themselves laborers. Hence the wage system as a whole, and in the main, is a means of exchanging services, among all who work.<sup>4</sup> Some of the consumers of a given line of product may also be potential suppliers of it; and if price relations shifted sufficiently, they would become actual suppliers. Thus, motor car owners are consumers of repairs and maintenance; and many of them, at times, are on the margin of doubt whether to hire such services or to do the work themselves.

Economists are wont to emphasize the "productivity of labor" as a determinant of wages, and, within limits, this emphasis is sound. What are these limits? Employers, of course, tend to pay the superior workmen more than the low producers within any one craft; this process is most clearly evident in piece work. But employees as a group might still be receiving less than that fraction of the value of the whole produce which might reasonably be imputed to them. They might receive a larger fraction, for instance, if employed by numerous small masters who exemplified the economist's notion

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<sup>4</sup> Compare E. Cannan, "The Demand for Labour," *Econ. Journal*, Vol. 42, pp. 357-370 (Sept. 1932).

“perfect competition,” than if hired by a few large concerns or by an outright monopoly;—though small-scale industry might be so inefficient that the larger fraction would yield a smaller average real wage.

Supposing a state of well-informed competition among numerous units on both sides, is any further sophistication necessary in order to argue that the laborer tends in the long run or “in the static state” to receive his whole (economic) product as his wage? We still have to deal with the “problem of imputation”; of judging whether the respective contributions of various laborers, capitalists, and landlords to the innumerable joint production processes are (in any rational sense) to be sufficiently disentangled so that the remunerations of these factors seem amenable to economic laws; or if the products are so indeterminate that rewards depend wholly on luck and cunning. Obviously it is usually impossible to isolate the specific products of the various factors in a literal and physical sense, although if there is a frontier of free land to which the laborer may resort, his gross produce on such land is bound to exert a powerful pull on wage rates in all communicating regions. Henry George and many other theorists have emphasized this influence of cheap land on American wages. Most production processes, however, are economically as well as physically joint affairs; and no simple method of analysis will disclose what shares of the value of the whole produce may economically be imputed to the respective factors of production.

**Processes of Imputation of Value to Labor.**—The “marginal productivity” theories of wages which are upheld by many economists are based on various combinations of the following principles: (1) Entrepreneurs tend to find out by experiment the resultant effect on the value of the joint produce, which follows upon employing just a little more, or just a little less, labor—other things equal—and competitive pursuit of profit induces entrepreneurs to hire labor up to the point where the marginal or “last” man’s wages nearly equal the increase in product which results from adding him to the preceding pro-

ductive combination. (2) All units of similar labor must sell for the price of the marginal unit. (3) No one entrepreneur is a perfect experiment station for such determination, but each one has considerable opportunity to vary his combinations of productive resources; and so at any time the whole economic system is tending to settle into an equilibrium of prices of products and prices of factors which ideally might be described by a vast system of simultaneous equations.<sup>5</sup>

This line of theory, in my judgment, contains a great deal of profound truth; but it is readily misapplied if we do not realize its practical limitations. We cannot truthfully assure workmen that if they will work harder, the reward of their increased productivity will infallibly and without limit be proportionately, or even absolutely, greater prosperity for themselves. One reason why such truthful assurance is beyond our power is this: Our world is so full of various sorts of "economic frictions" that a productive group, like farmers, may increase their physical output greatly, with the dismaying immediate result that their total and real income is reduced by reason of disastrous declines in prices of their products.

And even supposing that such frictions did not exist, and we actually had "perfect competition" throughout our economic system, if an increase occurs in the supply of a given type of work relative to the supply of its cooperating factors, two circumstances will determine the resulting impact on the earnings of such labor:

(1) The marginal *physical* "productivity" of the work-unit will be lowered, by some technical production coefficient,—and the marginal physical "productivity" or "significance" of the other (now relatively scarcer) factors of production will be correspondingly raised.

(2) The total product, being increased, will probably be

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<sup>5</sup>This mathematical concept was formulated most elegantly by Léon Walras (1874); the non-mathematical notions of "imputation" and "productivity" were elaborated by von Wieser and J. B. Clark somewhat later. Among expositions of these matters may be cited H. L. Moore, *Laws of Wages* (New York, 1911); W. L. Valk, *Principles of Wages* (London, 1928); J. R. Hicks, *The Theory of Wages* (London, 1932); P. H. Douglas, *The Theory of Wages* (New York, 1934).

salable only at a lower price per unit—how much lower will depend on the applicable coefficient of elasticity of demand. Each of these reactions, by itself, tends to lower the value per unit of this work, relative to other productive factors. (The laborers, to be sure, if they have increased the amount of work done per man, may realize higher real incomes per worker—though lower incomes per unit of work done). In some such technical and sophisticated sense, only, may it be convincingly argued that “wages are determined by the productivity of labor.”

**Wages and Capital.**—In the foregoing paragraphs we have taken some account of the reciprocal relations of labor and capital, wages and interest; but a few further remarks seem in order. For a century and more most economists have held that in the long run it is advantageous to the laborer if the supply of capital grows at a more rapid rate than does the supply of labor (or rather, the supply of work offered for sale). In its physical aspect this will mean that the workman’s “marginal productivity” will be raised, in part by reason of improvements in the equipment with which he works; on the economic side it means that the unit of capital declines in relative value, in bargaining power in a sense, as compared with the unit of work. The old Wages-Fund Theory of Ricardo and Mill was a crude and too-rigid version of this tendency; the distribution of the product of industry between laborers and property-owners (as such) is actually subject to considerable “squeezing,” by concerted action on either side, in the short term; and only gradually and haltingly may supplies of these factors tend to respond to changes in their remuneration.

The exact relations between prices of labor and of other factors of production become, as we pursue the analysis, extremely elusive. Marx’s view that capital is only crystallized labor is plausible enough at first blush; so is the common view that capital, in the form of labor-saving machinery, is a competitor which threatens the very existence of all labor. But capital *as capital* is not the physical plant or equipment (which from one point of view is merely the product of land and suc-

cessive touches of labor); capital as such is rather a function of time, of waiting and carrying power.<sup>6</sup> So we find some economists holding that wages tend to equal the "discounted marginal product of labor."<sup>7</sup> They mean that the various workmen who plow and sow and harvest, in the course of getting the finished product, bread (for example), to the point of consumption,—all these men cannot expect to divide among themselves the whole of the retail price of this bread unless they become capitalists to the extent of waiting for their pay until the ultimate product is bought by the consumer. In any except the most direct, hand-to-mouth production, the worker must be furnished the necessities of life out of a reservoir of capital, while goods-in-process are gradually brought toward completion. And even if most of the capitalists are rich while most of the laborers are poor, increasing accumulation of capital is apt to benefit labor if there is competition among capitalists for the hire of labor—since only by hire of labor can capital yield an income to its owner.<sup>8</sup>

It is also argued, to be sure, that some sorts of capital accumulation in the past have injured more than they have helped laborers, by producing business depressions and so causing wholesale unemployment.<sup>9</sup> People who hold such views are

<sup>6</sup> See F. W. Taussig, *Wages and Capital*; F. W. Taylor, *Principles of Economics* (8th ed., Chs. IV-VI).

<sup>7</sup> F. W. Taussig, *Principles of Economics* (1st ed., 1911), Vol. II, Ch. 51 (General Wages).

<sup>8</sup> P. H. Douglas, *The Theory of Wages*, Pt. II, reports a statistical investigation which is claimed to show that the annual physical outputs, real wages, and return to capital in manufacturing have responded to changes in relative supplies of capital and labor engaged, in a manner consonant with the marginal productivity theory. According to Douglas's calculations, from 1899 to 1922 capital employed in American manufacturing more than quadrupled, while in the same period the labor employed increased by only about 60%. This more rapid growth of capital than of labor appears to have benefited labor, for the real average annual earnings (i.e., money earnings adjusted for changes in living costs) per man grew by about 20%, although the hours of work were substantially reduced; while the return per dollar of capital invested probably declined.

Such results, however, are but tentative; for work of this type is still in the pioneer stage. Compare H. L. Moore's *Laws of Wages*, for other statistical approaches to these problems.

<sup>9</sup> See writings in this vein by J. A. Hobson, W. T. Foster and W. Catchings, as well as others; including Paul Douglas's *Controlling Depressions* (1935).

apt to think that too large a part of the current receipts of industry have gone to capitalists, and too small a part to labor; that on this account plants become over-extended during a boom, and depression ensues because the consuming workmen have not the wherewithal to buy the outputs of these new plants. We have here a suspiciously simple explanation of business fluctuations; but it is true that a great deal of capital is, in effect, consumed by unwise investment during booms, and hence benefits only temporarily that labor which is immediately employed in such construction. These unwise investments are results, however, as well as causes of the instability and unpredictability of the economic world. If future events like inventions and consumers' wants could be better forecast, "excessive" capital accumulation would probably be checked gradually by falling rate of return; and we should not find out suddenly that all sorts of facilities were greatly over-built. (The illusion of over-capacity in all, or nearly all, industries, which is characteristic of a major depression, is produced by the innumerable breakdowns in exchange which persist, while new price and wage and debt relations are being painfully worked out.)

**Influences on Supplies of Workers.**—So much for "demand" aspects: we have surveyed a few key-doctrines concerning the bearing of natural resources, capital, and imputed productivity of labor on the general rate of wages. Let us now deal summarily with "supply" aspects, and see what are some of the forces affecting wages from this direction. Let us apply the general theory of value to labor by means of the accompanying diagram (Figure VII). As we pass from  $O$  toward  $X$ , we are plotting increasing supplies of labor-power; from  $O$  toward  $Y$  we show increasing wage or price per unit of work done. The demand curve  $DD'$  reflects the supposition that at a given time, a larger supply, such as  $ON$ , can be completely sold only at a lower price ( $OF$ ) than a smaller supply such as  $OM$  or  $OV$  (these will bring prices  $OS$  and  $OT$  respectively per unit of work).



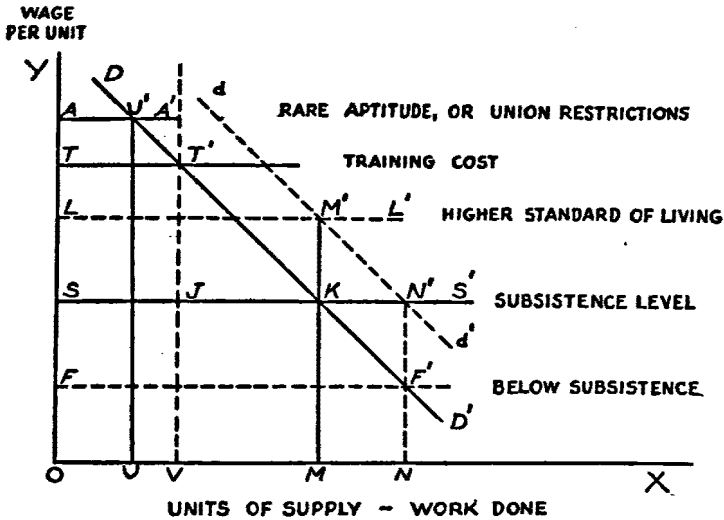


Figure VII. Effects of Various Supply Factors on Wages—Hypothetical.

**Subsistence Factor; "Iron Law of Wages."**—Now let line  $SS'$  represent the average bare cost of subsistence, for the time being, per unit of work—not merely food and shelter for the adult worker, but enough to support such families as will maintain the supply of labor, year in and year out, just to keep pace with demand. Thus a supply of  $OM$  units of labor might be maintained indefinitely so far as mere biological forces are concerned, if demand is stationary and if the wage is  $OS$ , since the latter just provides the absolute necessities of small-family life. The picture thus far reflects the old "iron law" or subsistence theory of wages, which said that common labor wages tend toward the subsistence level.

This theory did not deny the possibility that temporary conditions of supply and demand may cause wages to fluctuate at times above or below the level of  $SS'$ . If, for example, the demand suddenly increases to  $dd'$ , the supply of adult laborers cannot be immediately increased; hence the price per unit at which the existing supply of work can be sold is soon established at  $OL$  (the short-run supply curve  $MM'$  cuts the new

demand curve at  $M'$ ); and for a while the laborers are more prosperous. In the contrary case also, of suddenly decreased demand (say from  $dd'$  to  $DD'$ , after labor supply had grown to  $ON$ ), supply would remain unchanged for a little while, and competition of laborers for jobs would depress the wage below  $OS$ , perhaps to  $OF$ . But it could not remain indefinitely below  $OS$ , since we have assumed that this price is the long-run physiological "cost of production" of a unit of common labor work. If the demand remained contracted, the supply of labor would gradually diminish, through some combination of later marriages, lower birth rates, and higher death rates, if not sheer starvation; and as the supply diminished, price would gradually rise until it reached  $SS'$  again, as at  $K$ . It is clear that this part of the "iron law of wages" is true, if trite. In the long run, subsistence cost sets a lower limit to wages, though temporarily, as in the case of commodities, price may sink below the "cost of production."

Another clause of the "iron law," which was based on older theories of population, now seems more debatable. It says that if wages are increased to a point above the subsistence level, either by a sudden increase in demand or by a sudden decrease in supply through war, pestilence, etc., this advantage to the wage-earners will presently be neutralized by an increasing supply of labor, through an increased birth rate and a lower death rate. In Figure VII, as explained above, sudden increase of demand to  $dd'$  may raise the wage rate from  $OS$  to  $OL$ . The same sort of unit price rise may be attained if demand remains at  $DD'$ , while supply suddenly shrinks to  $OV$ , the new equilibrium in this case being a price per unit of  $OT$ . Many of the older economists (including Karl Marx, so long as he was assuming the "iron law" to hold true) supposed that, in either case, the higher wage would be only temporary, for the laboring population would elastically spring up, sooner or later, to the point where the demand-curve (wherever it be) cuts the long-run "supply curve"  $SS'$ .

**Standard of Living Factor.**—In more recent times, two beams of light have pierced the gloom of the Malthusian

theory (without, however, fully dispelling it). Real wages of common laborers in Europe and America evidently have advanced considerably above the subsistence level, as the term would be understood in many other regions and ages. (Of course numerous individuals still die prematurely from causes associated with poverty, but apparently such cases are relatively much less numerous in these nations, than they were a century ago.) The explanation, and the hope for the future, seems to be that both demand and supply forces are now behaving differently from both the earlier theory and the earlier reality. "Demand" (in the sense of per capita productivity) is increasing faster, as rapid strides of discovery and invention make it possible for an increasing population to live in greater comfort on the earth's resources. And population is increasing less rapidly than of old, both as a result and as a cause of the increasing wage levels. This is the "standard of living" factor in wage theory, which does not so much refute the subsistence theory as modify it. If a sufficient number of laborers are prudent people, who defer the begetting of children until they see reasonable prospects that their earnings will support families in a manner of life more expensive than the subsistence level would allow, then their standard will hold a check on the growth of population, and tend to keep the supply of such labor low enough so that it can command a wage high enough to live according to this standard. The line  $LL'$  in Figure VII may represent this standard of living; if wages fall below it, restriction of families is supposed presently to reduce the supply of workers until the price of work per unit rises to this supply-curve. If the arts, religions, morals and customs relating to birth control finally make procreation completely voluntary, we may perhaps see the line  $LL'$  moving rapidly upward. Laborers then might defer propagation not merely until plenty of fine food, raiment, and transportation was in sight for themselves and their progeny, but also until the services of numerous nursemaids and governesses (the latter being available only at rising wages) were assured.

**Immigration; Labor Unit.**—We may now put a few more details into the above rough sketch, still with reference to common labor. First, notice that demand for and supply of labor, as with many mere commodities, operate within comparatively local markets; there is no world market for labor in the sense that there might be for wheat and gold. Important barriers exist, which prevent labor supplies from flowing immediately to localities and occupations where wages are rising. One of these barriers is the ignorance and poverty of the laborer, which, added to his ties of blood and friendship, often prevent him from migrating in response to wage differences. But the exceptional opportunities presented by new and fertile countries nevertheless do stimulate large migrations in spite of such handicaps, unless obstacles like the present immigration restrictions of many nations are imposed. Such restrictions prevent, in part, the flow which tends to reduce supply and thus raise wages in the countries of emigration, and to increase supply and lower wages in the country of immigration. From the standpoint of an "over-populated" country, there is something to be said for government action in the opposite direction, not only permitting emigration, but subsidizing it,—though we can scarcely determine accurately what is the optimum population for a given country in a given state of the arts and with a given supply of capital.

A further detail is that the mere number of laborers accessible to a given labor market is not a satisfactory indication of the amount of labor supply, for purposes of economic analysis, even if we assume that the average capacity among the people would not be much affected by increases and decreases of numbers. The supply is more accurately to be conceived in terms of some standard unit of labor power or efficiency; that is why I have used the unfamiliar phrase "units of work" so much, above.<sup>10</sup> Such supply may be restricted by laws or

<sup>10</sup> "In order to give its right meaning to the statement that economic freedom and enterprise tend to equalize wages in occupations of the same difficulty and in the same neighborhood, we require the use of a new term. We may find it in *efficiency-wages*, or more broadly *efficiency-earnings*; that is, earnings measured, not as time earnings are with reference to the time spent in earning them; and not as piece work earnings are with

customs which limit the hours in which laborers may work, or prevent employers from buying the services which special classes like women, children, or convicts are willing to sell. Not all restrictions on hours of labor, however, reduce the available supply of labor power. Within limits, the laborers may work so much more intensely as to produce more in a short period than in a long period. If very long work spells are in vogue, the work supply might be somewhat increased by restriction of hours. As a final illustration of the variable labor supply contained in a given population, consider the possibility of a number of persons living in a given labor market, whose elementary wants are supplied at public expense, or by the bounty of nature, or by income from their property. In these cases the principal check on the supply of labor power might be the unpleasantness of toil, or the loss of opportunity for other activities more pleasant in themselves.

In this chapter we have sketched a bare outline of abstract wage theory, with reference especially to basic rates for the most common, the most nearly unskilled, labor. We turn now, in Chapter 10, to more realistic considerations, with reference especially to differentials for skill and taking some account of trade union and state regulations applying to labor.

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reference to the amount of output resulting from the work by which they are earned; but with reference to the exertion of ability and *efficiency* required of the worker."—A. Marshall, *Principles of Economics*, Bk. VI, Ch. III, Sec. 2.

## CHAPTER 10

### DIFFERENTIALS FOR SKILL; UNION POLICIES; THE NRA

**Premiums for Skill and Hazards.**—We must now inquire into the circumstances which determine the wages and salaries of skilled workers and professional people. The quotation that was given in Chapter 1, page 7, shows that Adam Smith thought high time rates are produced by one or more of the following causes: (1) unusual disagreeableness of work, (2) expense and difficulty of learning trade, (3) high exposure to seasons of unemployment, (4) special trustworthiness required, and (5) uncertainty that the worker, after preparing himself (in the legal profession, e.g.) will find his own services in demand. The drift of this analysis is that differences in earnings are more apparent than real; that they serve to equalize the attractiveness of various kinds of work. It says that the wage must be high enough to “make it worth while” for the workman to do particularly unpleasant or highly seasonal work; that skilled wages are higher than unskilled to compensate for the unremunerative apprentice period; and that professional earnings are still higher, since the apprenticeship is even more protracted, expensive, and speculative.

Many modifying and supplementary principles have been emphasized since Smith's time. We must notice, first, that the factors of expense and study necessary for acquiring skill tend to make that skill higher-priced than common labor *only in the long run*. There is, so to speak, a higher “cost of production” of bricklayers than of hod-carriers. But all goods which require time for production are liable to sell temporarily for more or less than their long-run total cost of production,—as wheat farmers and coal miners and railway men have had bitter reason to know. For shorter periods most of the supply

available must be sold for what it will bring, or only part sold at a maintained price and the remainder unsold or unemployed; demand is the dominant factor in the price at the moment. Yet a price higher or lower than cost of production is unstable. If radio announcers, for example, become conspicuously prosperous, due to a sudden increase of demand, numerous other aspirants will presently be entering the lists, and by their competition will bring earnings down toward the "cost of production."

Whatever check upon supply may come from mere danger, or other repulsion in a given job, doubtless acts more quickly; though when men have become accustomed to hazards in an occupation, such as electric shock, they may give so little attention to it that wages are not much affected, or they may even regard the hazard with a sense of adventure, as rich explorers apparently do. When uncertainty is combined with necessity of preliminary investment, however, as in the case of lawyers and business owners, then Adam Smith may be right in supposing the uncertainty of success is a deterrent, and tends to restrict supply and thus to maintain the *aggregate* earnings of people who do go into the occupation at levels higher than those of more dependable callings.

Yet some uncertainties as to income have the opposite effect. Many economists have suggested that the conspicuous prizes obtained by a few successful people in professions, or in business entrepreneurship, lead many would-be imitators to try their own luck, somewhat as do the buyers of tickets in a lottery. The earnings of business proprietors, independent farmers, and professional consultants, are in part virtual wages for their personal exertions; and moreover are wages subject to special hazards in addition to some of the seasonal unemployment which scourges the laborers they may hire. (Employers and self-employed take chances on ultimate "success," and beside this they must daily accept the hazard whether their expenditures for wages, materials, etc., will be recouped by the prices they can obtain for their produce when it is finally sold and paid for.) These uncertainties and worries are probably deterrents, which of themselves tend to restrict supplies of

such services. Professional people in university faculties and government posts apparently obtain lower average salaries than do people of the same type in the business world, or in independent practice; since the former forego the hope of a fortune in return for the comparative security which their institutional positions afford them. The number of people actually trying their luck in business and independent practice is very large, however, relative to that small part of the population which has money enough to pay what we may call the "entrance fees." It seems that the lottery-lure of the large incomes which some entrepreneurs and independent practitioners obtain, and the attractions inherent in the work of these self-employing occupations, more than counterbalance the repulsion of worry involved, in the minds of a great many people.

**Aptitude.**—The important difference between the influences of "costs of production" and of other factors on wages may be brought out in another way: by considering the varying degrees in which types of labor-supply can be increased. Some sorts of craftsmen could be multiplied almost without limit, if the wages offered were sufficiently high and the cost of training were within reach of the whole population: for example, rough carpenters. But other skills, such as those of the learned professions and of the most capable business management, are limited not merely by the expense and time and boredom of training but by the rarity of natural aptitudes. Doubtless supplies of even these latter services could be immensely increased, if all children had the best conceivable opportunities for developing whatever talents they may have. The popular surgeon or singer is perhaps not so superior to his colleagues as his popularity and earnings seem to show; but for some time to come there are likely to be vogues of Chaplins and Chaliapins which will make their earnings completely out of proportion to their "costs of production."

In these cases, to be sure, the "cost of production" is by no means small,—Charlie Chaplin and Feodor Chaliapin nurtured their inborn talents into their final supreme skills by considerable expenditures of money and effort, during long pe-



riods of discouragement. But there are a few instances of well-paid human services, the supply of which is limited by forces entirely beyond human control. The stature of the Prussian king's guards, the beauty of actresses, the deformities of people exhibited at carnivals illustrate this point; and show that wage differentials are paid, not only for skill (and must thus tend to cover costs of acquiring skill), but to command services which for *any* reason are scarce in relation to the demand for them.

The foregoing discussion, with its emphasis on the differences which may often appear between "market price" and "long-run supply price," may be summarized by reference back to Figure VII on page 155. As before,  $SS'$  represents the minimum of subsistence supply price of common labor, and  $LL'$  the supply curve of common labor when a standard of living higher than mere subsistence characterizes all workers. We now add a further differential  $LT$  as the extra "cost of production" of skilled labor, so that its supply curve (total long-run supply price) is  $TT'$ . If demand for skilled workers suddenly increases from  $DD'$  to  $dd'$ , the immediate effect will be a rise of wages, but gradually this high wage may attract recruits into the trade until supply is increased and wages once more are at  $OT$ . If, however, the supply is absolutely limited, like the time of a popular actress, then increased demand puts the price up above  $OT$ , and it cannot come down by reason of increased supply. Further influences tending to restrict supply (adding other special "costs of production") might be shown in the diagram: for instance special dangers and pains, like those of caisson workers or explosive makers or experimental air pilots.

**The Easier the Work, the Higher the Pay?**—We may easily convince ourselves that wages do not at present wholly *equalize* the attractiveness of employments. Disagreeable and dangerous and seasonal work is to a great extent paid low wages, while the higher-salaried jobs are often, as Mark Twain's Yankee observed, intrinsically pleasant,—at least to many of the incumbents. The immediate cause of this situa-

tion is that workers in the former types of occupation—common labor, for example—are frequently more numerous, relative to demands for them, than are people who can do the work of the “soft” jobs. But what makes this difference in scarcity? Doubtless one reason is the disinclination of many young people to work for distant goals; they may take “blind-alley” jobs which give immediately higher pay than apprenticeship or schooling, and in the end leave these persons stranded in the common labor market. Another cause is differences of inborn talents. We have long known that “too many” children drop out of school in order to go to work, and formerly we accepted without much reserve the explanation that the principal cause was the poverty of their parents. More recent investigations show that other forces are also important. One is the misguided advice given by parents; another is the stupidity of the child which makes schooling specially disagreeable to him; and finally the school system must bear part of the blame for not offering curricula in better accord with the variable aptitudes of the children.<sup>1</sup>

With due allowance for complications, however, it remains true in general that the poorer the parents, the poorer the chance of the child to be educated and polished into capacity for holding a professional or managerial post. Conversely, the children of prosperous people have better chances to make the most of their natural gifts. We pride ourselves on offering education freely to all, and truly we have made great advances in this respect; yet, as Professor Taussig has said: “Only if the state were to supply education of every kind on the terms which it grants in the United States for the army and navy cadets at West Point and Annapolis, would the burdens which education entails be taken entirely from the individual’s (or parents’) shoulders.”

The incomes of employed workers of all grades, indeed, have risen markedly during the past few generations, especially if measured in hourly earnings; and modern states have made

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<sup>1</sup> See, for example, W. F. Dearborn, *The Intelligence of Continuation School Children in Massachusetts* (Harvard University Press). Compare Evan L. Lewis, *The Children of the Unskilled* [British] (London: King, 1924).

increasing provisions for "social security." These movements hold out some promise that the means that are required to give a child a good preparation for life will some time be within the reach of all families. The costs of education and culture and training which prosperous people want for their own children, however, seem to be growing still faster than their incomes. College—professional school—internship—the further period required for establishment in a profession or in business—parents now try to support their children not merely through college, but for five or ten years afterward. We applaud when the leading professional schools "raise their standards," which to be sure may mean that their graduates, on the average, will be more competent, and more assured of finding good jobs. But it may also mean that the professions are kept too near the status of monopolies of the rich. Similar observations apply to many methods of "raising standards" in state requirements for other licensed practitioners, such as nurses, electricians, radio operators and what-not.

**Non-Competing Groups.**—It was the British economist Cairnes who epitomized the foregoing sort of reasoning into the expression "non-competing groups." He pointed out that, if all people were really able to compete on equal terms for jobs, there would emerge a premium for disagreeable work. There is such competition and such a result, he argued, *within* each grade of labor or social class. Thus, in a given market, common labor for easy and steady jobs can usually be hired for lower hourly wages than common labor for repulsive and dangerous and casual jobs. But competition does not operate in this way *between* grades, any more than it does between nations, since workers cannot pass freely from lower to higher grades.<sup>2</sup>

<sup>2</sup> J. E. Cairnes, *Political Economy*, Ch. 3 (1874). Compare J. S. Mill's *Principles*, Bk. II, Ch. 14 (1848), and F. W. Taussig's *Principles*, Chapter on "Differences of Wages; Social Stratification." The extent to which mental test data, classified by occupations and social status, afford means of statistically checking up on this section of theory is discussed by R. M. Woodbury, "Intelligence and Wages," *Quar. J. of Econ.*, Vol. 31, pp. 690-704 (1917) and A. W. Kornhauser, *Am. Econ. Rev.*, Vol. 15 Supplement, pp. 110-122 (1925).

Radical reformers have long argued that if the spur of necessity were removed from laborers, all manner of ways would be found, including shorter hours, to make work inherently more pleasant. True enough; the concessions made to cooks and even to farm laborers (in our own time) illustrate the point. What the reformers often do not realize is that the desired result will not be stable except as means are found of reducing the supply of cheap labor relative to dear labor; and moreover that if relative supplies could be changed in this manner, earnings would automatically tend closer toward equality even within the framework of "capitalist society."

**Wage Bargaining.**—When the suppliers of a service are especially scarce relative to demand, they are often said to be in a strong bargaining position. There are other aspects of

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F. W. Taussig and C. S. Joslyn, in *American Business Leaders* (1932), give statistical evidence which shows that many sons of laborers do reach the topmost business posts; that lack of formal education has not hitherto been much of a handicap to such lads; and that youths who had advantages of birth have not got on in business in full proportion to such advantages. They demonstrate clearly, however, that business-owner families have produced "business leaders vastly out of proportion to their numbers," and there remain many grounds for supposing that this record is due to environmental as well as biological superiority of such families.

B. S. Rowntree showed, in his *Poverty, a Study of Town Life* (1901) that the proportion of children who must live in a state of poverty is much larger than the fraction of families who, at a given time, are poverty-stricken. For it is the larger families, on the average, that will be in poverty.

The well-known statistical fact that in modern populations, within limits, the more prosperous the parents, the fewer are their children, leads many persons to suppose that if we could endow all poor families with prosperity we should thereby "raise their standard of living" in the sense of bringing their birth rates down to the level of families who are now prosperous. Among the numerous fragments of evidence which bear on this problem may be mentioned several researches cited by N. E. Himes, in his "The Birth Rate of Families on Relief: A Summary of Recent Studies in the U. S. A.," in *Marriage Hygiene*, Bombay, August 1935. It seems these investigations have pretty consistently shown, not merely that large families tend to be forced to apply for charitable relief; *their birth rates are apt to remain high while they are supported at public expense.* "We have, for example," says Himes, "the excellent study of Professor S. A. Stouffer of the University of Wisconsin (*Journal of the American Statistical Ass'n*, Sept. 1934), who has lately shown that, in his study of 5,520 families in Milwaukee on public relief, the rate of confinement of families on relief exceeded that in a control group of non-relief families by 43%. These data include only those confinements taking place nine months after the families went on relief, and for a comparable period among the control group."

bargaining which we must consider, however, lest we conclude too hastily that all actual wages are determined entirely by comprehensive supply-and-demand forces such as were discussed above. The main qualifications we must now make are based on the proposition that a single wage bargain, like a single commodity bargain, will reflect the "going market rate" only if buyer and seller both have means of knowing what the market rate is, and if neither is under undue pressure to make a quick transaction. A person who needs so desperately to raise money on his watch that he feels obliged to take whatever the first pawnbroker offers him illustrates both points. He does not "shop around," so that other brokers would have a chance to bid; and even if he did, the whole market for used watches might be so little organized that no one, with the best will in the world, could say just what the full competitive price of his watch would be. If our friend shops around, but all the pawnbrokers he can reach are acting in concert, clearly his bargaining power will suffer further from the monopoly situation. Even seasoned traders, moreover, dealing in staple goods through specialized markets, must occasionally find they have not been astute enough to get the full price which current supply and demand tend to establish—perhaps because they did not realize that a somewhat higher price was ruling at the time in a distant market, or because some obstacle prevented them from sending their goods to this more advantageous selling point.

Now an individual laborer may be a poor bargainer in any or all of these ways. His necessities tend to prevent him from holding out for long, or ranging widely, in search of the best bargain the market forces would give him. The large employer is necessarily, in some respects, like a combination of small managers,—though so long as there is a real competition among large employers there may be no monopolistic depression of wages. The fewer the employers in a market, however, the easier it will be for them to combine in some degree, even if they do not realize that their informal cooperation amounts to a partial monopoly in labor-purchasing. The difficulties in developing standard terminology for jobs, and for degrees of skill in those jobs, moreover, make it much more

difficult for the single laborer to follow market quotations of his stock in trade than is the case with many a small farmer.

Two important agencies which attempt to increase the laborer's income are the state and labor organizations, whose influence form the theme of the rest of this chapter. Their activities may be classified into several distinct categories:

1. They may try to raise the *incomes* of the poor in other ways than through the *wage-mechanism*—e.g., by workmen's compensation laws, mothers' pensions, or education and health services at public expense;
2. They may oil the wage-machinery by providing new means of quickly disseminating information as to the current market prices of various types of labor; or
3. They may control wages by influencing the fundamental forces of supply and demand.

**Traditional Union Wage Policies.**—The chief way in which unions affected wages in the past was through their quasi-monopoly of skill. They utilized the supply-and-demand principle that in most cases, at a given time, a smaller supply can be sold at a higher rate per unit than a larger supply. By various policies like standard apprenticeship period, arbitrary limitation of apprentices, high initiation fees, closed shop, or other restrictions on entrance to their trade, the old craft unions restricted the number of qualified workers available below the supply which would be established by the automatic effect of talent, money, time and effort required to acquire the skill in question. We may represent this process diagrammatically by referring once more to Figure VII on page 155. Line  $TT'$  represents the total "cost of production" of a given type of skilled labor (iron puddlers, for example), being  $LT$  higher than the common labor supply curve set by forces like aptitude, cost, and effort of training. If any worker who could surmount these hurdles were free to acquire the skill, and demand is stabilized at  $DD'$ , then the supply would tend toward  $OV$  units, and the wage rate would be  $OT$  (equal to  $VT'$ ). Now if a powerful union places further restraints on entrance, the supply price may be raised by an entrance or initiation fee

(further "cost of production"), or the same results could be achieved by other monopolistic restriction of supply to  $OU$ , which supply can be sold at the higher price  $UU'$  or  $OA$  per unit, without corresponding alteration of the cost and effort of acquiring skill *for the fortunate people who are admitted to the trade.*

The above argument runs in terms of numbers of workmen; but it should be immediately refined to include policies which restrict or increase the work which a given number of men in the trade will turn out,—for example, shortening hours without increasing hourly output. Whether such restriction will increase the *weekly* earnings of the men in the trade depends on the elasticity of demand for their product. If the demand is inelastic, meaning that nearly as much will be demanded at a higher as at a lower price, then restriction of supply of work-units will put up the unit wage so high that the long-run weekly incomes of the men are increased. If, however, the demand is elastic, so that a much lesser quantity will be bought at a higher than at a lower price, then the restricted supply can be sold only at a slight advance in unit price, and the men's weekly and annual earnings will be lower than if no restriction were practiced. Factors like their greater leisure, lessened speed of work, or "spreading the work," to be sure, may be worth the lowering of weekly incomes, in their view.

**Other Ways in Which Unions May Affect Wages.**—The foregoing is perhaps the most obvious method by which unions may control wages, but some other policies call for our consideration also. In fact, the tactics which tend to make entrance into the union and hence into the trade expensive and difficult are not as prominent in unionism as they formerly were. There seems to be a trend toward industrial unions like the United Mine Workers and Amalgamated Clothing Workers, which admit workers (I suppose) on comparatively easy pecuniary terms. (Within an industrial union, however, you may find some essentials of craft unionism; regulations governing entrance into various sub-crafts, such as clothing cutters, for example.) If they give up, wholly or partly, the old devices

for limiting the supply of workers or controlling the work they do, or both, how then can they hope to raise wages?

One way is to improve their members' bargaining power by means of better information concerning the state of the labor market. We have already developed the notion that the fundamental conditions of supply and demand do not infallibly determine the wage. A single price for a given unit of efficiency, determined by these fundamentals, prevails throughout a market *only if* both buyers and sellers are good traders, who are not in too much of a hurry to buy or sell, who "shop around" to find actual transactions and other indications of the prevailing condition of supply and demand. The union business agents are, or might be, somewhat like the lawyers, brokers, and other experts whom business men hire to obtain special information incident to striking bargains. An employer rather commonly likes to hire his own lawyer, rather than trust to the representations of the other fellow's counsellor; and he should not be astonished if workmen do not always have complete confidence in the representations of their employers' agents. The union official, ideally, is supposed to know all about prevailing wages, piece rates, and the trend of labor supply and demand in his own line; so that he may protect his constituents in getting the full market value of their labor, somewhat as a skilled and honest real estate broker can protect a widow who is obliged to sell her home. Needless to say, union officials do not always conform to this ideal picture; whether they fall short of it further and oftener than do real estate brokers, lawyers, and counsellors generally it would be difficult to prove. At any rate, this sketch indicates a manner in which unions might affect actual wages, without being able to change the prices indicated in our diagrams, which are based on the assumption of full, clear-eyed "willing buyer and willing seller" competition.

Another possibility, too, remains for consideration. It has just been said that our standard economic diagrams assume competition, but every one knows that competition does not always prevail,—that something in the nature of restraint of trade is very common in all markets, including labor markets.



Probably it often comes about quite innocently. If there are but few employers, and they frequently ask each other "What are you paying for common labor?" the result may be that in effect they present a partially united front to the workmen, offering a wage which really gives the employers more than purely competitive profits,—wages which workmen are in a sense compelled to accept. If, now, the workers through their unions have their immediate necessities secured by strike funds, and perhaps also by recourse to unemployment benefits or relief from the public treasury, they may present a counter-monopoly. If two monopolists, who must finally come to some sort of terms, lock horns, the result is not accurately predictable on economic principles, any more than is the outcome of a single horse-trade. The "marginal" independent buyers and sellers are no longer in the picture; the total demand becomes much more important than marginal demand, and similarly for supply.

There is usually a range of possible wage rates, for a short period anyhow, between the highest the employers will pay, if sufficiently squeezed, and the lowest the workmen will take, in the last resort. Within this range somewhere, according to the shrewdness of the traders, a bargain will finally be struck which ends the dispute. This bargain may easily be better for the workmen than if full competition among them had been opposed by more or less of monopoly among their employers; and possibly it may be better, at least temporarily, than they would have made if there had been full and informed competition on both sides. A labor monopoly, however, cannot maintain wages permanently above the competitive level without means of preventing some of the outsiders who want to work at these higher wages from entering the employment. Such restriction of supply takes us back to the analysis given above, and illustrated by Figure VII.

Study of the large literature of trade union economics, the Webbs' classic *Industrial Democracy*, for example, would yield many variants of the foregoing wage policies, and quite possibly some additional or alternative measures which are distinctive and important. The legitimate and business-like labor

groups we have been considering, of course, are sometimes imitated by, or perverted into, predatory or "racketeering" organizations; and of course there are always people trying, with more or less success, to use labor unions primarily for political purposes. Unions, moreover, may affect their members' *incomes* in a wide variety of other ways, e.g., by acting as mutual insurance societies, and by mobilizing votes for bread and butter legislation.

A policy recommended to labor organizations by J. W. F. Rowe, a British student of wages, may be cited as a variant of those which I have sketched above. Rowe thinks that increasing costs stimulate employers to improve the efficiency of their production methods, and that such improvements in the long run spell higher real wages for workers. He argues, "Trade unions ought consciously to try and keep wages not in exact adjustment with but a trifle above, the current marginal productivity equivalent; to accept the fact that this is bound to produce a variable, but permanent, margin of unemployment which is of their own deliberate making and no inherent fault in the capitalist system; to take all possible steps to increase the mobility and fluidity of labor, in order to facilitate the reorganization and improvement of technique which must ensue before a fresh advance in wages is possible. . . ." <sup>3</sup> The unions, however, can act thus only so far as they can prevent the unemployed workers from taking jobs at less than the union rate of wages,—that is, only if they have a quasi-monopolistic control of the labor supply.

**Unions and Wages—Summary.**—Thus the principal or fundamental methods by which unions can affect ordinary private bargains seem to be the three discussed above, namely (1) restricting entrance to, and output within, the occupation; (2) supplying specialized labor market information; and (3) matching the short-run power of an employers' united front. The first of these is clearly a method by which some workers may be benefited, at least as to hourly or piece earnings, only at the expense of other workers and consumers. The second has no

<sup>3</sup> *Wages in Practice and Theory* (1928), p. 229.

such anti-social effect, and may be used to the benefit of any number of workers, regardless of whether others want to join the union. The third is of potential benefit to all workers, though it raises a power which is easily abused or used shortsightedly for an advantage which will prove temporary, as exorbitant rates and restrictive rules, if adopted by railway unions, would badly handicap their employers in competition against highway and other non-rail carriers.

**Minimum Wage Laws; the NRA.**—The foregoing discussion of trade union and trade association wage policies brings us to another large factor in modern wage-setting, namely, the state. I refer now, not to the state as a direct employer of labor—some of its own wage problems are dealt with in Chapter 11 and elsewhere below—but rather to governmental regulation of wage and salary rates in private employments. Such regulation has been rather common abroad, especially since “compulsory arbitration” became the rule in New Zealand and Australia in the 1890’s. In the United States, however, we had only a rather inconclusive experience with minimum wage laws confined to women’s and children’s work, in some sixteen states until June of 1933, when the late National Recovery Administration (NRA) began to give us a large-scale demonstration of one sort of governmental participation in wage-fixing.

This attempt to hit the two birds of industrial recovery and long-run labor benefits by the single stone of widespread wage-boosting lasted about two years, during which time many other forces were simultaneously affecting wages. Therefore we cannot say with confidence just what effects were wrought upon wages and employment by the NRA measures alone. The philosophies and interests underlying this NRA experiment, however, continue to show considerable power, for instance, in the Commission set up by the national government to regulate our bituminous coal industry, and in legislation by some states with reference to other industries. Apostles of voluntary adoption of many NRA principles are still active, moreover; various pressure groups demand that governmental purchases be lim-

ited to firms using NRA standards; and others attempt to obtain decrees for shorter and shorter hours of work. I propose in the following paragraphs to make a very brief examination of NRA wage policies and practices, as a sort of case study of one form of state wage regulation. Let us consider, first, what was done; then, why it was done; and finally, what was the net effect.

**What Was Done.**—The NRA wage policies and practices included the following principal elements: (1) Each industry, so far as practicable, was to be organized under a “*code of fair competition*.” More than 500 codes, besides numerous supplements, were approved by the President, embracing industries which in 1929 employed over 20 million people. This “codified” sector of our economic life comprised practically all of manufacturing, also most of wholesale and retail trade, certain professions and personal-service groups, banking, hotels and restaurants, and bituminous coal and copper mining.<sup>4</sup> Something like two-thirds of the *employees* of the nation were thus included in this NRA structure. The remainder, chiefly in agriculture, public service, railways, electric power and other public utilities, and anthracite and metal mining, for various reasons remained outside. Within the NRA fold differing conditions, especially as to negotiating ability of labor, capital, consumer, and government representatives during the code-making days, gave rise to many important variations among the codes, so that any brief generalizations about them are inaccurate, and neglect many important exceptions.

(2) The “*teeth*” or *sanctions* or *inducements and penalties* relied upon to secure general observance of the codes were of several general sorts, especially: (a) the unfavorable reaction of public opinion and patrons upon any firm which the Recovery Administration found guilty of non-compliance, (b) ineli-

<sup>4</sup>The elasticity of the concept “industry,” in the range of codes as they finally emerged from the mad scramble, is illustrated by the contrast between the animal soft hair industry, with a code for its 45 employees, and retail trade, with one code applying to nearly 3,500,000 employees. To a large extent the remarks in my text concerning codes will also apply to the concerns which entered the President’s Re-employment Agreement (PRA) in the autumn of 1933, but never achieved codes in the strict sense.

gibility of concerns which had lost the Blue Eagle to secure government contracts; (c) prohibition in the retail code of sales of goods whose makers had not complied with their producer's code, if any; and (d) a fine or imprisonment or both, to the extent that these regulations were held by the courts to be binding,—perhaps only on firms which had voluntarily adopted them, or perhaps, as such firms hoped, also on minority trade members who had never agreed to be bound by the industry's code. The prospect that the courts would ultimately enforce all these codes was thought doubtful by many people, including members of the government, from the outset; and such prospect vanished completely when the Schechter decision was handed down by the United States Supreme Court in May 1935. The weapon of unfavorable publicity, also, had become more and more blunt; but at least during the first year or so of the NRA régime this weapon, reinforcing the widespread willingness among employers to give a fair trial to the scheme, brought about remarkably general compliance. I shall presently cite some statistical evidence which indicates that total wages were raised with astonishing speed and force; and shall then review some of the factors which promoted voluntary observance of the codes.

(3) A dramatic feature of the NRA was its *outlawry of child labor*. All the industrial codes set the minimum age for regular and full-time employment at 16 years or even higher; and some other parts of the New Deal apparatus operated in the same direction. Sugar beet growers, for example, in order to qualify for cash benefits from the Agricultural Adjustment Administration, had to withdraw children under 14 from regular work in their fields.

(4) *Organization of labor* was fostered by the NRA movement, especially in its earlier phases, before the difficulties in the way of interpretation and enforcement of Section 7(a), obligating employers to collective bargaining, were generally realized.

(5) The code provisions dealing with *hours of work* called for drastic shortening of the work-week, nearly always to less

than 49 hours, and, for more than half the workers concerned, to 40 hours or less.

(6) *Minimum wage provisions* of some sort were written into all the codes and the PRA, which scales in many cases were designed to increase the hourly earnings of the lowest-paid workers so greatly that their weekly pay would be advanced, despite the shortening of normal hours. A vivid and influential example was set by Code No. 1 for cotton textile manufacturing. Even in 1929 weekly earnings in this industry (which then employed some 450,000 people) were averaging only \$15-\$16 for *all* occupations skilled and unskilled; it was at or near the bottom of all our non-agricultural groups. By July 1933 the least-skilled women regularly employed in the southern mills were earning ten to fifteen cents an hour, the usual work-week there being 50 hours or longer. In the northern cotton factories the 48-hour week was common, and weekly as well as hourly earnings distinctly higher—on the average, hourly earnings in New England mills (all occupations) exceeded those in the South Atlantic states and Alabama by nearly 40%.<sup>5</sup> The minimum wage set by this cotton textile code was \$12 in the South and \$13 in the North, in each case for a 40-hour week. The lower of these rates is 30 cents an hour, at least double the figure which had been paid many workers just before the code was adopted. The new *minima* of \$12 and \$13 for a 40-hour week may also be compared with \$15.64, *average* earnings for a week of about 50 hours, throughout all cotton mill occupations, skilled and unskilled, sampled by the U. S. Bureau of Labor Statistics in 1929.<sup>6</sup> In most of the other industries affected, wage rates were already higher, and so the NRA prescribed proportionately lesser advances (in a few cases, perhaps, none at all) for the lowest-paid people. Often there were differentials,—higher minimum rates for North than for South; for larger cities than for smaller; for men

<sup>5</sup> See General Johnson's letter of transmittal to the President, dated July 9, 1933, in NRA pamphlet giving the Cotton Textile Code (and in Vol. I of the complete series entitled *Codes of Fair Competition*); also A. F. Hinrichs, "Wage Rates and Weekly Earnings in the Cotton-Textile Industry, 1933-1934." *Mo. Lab. Rev.* of U. S. Dept. of Labor, March 1935.

<sup>6</sup> See Hinrichs, *op. cit.*, p. 3.

than for women—except that most codes provided that women should receive the same rate of pay as men for the same kind of work.

(7) *Wages above the minimum* were but seldom directly determined by schedules in the NRA regulations; there were usually somewhat elastic and vague provisions, that they should be "equitably adjusted." The two forces of reduced weekly hours and increased minimum wages, however, exercised strong though perhaps inequitable pressure for increases in hourly rates, all along the line. In the cotton textile industry a comparison of hourly earnings by occupations, between July 1933 and August 1933 (just before and just after the code was approved), showed that the least skilled workers had their hourly earnings advanced immediately by about 60% to 100%, and that the relative gain tapered off gradually, with increasing skill, to about a 50% advance in the South and 35% to 40% increase in the North, for hourly workers of highest skill. The table also shows that average hourly earnings in August 1934 (by which time the NRA machinery had ordered hours reduced, for 12 weeks, to 30 a week) were slightly higher than in August 1933—immediately after the code went into effect—in most of these occupations.<sup>7</sup> In the great majority of other industries the proportionate advances in *minimum* wages were less, and so also the pressure upward on rates above the minimum was correspondingly weaker.

**Why It Was Done.**—Such were the main outlines of the NRA system, which were most closely relevant to wage determination. How came that system to be applied so suddenly and extensively? My account of all these matters owes much to the comprehensive analysis, prepared under the auspices of the Brookings Institution by Lyon, Homan, Terborgh, Lorwin, Dearing, and Marshall, which I shall hereafter refer to as the "Brookings Report."<sup>8</sup>

<sup>7</sup> Hinrichs, *op. cit.*, pp. 4, 5.

<sup>8</sup> *The National Recovery Administration; an analysis and an appraisal* (Washington: Brookings Institution, April 1935). See also various mimeographed and lithoprinted reports of the Research and Planning Division of the NRA, especially the one entitled *Hours, Wages and Employment under*

The growth of labor and radical demands, as the depression deepened up to the national election in 1932, requires no comment here; but truly "Casual observers of the NRA scene were nonplussed that committees of business men were crowding into Washington and staying for weeks and months for the privilege of increasing their costs by raising wages and reducing hours of work."<sup>9</sup> How may this paradox be explained?

Some employers were predisposed toward raising wages, no doubt, by the numerous variants among *high-wage philosophies*, long preached by labor advocates and left-wing economists, and to some extent recommended by employers. Mr. Henry Ford had preached and practiced, since 1914, the view that high wages are good for employers, as well as for wage-earners, because the latter constitute the great bulk of consumers. In December 1929, when President Hoover recommended to a conference of large industrialists that they should not immediately cut wages, Mr. Ford announced that on the contrary he would *raise* his minimum rate from six to seven dollars a day. As business continued to get worse rather than better, Mr. Ford later reduced his wage scales. Nevertheless from 1929 to mid-1933 the hourly rates of pay for non-agricultural workers were in general cut much less than in proportion to the declines in commodity prices (and rather less than the total cost of living). Some of the abundant statistical evidence of this disparity is summarized in the Brookings report, Pt. VI.

The absurdity of the simpler forms of high-wage philosophy was illustrated by Professor Paul Douglas's comment: "When Mr. Ford appears to argue that an increase in (Ford's own) wages will increase the demand for Ford cars commen-

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*the Codes* (January 1935), and succeeding volumes of charts by industries; M. H. Schoenfeld's article, "Analysis of the Labor Provisions of NRA Codes," *Mo. Lab. Rev.*, March 1935; and L. C. Marshall, *Hours and Wages Provisions in NRA Codes* (Brookings). Origins and general policies of the NRA are incisively treated in *Minimum Prices Under the NRA* (Univ. of Mich., Bureau of Business Research, 1936), by my colleague, Professor H. F. Taggart, who kindly read and criticized my first draft of this section.

<sup>9</sup> Brookings report, p. 91.



surately, he forgets what should be obvious to all, namely, that even in America men have other desires to gratify than that of driving his particular type of automobile;"<sup>10</sup> but of course the theory becomes much more plausible if it may be assumed that employers of some two-thirds of all labor in the nation are to raise wages simultaneously.

More generally congenial to business managers in mid-1933 than any sort of high-wage scheme of recovery was the idea of dealing with unemployment by *spreading work*. The practice had already become rather common of keeping as many workers as possible on payrolls, for reduced actual hours of work in a week. This condition made the drastic measures of the NRA for shortening the work-week and eliminating child labor distinctly less distasteful to employers than similar edicts would have been during more prosperous seasons. Apparently not much stock was taken by NRA leaders in the optimistic view that labor efficiency might soon be greatly improved by higher wages and shorter hours, for General Johnson remarked, in transmitting the Cotton Textile Code to the President:

While the proposed increased minimum wage and lower working hours will raise labor costs somewhat above the 50% ratio of wages to "mill-margin" that existed between 1923-29, there has recently occurred a marked improvement in mill-margin back to conditions of profitable operations. Therefore the increased wages could now be absorbed with only a small increase in price to the consumer.

Then, addressing himself to critics on the left, he continued:

Our studies show, however, that any larger wage increase would require such a mark-up as might impair consumption and so react unfavorably on the President's whole reemployment policy. There is such a thing as taking too big a bite. . . . We are increasing for certain mills unskilled rates enormously and total wage payments by about 20% [elsewhere in the letter he indicated the advance would be 30%] and lowering hours over 25%. . . . While it is not enough to produce

<sup>10</sup> "The Modern Technique of Mass Production and its Relation to Wages," *Proceedings of Academy of Political Science*, Vol. 12, p. 34 (New York, 1927). In this article Professor Douglas developed a more sophisticated argument in favor of increasing the relative share of the product going to labor; and in his book *Controlling Depressions* (Norton, 1935) he gives a somewhat qualified approval to the wage policy of the NRA.

the general effect at which we are aiming, as a practical matter, it should be accepted for the present. As general purchasing power increases and as the industry gets the benefits which it should reap from the wise self-government authorized under the code, further adjustments can be made.

So we come to these "*benefits of wise self-government*" to the proprietors. What were they expected to be? The answer is suggested by the phrase "Code of Fair Competition" which was part of the official title of each of the NRA codes.

Low wages, of course, are usually viewed as unfair competition by employers whose particular circumstances enable and oblige them to pay more. The NRA codes, however, went much further and attempted not only to allow but to enforce concerted action, within the respective trades, on many practices beside those pertaining to labor. The cotton textile code, for example, together with the various supplements and administrative orders to which it led, regulated production by controlling new plant and equipment, by keeping multiple shifts within depression-bounds, and by cutting hours as low as 30 per week, for some months. Many of the other codes provided for central filing of price lists and discounts, and prohibited sales "below cost," as well as sundry inducements, like advertising allowances, which might otherwise be offered to a buyer in lieu of outright price-cutting. Such provisions, and numerous others which tended to maintain or raise prices, appeared in many of the codes. Even in more prosperous times they would have been very attractive to business managers, for they seemed to promise, not merely relaxation of anti-trust laws and administration, but the still greater boon of *legal penalties against price-cutting competitors*. After the harassing years of depression, naturally this prospect was particularly appealing; and it goes far toward explaining the willingness of employers to assume the wages and hours burdens which seemed to be the government's price for the trade practice clauses of the codes. If a government attempted to raise wages so generally and so far and so fast, without entering into some such "partnership" as was the NRA, in respect to something like these controls of production and prices which

employers very much wanted, it is evident that the problem of enforcement would be much more difficult than it was in the early days of the NRA.

**What Was the Net Effect?**—We have not space here for further discussion of the mass of statistical evidence, yet a few inferences must be hazarded as to what the measures reviewed above actually accomplished, with respect to wages. I shall comment first on the behavior of money wages, hourly and weekly; then on connections between wage and price movements. In a nutshell, the NRA appears to have (a) raised hourly earnings, of wage-earners included within it, by 10% or more, on the average; (b) decreased nominal weekly hours by 10% to 15%; (c) increased the number of persons employed, materially, thus leaving weekly money earnings about stationary, on the average, for a shortened work-week; (d) raised prices and cost of living, hence led to some reduction in average real weekly earnings of employed workers; and (e) produced great upheavals in relative wages among occupations and industries.<sup>11</sup>

In the realm of money wages, and in somewhat greater detail, what were the chief changes from 1932 and early 1933, to the autumn and early winter of 1933, as the NRA took hold? We may disregard further consideration of weekly hours and weekly earnings, for these had been cut low during the depression by part-time operations. The NRA held weekly hours low for each worker (subject to flexibility devices which differed considerably among the codes), thus forcing more people to be employed, as production increased; and, if we refuse to give it full credit and responsibility for the increases in hourly earnings which took place concurrently with its installation, we should at least concede that it probably expedited such rises in hourly rates. Outputs of bituminous coal mines and factories were driven rapidly upward after March, 1933,

<sup>11</sup> Beside the citation given on page 176, on cotton textile wages, see the excellent and comprehensive survey entitled "Employment, Hours, Earnings, and Production, January 1933 to January 1935," by Witt Bowden, in *Mo. Lab. Rev.*, Vol. 40, pp. 541-573 (March 1935); also Pt. VI of the Brookings Report already referred to.

considerably by reason of forward buying in anticipation of the increased labor costs expected under the impending NRA. Average hourly earnings, on the other hand, rather declined from the spring of 1933, until, between July and August of that year they suddenly jumped from 41.9 to 48.2 cents in manufacturing and from 45 to 48.4 in bituminous mining. Further advances were soon made in these industries—to 55 in manufacturing and 70 cents in bituminous mining, by the spring of 1934.

In retail trade, another large and codified industry, total man-hours were not much affected; but average weekly hours were reduced, and number of employees and hourly earnings were substantially increased, according to the U. S. Bureau of Labor Statistics indexes.

It was pointed out by the NRA's researchers that wages rose more, during this period, in codified industries than in others for which data were available. This bit of evidence—tending to show that the NRA did raise wages within its industries—should not be pressed far, however, since some of the large groups outside the codes, such as railway men and anthracite miners, did not have their wages reduced after 1929 as much as did most other employees; and on the other hand the public utilities which entered the NRA were not much affected thereby, since their hours were already short and their wages but little reduced from the peak.

The limited long-run influence of the NRA on wages is furthermore shown by the stability of hourly earnings during 1934 and early 1935, as enforcement of the codes was decreasingly attempted; and especially by the very slight decline in wages which occurred after the Schechter decision in May 1935.<sup>12</sup>

**Effects on Real Wages, of All Employees.**—Such was the general course of money wages. What was happening, meanwhile, to commodity prices and cost of living? Here we return to the "increased-purchasing-power" theory, discussed before

<sup>12</sup> See *Mo. Lab. Rev.*, e.g. Vol. 42, pp. 447, 454 (Feb. 1936); also National Industrial Conference Board's Bulletin, Vol. 10, No. 1 (Jan. 10, 1936).

at page 178. According to one version of that theory, wage increases may promote prosperity if they precede price advances and therefore lift the real incomes of wage-earner-consumers. We are also reminded of another hoary and over-simple wage theory, which teaches almost the opposite idea,—that money-wage advances are of no benefit to workers, because such advances will be passed on by employers in the form of increased cost of living, and so no rise of real wages will occur. The latter I call the “vicious circle” theory of wages and prices.<sup>13</sup>

The Brookings investigators argue, plausibly enough, that in the America of mid-1933 it was very unreasonable to suppose that the NRA could make employers increase their wage payments greatly *before* they advanced their prices; and the Brookings report presents impressive evidence tending to show that, quite apart from other influences (such as the government’s currency policy, processing taxes, and the drought of 1934), the prospective increases in wages did lead to a wave of forward buying and price advances which lifted the cost of living a month or more ahead of the actual wage rises. The authors of this appraisal conclude: “(1) The NRA raised substantially both the average hourly earnings and the cost of living of the nation’s employed workers as a whole. (2) If on the average wage rates per hour were raised more than living costs, the difference was small. For the most part gains in money earnings from this cause were offset by the effect of the NRA on the prices of the goods and services bought with these earnings. Average real earnings per hour were but slightly affected.”<sup>14</sup>

We may give the NRA credit, then, for inducing at least a temporary boomlet of prices, wages, and production in the summer of 1933. What was its general effect on *relative* wages; did it raise them where they most needed to be raised? Did it spread total wage earnings more equitably among the

<sup>13</sup>It is held, of course, by many employers; and, according to Karl Marx, was taught also by his comrade Weston in the First International. See *Marx’s Value, Price, and Profit*.

<sup>14</sup>*Op. cit.*, p. 788.

whole laboring population? Did it tend to cause an enduring increase of employment in the fundamental sense of total man-hours worked? These are ambitious questions, and to some extent independent of one another. But their interdependence is important, too, and I venture a few observations which bear upon all.

**Merits and Defects.**—It is generally agreed that, within the NRA-PRA system, the scheme had somewhat of a levelling effect upon wages; that it tended to raise the lower-paid people relatively more than the higher-paid. The cotton-textile data, cited on page 176, will serve as a rather extreme illustration of this tendency—wages of the less skilled were raised relatively to those of the more skilled, and most of the scale in the low-wage South was raised relatively to the higher-wage North. And of course, if the codes raised wages and prices at all, they thereby tended to shove up the cost of living faster than wages for the employees outside the codes. Any one can find much to commend in such effects as these. Some of the groups whose rates were raised little or not at all had not had their rates cut from pre-depression levels so much as those favored by the NRA,—e.g., anthracite miners, railway workers, and public servants (outside the codes) and telegraph and telephone employees (who were within the NRA-PRA fold, but whose rates were not raised much, if at all, by NRA). The hourly earnings of a good many people, moreover, such as needle workers in their homes, reached shockingly low figures by mid-1933. And, when we suggest that the NRA failed to raise real wages very far, let us remember that without it the money wages of people in the codes might well have lagged still further behind, as cost of living rose by the operation of other forces.

Yet I think these benefits were secured at an exorbitant cost. As the Brookings critics suggest, the scheme would have been sufficiently difficult of execution, without net anti-social consequences, if it had been confined to raising *minimum* earnings, say, to 30 or 35 cents per hour; for that would have involved a vast amount of enforcement machinery, and especially of planning and work to provide for the children and adults who

became unemployed as a result of the minimum wage regulations. But the grandiose vision of hastening industrial recovery by hastily "increasing the purchasing power" of millions of workers above the minimum, by raising their rates also, led to a grab-bag competition which I think was a net impediment in the way of recovery. Great classes of people working for tremendously "deflated" wage rates, such as farm and domestic laborers, were made to suffer from sudden advances in cost of living. Some occupations within the codes, such as those connected with building and other durable goods, were suffering unemployment in part because their labor costs had been "deflated" less than most others; yet they were enabled by the NRA to raise their wage rates still further. And though the northern cotton textile makers no doubt thought they were benefiting southern labor, as well as themselves, by providing in the codes for raising southern wage rates relative to northern, this solution of the problem proved too simple; and after the NRA's demise the northern cotton mill communities were in desperate straits again, with reference to southern competition. Their next move, lengthening hours and cutting wages, perhaps was also unduly simple; for much might be done through lightening capital and overhead charges, and increasing labor efficiency.

**Summary.**—In this chapter we began with a further elaboration of abstract competitive theory of wages, showing how successive differentials may be added to the basic common labor rate, especially by costs of the education and training required for skilled work. We passed then to consideration of trade union policies and powers, and found that unions may exert continuing pressure on wages per unit of work done by various restrictive methods, also by improving the market information and bargaining skill available to the worker. Finally we tackled the influence of the state upon private wages, and considered some evidence and arguments tending to show that the NRA was a very doubtful blessing to the whole of American labor, much as it may have done for some classes of beneficiaries. The reader should apply this analysis to other measures for state control of wages only with great caution, of course; and especially

should he beware of supposing that the NRA experience demonstrates that the "vicious circle theory" (that advancing money wages will be nullified by advancing cost of living) is always sound. It is, in fact, demonstrably false as a long-run proposition, for real wages have advanced greatly in the modern world, in the face of decreasing hours. The state and the trade unions, let us also notice, are not entirely independent agencies of wage pressure; on the contrary, an outstanding function of unionism is that of "lobbying" for legislation, much of which the union leaders think (or subconsciously feel) will support the wage interests of their members. These lobbyists, like the general mass of their constituents and other lobbyists and citizens, often adopt short-sighted policies, as by crowding up wage rates at the cost of too great increases of unemployment within their own ranks. The higher wage rate, however, is the bird in the hand; the fuller employment which lower rates might yield corresponds to birds in the bush, whose number and reality are much harder to ascertain.



## CHAPTER 11

### JOB ANALYSIS FOR WAGE AND SALARY DETERMINATION

**Background: Civil Service Surveys.**—The general wage-theory discussed in the two preceding chapters has been developing for centuries. We may now notice how practical people, for purposes of their own wage and salary administration, during the last few decades have built up some special methods for determining rate of pay in actual dollars and cents. We shall find that many of the forces which economists have emphasized turn up again in these personnel management discussions, that the said factors are misinterpreted in some respects by the personnel people, yet that some extremely valuable techniques for dealing with our problems have emerged.

The earliest efforts along this line seem to have been made in government organizations, by specialists on civil service administration. We all know that government wages and salaries are not directly prevented by competitive pressures from becoming generous (partly because so many of us entertain fallacious notions on the extent to which the government as a "model employer" can influence private wage rates); also that flurries of economy occasionally necessitate surveys to determine how government rates compare with those paid for "similar work in private business." This demand is a perennial provocation to job analysis. It does not necessarily lead to any careful study worthy of the name, however, for some "classifications" of jobs amount to little more than arrangement of these posts in brackets according to their existing rates of pay.

Another stimulus to the newer methods of wage and salary control is furnished by discontent among state employees who think they are underpaid, not primarily in comparison with employees of private industry, but in comparison with other

state employees in their own large organization. Favoritism and differences in aggressiveness in asking for pay-increases, on the part of either the employee or any of his superiors, are potent sources of unequal pay for equally valuable work, or equal pay for unequivalent work. The older civil service devices of competitive examinations and hierarchical job-titles, which to some extent combatted this tendency, have evolved toward the newer methods which we are about to study.

**In Private Business.**—More recently private employers have begun to realize that they also are confronted by the above problems; and other related difficulties have become prominent too. During the war period of 1917-18, for example, the upheaving price level and the rapidly shifting labor supplies and demands created special inequalities in remuneration, because new people were often hired in at larger wages or salaries, for a given value-product, than those employees received who had been with the company since the lower-price era. In a sense the latter had themselves to thank if they did not look for new jobs and threaten to quit if they were not raised to equality with the newcomers; but fear of unemployment and timidity made many of them stay on, with a declining morale due to their sense of injustice.

Still another angle of the same problem, in private as well as in public employments, is the way inequities in remuneration are fostered by misleading job titles, and by dissimilar distributions of abilities within an occupation among different departments or establishments. Thus, if A's "secretary" is paid the same as B's "secretary," the chief executives and auditors may be satisfied; but if one of these "secretaries" knows, or thinks she knows, that her work is more difficult and valuable than the other's, then all is not well. How inequalities are masked by loose terminology in business is illustrated by Lott's report that various machinery manufacturers in a given community at one time reported they were paying "first-class toolmakers," some as low as 50 cents and some as high as \$1.05 per hour; also by the statements he cites from the International Harvester Company that their job analyses uncovered marked differences

in names and rates of pay for work which was really the same.<sup>1</sup> Still other practical wage problems are involved; for example, a satisfactory outside market rate may be unavailable, either because the job is so peculiar that no outside employment comparable to it can be found, or because, due to exceptional prosperity or depression, outside rates are in a chaotic state.

In all these cases, of course, the employer makes *some* attempts to pay for each job at the supposedly prevailing rate for similar work, both in his own establishment and outside. If his rates remain sufficiently below what market conditions tend to set, he will finally be left without workers. But this rough sort of trial and error has serious drawbacks. The bad morale of those who think themselves underpaid (and often are so) is expensive while they remain; so is the process of replacing them when they leave; and if the employer's rate is higher than he needs to pay, he and all his workers are handicapped in the struggle for business survival.

**General Features of Job Analysis for Wage Setting.**—Job analysis itself is a job which suffers somewhat from loose terminology.<sup>2</sup> In its broadest sense it naturally comprehends all sorts of systematic occupational studies, including those whose main purposes are better hiring specifications or training or promotion programs; also time and motion studies for task setting. Sometimes, no doubt, it is economical to collect information for all such purposes in one grand campaign; and cer-

<sup>1</sup>M. R. Lott, *Wage Scales and Job Evaluation*, pp. 13-17 (Ronald, 1926). His tabulation of toolmakers' rates, to be sure, shows that many more men were employed at about 80 cents per hour than at higher or lower rates. Yet the total range, cited above, and the range of plant-averages (76 to 90 cents in one trade association), indicate the difficulty one has in finding "the market rate" for toolmakers. The Harvester Company found, for the same job in its own different departments, variations of eight or ten cents an hour,—not merely on straight time work, but in the basic time wage used for setting piece rates. These variations were doubtless due in part to differences in titles; e.g., an Assembler was variously called Builder, Erector, Fitter, Bench Hand, Bench Riveter, Handyman, in different departments. The *Wage and Personnel Survey*, of the Federal Government's Personnel Classification Board exhibited similar cases in government service. See 70th Congress, 2d Session (1929), House Document 602, pp. 7, 8.

<sup>2</sup>Job analyses, in the present sense, are also referred to variously as occupational descriptions, position analyses, salary surveys, and so on.

tainly it was experiences with job analyses undertaken with more restricted objectives which suggested that here is an instrument that should be serviceable for many another use, such as wage standardization. But let us confine ourselves now to the job studies which are aimed most specifically at the problem of establishing sound basic time rates (both wage and salary), and let us pay no attention, for the moment, to other functions which the same occupational survey may have.

**A Position, a Class of Positions, a Grade.**—Another ambiguity against which we should guard comes from uncritical usage of the word “job” in the following senses: (1) the work of a single individual; (2) an occupation at which many workers may be engaged; and (3) a batch of work to be done, which might occupy one worker only a few hours or a few minutes, or many workers for many months. The Federal Personnel Classification Board uses the term “Position,” for the first of these concepts: “A *position* is a specific civilian office, employment, or job (whether occupied or vacant) calling for the performance of certain duties and the carrying of certain responsibilities by one individual.”<sup>3</sup> Also the Interstate Commerce Commission labor statistics have distinguished between the number of separate persons on payrolls in a given month, and the lesser number of “full-opportunity positions.” The Personnel Classification Board does not, in this connection, attempt to define and use precisely the slippery word “occupation,” but proceeds next to define a “Class” as “a group of positions which are sufficiently similar in respect to their duties and responsibilities that—

“(a) The same requirements as to education, experience, knowledge, and ability are demanded of incumbents.

“(b) The same tests of fitness are used to choose qualified appointees.

“(c) The same schedule of compensation can be made to apply with equity.” Government stenographers, for example, have been grouped into four classes—

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<sup>3</sup> *Op. cit.*, p. 20.

junior, senior, principal, and head stenographers; and specifications written for each.

Federal "positions" are further identified by the "service" in which the worker is occupied (e.g., "Clerical, Administrative and Fiscal," or "Professional and Scientific"); and furthermore the classes in the various services are arranged into "grades": "The term *grade* means a horizontal subdivision of a service including one or more classes of positions for which approximately the same basic qualifications and compensation are prescribed, the distinction between grades being based upon differences in the importance, difficulty, responsibility, and value of the work." In short, a "class" of positions is approximately a sub-occupation; and all sub-occupations, which the job analysis or survey shows should have equal pay-ranges, are thereby put into a uniform "grade."

But now we are getting ahead of the story of our chapter; for the processes involved in definition and classification of individual "positions," for purposes of compensation, form precisely our present theme. Some elements of abstraction and arbitrariness must always be involved in any such classification, for literally the work of any real person is unique,—he gives his "job" individuality as he works and grows. In many instances the following proposition of Kingsbury acquires importance:

A position which acquires added responsibilities and importance because of the exceptional competency of the person holding it, should be reclassified at a higher level, retitled, and appropriate higher salary standards set.<sup>4</sup>

We may all feel considerable sympathy with Mr. Henry Ford's detestation of official titles, on the ground that each person makes and remakes his own job continuously.

**General Procedure: A Federal Government Survey.**—Wage and salary surveys have to be planned carefully in advance, and thoroughly backed by the higher management involved. Also, *the more give and take that occurs in connection*

<sup>4</sup> *Personnel Journal*, Vol. 12, p. 92 (Aug. 1933).

*with explanations of purposes and methods to the common employees, the better the results are apt to be.* Much may be learned from study of the rapidly growing literature,<sup>5</sup> and sometimes one organization's classification can be used with some success in another. Ordinarily, however, considerable preliminary experimentation, and local adaptation of procedures developed elsewhere, are necessary.

Usually a questionnaire is devised (or, better, a schedule of points of information to be secured by interview) concerning each job-class, if not concerning each individual worker. Information is sought from one worker or more in each job-class, which data are checked by a supervisor or supervisors. If the existing class-titles are generally under suspicion, then it is not at all sufficient to study one "secretary's" job, for example, as a representative of all secretarial operations; for a main objective is to determine, independently of existing nomenclature, how many genuinely distinct types of position are to be found. (Efficiency study, to determine what improvements are needed in equipment and methods, is a related but distinct task.) In the Federal Personnel Classification survey of 1928-29, apparently every one of the hundred thousand employees involved was supposed to fill out the questionnaire, and to have his account checked, in writing, by his supervisor and by the latter's superior.

What items should the questionnaire or schedule contain? We shall see more clearly in a moment why there is so much disagreement among the doctors on this point, due to underlying differences of opinion as to which factors should and can be evaluated for rate determination, and especially to differences in number of employees covered by such surveys, and in areas and conditions of their work. Various technical particulars are required to identify the position formally; and each of a very wide range of characteristics may have some influence on the wage

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<sup>5</sup> Beside the other references cited in this chapter, there are a number of pamphlets on wage and salary administration in the American Management Association series; and the texts on personnel problems and principles contain treatments. See also chapters in *Handbook of Business Administration* (McGraw-Hill), and articles in the *Personnel Journal*.

or salary, and may perhaps be intuitively allowed for in the evaluation process, even if it cannot be accurately measured.

Examples of the data which may be collected for salary standardization are supplied by Form 14 of the Federal Personnel Classification Board.<sup>6</sup> This blank form, for each employee, contained 23 numbered items, some of which in turn embraced various subdivisions. These covered the "gross rate of pay"; the allowances or perquisites if any, such as housing, food, laundry, and their supposed value; the net cash pay; any special equipment or bond furnished by the employee at his expense; regular and actual hours and days of work in the day, week, and year, with provisions, if any, for overtime pay; supervisory activities; employee's education; "length and kind of experience or other training the employee possessed upon original entrance into this position which was most qualifying or pertinent"; and finally the nub of the matter: detailed description of each type of duty of the employee, with estimate of percentage of time devoted to each. The employee might be required to keep up a standard time chart for a week or more, in order to supply needed data.

Before the employee filled out this last "Item No. 23," he was to study a supplementary instruction form, which contained the following passages:

(a) For example, if you are a stenographer, it is not sufficient for you to state: "I take dictation and transcribe my notes." What kind of dictation—correspondence, reports, informal conferences, formal hearings? What subject matter—general administrative, medical, engineering, legal, or what? What is the official position of such officers or employees as dictate to you? Do you have occasion to compose your own letters? How often? . . . Do you do any clerical or secretarial work? . . . Describe them in as much detail as your stenographic duties. If your position requires you to have unusual speed and accuracy as a stenographer, so state and tell why.

In the extensive investigation which this Board made at the same time of wages and salaries in private industries and railroads, they gathered data somewhat like the above for each job-class in each establishment, and also information on the sundry other matters mentioned below.

<sup>6</sup> See *Wage and Personnel Survey*, pp. 476-77, and other forms in the same Appendix.

Comparison of the schedule just cited with numerous others which are readily available discloses some significant variations. First, such forms (especially those devised for manual work) often contain inquiries about "working conditions" such as temperature, humidity, noise, fumes, accident and health hazards; for between jobs which are otherwise in the same value-grade, those which impose most disagreeable and hazardous conditions are often supposed to command somewhat higher pay. Another type of inquiry which is usually made explicitly and separately in wage and salary surveys concerns the "responsibility" and "judgment," if any, required in the job. These concepts may be broken down into queries as to typical frequency of errors, and typical cost of errors, in good will, convenience, money, or personal hazard. Thirdly, the above schedule, standing alone, does not bring out the important contrast between analysis of the *job*, or class of positions, and analysis of the *individual who happens at the moment to be on that job*. In some respects, such as education, experience, or physical characteristics, the person may be rarely endowed; but except to the extent that such qualities are in general necessary to the satisfactory filling of the job, they should be disregarded in the final evaluation. An important type of evidence, to be sure, as to what qualities are really needed for job success is supplied by a census of the qualities of numerous persons who are actually (and "normally") holding that type of position.

These problems, encountered in formulating the queries to be made, may be considered at somewhat greater length after we have examined briefly the next stages of the wage-surveying process—those concerned with analysis of the answers secured to the queries.

**Utilizing the Questionnaire Data: Occupational Index.**—After such materials have been collected, with reference to all jobs which are to be first evaluated—starting, e.g., with only hourly paid male workers—the next problem is to find out how many genuinely distinct occupations or job-classes we have. It will often be found, as we have noticed, that a single designation will do very well for positions which have previously masquer-



aded under anything up to fifty distinct payroll titles; on the other hand, some jobs which have had a common name are found to require separation. Careful study of the job descriptions, with additional investigation when needed, will enable the titles to be revised so that they are more significant for wage and salary control, and sufficiently detailed for other routines. Perhaps, for instance, "Payroll clerk" and "Time clerk" need only to be reformed into "Clerk—payroll" and "Clerk—time" to make it clear to all that the jobs are similar enough so that they belong in the same salary grade. Finally a revised, and probably condensed, *occupational index* emerges. In practice the resulting nomenclature will depend somewhat upon the answers given to the questions we are about to consider, concerning relative payment; but logically the first objective is to determine what sub-occupations we have to deal with, within each of which the workers are virtually interchangeable. Also, by this means we can best assure "equal pay for equal work" in the most narrow and literal sense of the term.

**In Search of the "Going Rate."**—And now for the problem of payment. Equipped with more exact knowledge as to what our own people are doing, in addition to their mere job names, we may sally out and inquire what is the market or going rate for specified performances within each of our occupations. Instead of asking simply, for example, "What do you pay your typists?" we may specify more clearly what degree of excellence, in what sort of typing, under what auxiliary conditions, is to be evaluated. This is a very promising potentiality of job analysis—more accurate labor market quotations. Comparisons of rates of payment by the Federal government and other employers, for operations which job analysts find to be similar, would seem to be of very large public concern; and a great mass of just such comparisons the Personnel Classification Board have given us.<sup>7</sup> Since the private occupations were investigated and classified by the Board by the methods they used in zoning government jobs, the resulting comparisons are much more significant than any previously made.

<sup>7</sup> *Op. cit.*, esp. Pt. III, Chs. IV-XIV.

Such shopping about in the labor market, however, has many practical limitations at present. A job may be peculiar to a given establishment; here is one obstacle. Another is the lack of adequate information about the qualifications and duties of workers "outside," whose wages are to be compared with those "inside." Finally the spread of rates which will be found within almost any occupation, even in a restricted area, may seem too confusing; as is indicated by the material cited above from Lott's book, and several other instances to be discussed later in this chapter and in Chapter 12.

**An Early Evaluation Plan.**—But such lack of dependable market rates is not so serious if we can prove up, in any important degree, the claims of some personnel experts that they can set proper wage and salary rates "analytically" or synthetically, by study of internal data from job analysis. As we shall see, their art amounts to interpolating the jobs for which market rates are not available, between others which are more definitely attached to outside labor market anchors.

The problem may be presented in simplified form by reference to one of the earlier industrial wage surveys by job analysis, at the Mead pulp and paper mill at Chillicothe, Ohio, in 1921.<sup>8</sup> The occupational descriptions were boiled down, first, to about 170 jobs which seemed genuinely distinct. Then "there was devised a rating sheet for jobs, similar in type to the rating sheet which is in use for rating men in different departments. On this sheet, each job was rated for each of the six different qualities having to do with the job," viz.:

1. Responsibility of supervising and training others
2. Responsibility for equipment
3. Responsibility for quality of product, service, good will
4. Responsibility for wastage
5. Training or experience required
6. Working conditions (including hazards, discomforts and inconveniences of work-place and hours of shift.)

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<sup>8</sup> See *Mead Cooperation* (plant paper), July 1921, pp. 10-13. This survey was carried out with assistance from Scott, Clothier, D. G. Paterson, and their associates in The Scott Company. The chart and quotations given here are reproduced by permission of the present Mead Corporation.

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The four principal operating and personnel executives in the plant independently rated each of the 170 jobs on each of these factors; attempting to disregard existing wage rates as indica-

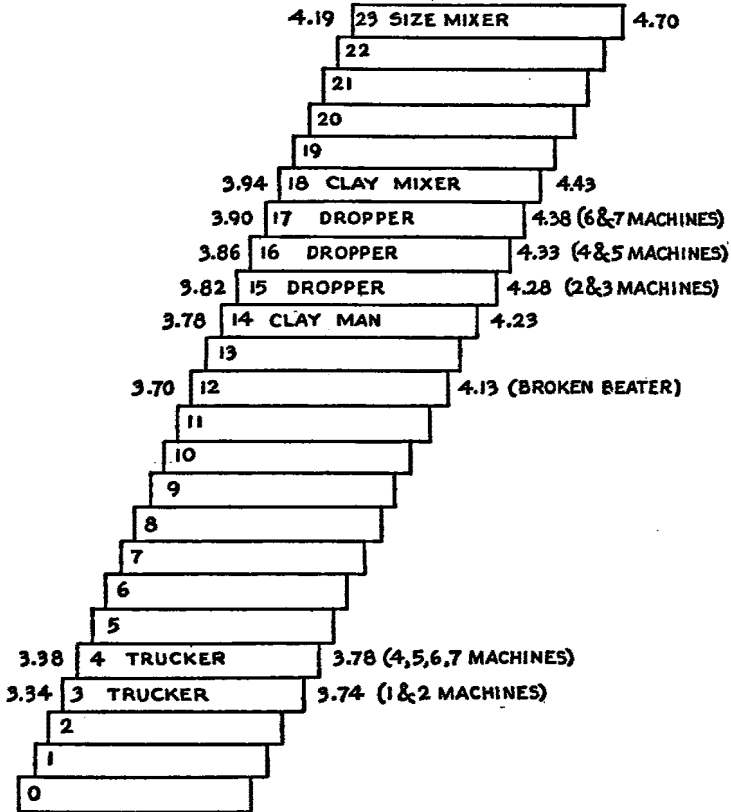


Figure VIII. Sample of Wage Zones in Mead Pulp and Paper Mill, 1921. This is part of a promotion chart.

tors of how any job should be ranked in any factor. Gradually differences of opinion were ironed out by conferences among these men, and with the minor executives; and the jobs were finally sorted into 55 zones, from lowest to highest pay. Figure VIII illustrates the relations of a few of the occupations (as

of 1921), in terms of minimum and maximum daily rates. These particular jobs are arranged as a promotional sequence, to show the beater helper trucker what are the more probable lines of advancement for him.

Before this stage was reached, however, the 170 jobs were spotted on a chart in which the vertical scale was the 55 grades into which all were classed, and the horizontal scale was the daily wage in dollars and cents which they were being paid when the analysis was started. "It was found that a curved line could be drawn having its top point at the spot representing the machine tender on No. 6 and 7 machines (the highest classified job in the mill), and the lowest point at the spot representing the lowest grade of unskilled labor." This line would be approximately a parabola, rising steeply through the lower grades where wage differentials in cents are small, and flattening out in the upper ranges where the differentials become greater. Probably the line was drawn free-hand with the idea of conforming as closely as seemed rational and practicable to the general trend of the actual rates. In order to establish the model ranges of pay for each grade, illustrated by Figure VIII, these limits were set respectively 5% higher and 5% lower in pay than the points marked by the parabolic curve.

Some of the actual rates, of course, fell outside these newly-determined ranges, being overpaid according to the analysis, or underpaid. These "were again carefully considered and either increased or decreased so as to make them fall between the lines, or the classifications were changed if further conference seemed to justify it. In some cases both the classification and the rate were changed." Here is a point on which the authorities agree rather closely: in the end, minimum and maximum rates should be set for each job-class (except that a single base rate is necessary for setting a straight piece rate). Those people who are found to be receiving less than the minima set for their jobs should be advanced to the minima as soon as possible. Those found to be getting more than the new maxima in their classes are usually not cut, but they are warned that they cannot be advanced unless they are promoted to work which carries higher rate-brackets; and whenever their present positions are

vacated, their successors are to be paid according to the revised scale. It is not denied that advance in pay with increasing length of service in a given job is good business, within limits; but one leading purpose of the brackets of minimum and maximum rates is to hold this seniority-factor within bounds.

**Use of Ready-Made (Bills) Classification Scheme.**—The foregoing illustration, and another paper mill case which will be discussed presently, refer to manual workers, and deal with evaluation procedures which were developed locally in each case. It will be instructive now to notice some possibilities of slighter local alteration of a scheme developed elsewhere. The following two cases concern university office positions. Methods of standardizing office salaries are perhaps more nearly stabilized than the corresponding techniques for manual jobs, doubtless in part because there are fewer varieties of office work, and also because they appear in rather similar form among all professions and industries.

When Drs. Margaret Elliott and C. S. Yoakum made a survey of office workers' salaries in the University of Michigan in 1929-30, they confined attention almost entirely to the character of work, including percentage of time devoted by the worker to each type of operation; and with this information in hand, they assigned each job to one of 19 zones of a classification already developed by Dr. Marion A. Bills in standardizing salaries in a large insurance company.<sup>9</sup> Six of these zones relate to typists, stenographers, and secretaries; thirteen to other clerical operations. These comparatively few steps are based mainly on permutations of variations within two types of criteria, viz.,

- (a) Number and character of decisions in the workday (number and complexity of rules the worker has to apply); special training involved
- (b) Doing, checking, and supervising

The doing of routine work, involving few and simple rules and

<sup>9</sup> For further particulars of the Bills classification scheme, including actual salary ranges, see W. V. Bingham, "Classifying and Testing for Clerical Jobs," *Personnel Journal*, Vol. 14, pp. 163-172 (Nov. 1935).

little special training (e.g., that of office boys, and of operators of the more "fool-proof" office machines) is in Class A. Checking and supervising such work obviously would be rated somewhat higher; while the fourth class, BB, includes supervisors of B-1 and B-2 operations. Finally we reach zone G, "Operations requiring knowledge of the general principles of the organization. Has at command and applies general rules or principles to cases not previously covered, or uses information which can be acquired only outside of the organization." Class H is "Supervision of any G work or a large unit of lower work."

Use of such a guide evidently requires many subjective and intuitive operations, so that the reliability of the ratings, between judges and between rankings by the same judge of the same jobs, made a month or two apart, might be somewhat less than could be desired. It is easy to pick flaws in any one objective criterion, such as years of education required, or number of persons supervised; yet the search for batteries of objective criteria which will give sensible results is worth keeping up. Job-titles and equipment that are similar in both the university and the insurance office give some help in classifying the jobs similarly, but we have already noticed how fallible in practice are inferences based on mere local job titles.

The salary chart, made after all positions had been graded (into these 19 classes) independently of actual salaries, threw spotlights on those cases of presumable over- or underpayment, and enabled the analysts to draw curves of maximum and minimum brackets for future norms. Altogether the use of the ready-made classification scheme meant a considerable saving in effort, as compared with the devising and application of a brand-new scheme; and it had the marked further advantage that the University's salaries in each zone could be compared with a private company's salaries in that same zone. This evidence, similar to that cited on page 243, tended to show that lower-grade positions in governmental service are more generously treated, in comparison with private employments, than the higher-grade posts.

Another point emphasized in this survey may as well be mentioned here: the case of double-classified positions, in which the

worker is not fully occupied with his higher-grade operations, and has to fill in time doing lower-value work. In general it seems that such a person's pay is much more largely determined by the higher-grade work than by the other; and one benefit of any occupational survey, from the management's standpoint, is to bring out the quantitative aspects of such mixtures and thereby call attention to the need of giving each such employe the practicable maximum of the highest grade of work he can do.<sup>10</sup>

Another university office occupational survey has been reported by Dr. F. A. Kingsbury, who applied a classification scheme which he had developed previously for a private office or offices.<sup>11</sup> This scheme resembles that of Dr. Bills, as to its first two "work factors"; but Kingsbury's total score for each job included ratings on responsibility for public contacts, and four "qualification factors," i.e., minimum requirements as to age, education, training, and experience. A very interesting finding in this study was the high correlation (+.96) between ratings of jobs given by "work factors" alone and "qualification factors" alone. We have here an illustration of considerable emphasis on objective criteria for evaluation.

#### **Kimberly-Clark Occupation Analysis and Classification.**

—Of special interest and value to students of these problems is the experience of the Kimberly-Clark Corporation, whose wage surveys have proceeded actively since 1929, with exceptionally

<sup>10</sup> Mr. Durant Rose, of the Armored Service Corporation, Brooklyn, has stated the other aspect of such cases. Most of this concern's employes possess one or more of the following characters, each of which is something of a wage factor: licensed chauffeur, thoroughly familiar with all routes; licensed pistol carrier, with minimum of target proficiency; and "signature man," whose signature is on file at various repositories and who is competent to be custodian of a truck-crew. "Since some men are scheduled for special or emergency work, it is required that certain of the employes be qualified typists or clerks, so that they may be employed usefully in the office should no special work arise. On the day mentioned above, two men—both signature men and drivers—were doing clerical work in the office. Although this work could be done equally well by lower salaried employes, since it was necessary to have these men on hand, the company was salvaging a certain amount of their wage through clerical work."—*Executives Service Bulletin*, Metropolitan Life Insurance Co., March 1933, pp. 5, 6.

<sup>11</sup> *Personnel Journal*, Vol. 12, pp. 91-97 (Aug. 1933).

competent direction and advice.<sup>12</sup> This company manufactures pulp, paper, and related products, operating six mills in Wisconsin and New York State, and employing in 1936 over 4,000 people, the great majority of whom are men. I shall give a few indications of the evolution of their techniques, but shall confine myself mainly to the procedure which is now (1936) in effect.

A fundamental unit in their wage studies, of course, is the formal written analysis of each occupation, or distinct type of work. They have written analyses of all their 700 hourly-paid occupations filled by men; and have provided for keeping analyses up to date.<sup>13</sup>

Following is a specimen of these write-ups:

Code	<u>178</u>
Mill	<u>B-G.</u>
Dept.	<u>Power—Maintenance</u>
Sect.	<u>Maintenance</u>
Date	<u>                    </u>

#### OCCUPATION ANALYSIS—FIRST MILLWRIGHT

**IDENTIFICATION:** 1st Millwright. Model number of employees is four. Male required. Day work—8-12 and 1-3, five days per week. Saturdays 7:00 a. m. to 1:00 p. m. (at their own request).

**A. SUPERVISION AND LEADERSHIP OF SUBORDINATES:** The 1st Millwright frequently supervises one or two Millwright Helpers or Millwrights 2nd class, in regard to assigning specific duties on jobs, method, etc.

**B. COOPERATION WITH ASSOCIATES:** The 1st Millwright frequently works with other men on this occupation and team work is necessary in planning and dividing duties. He has contacts with Operators and Foremen in the mill and cooperates by making adjustments and repairs according to their requests and by arranging their work so it does not interfere unnecessarily with operation. He has contacts with other

<sup>12</sup> No comprehensive account of this work has yet been written; and my own version is based upon materials which officials of the company have kindly supplied by correspondence, at various intervals, since 1929—supplemented by one plant visit. They have also read and corrected my manuscript, and it is published with their permission. Further reference is made to the concern in Chapter 20, in discussion of a research reported by Kornhauser and Sharp.

<sup>13</sup> For purposes of these counts and classifications, various grades and specialties are considered separate occupations, e.g., Head Millwright, Tour Millwright, Wood Room Millwright, Millwright-Welder.



Maintenance Workmen, when they are working on or near the same job and sometimes exchanges information about the equipment. There is also need for coordination between the various trades in scheduling work so there is no interference and so the work is continuous. He has contacts with Field Service Mechanics in regard to learning operation of newly installed equipment or in working along with them on installation work. They have contact with the warehouse stockman. One 1st class millwright has contact with elevator and insurance inspectors.

**C. DUTIES AND RESPONSIBILITIES:** The primary purpose of this occupation is to make repairs, adjustments and replacements on machinery and equipment in the mill, to keep it in proper operating condition and to make installation of equipment and machinery.

*General Setting:* The 1st Millwright does installation and maintenance work in the Badger-Globe and Neenah Mills, and the Main Office. This equipment includes three Crepe Wadding machines, two beaters, two jordans, one Kimflex wet machine and one Kimflex finishing machine, and various auxiliary items such as pumps, fans, agitators, rewinders, etc.

*Duties & Errors:* The 1st Millwright is responsible for making repairs, replacements, adjustments and installations such as lining up machinery, line shafts and motors, babbitting bearings which carry heavy loads, travel at high speed and where great accuracy is involved, changing couch and press rolls, filling jordan plugs and beaters, repairing and installing belts, etc. On these jobs he may work alone or have the assistance of one or more Millwrights or Helpers. In case he has help he takes the lead in the work and is held responsible for the finished job. In performing these duties he must know how to read blue prints and work to fine tolerances. He must also understand the operation of the equipment in order to be able to locate causes for mechanical failures, how to dismantle and assemble it and how to make the necessary adjustment, change or repair which will eliminate mechanical trouble in the quickest and most satisfactory way. His duties also include doing careful carpentry work such as making beater spouts, vats and head boxes, doing some blacksmith, welding and sheet metal work such as building structural steel frames for machines, guards, etc. In performing his work he must know how to use such tools as levels, combination squares, micrometers, straight edges, plumb bob, hammers, wrenches, saws, chisels, etc. *Errors:* The above work must be done accurately and thoroughly or it may result in (1) having to repeat the work, (2) additional shut down time for machines, (3) added wear or damage to equipment, (4) inefficient operation, (5) excess maintenance costs.

**D. INITIATIVE AND RESOURCEFULNESS:** The 1st Millwright must know how to find and correct defects in the operation of equipment

without being told. He has frequent chances to make minor improvements in equipment which will eliminate future breakdowns. He may suggest the use of fittings or materials which will make for better operation. He must figure out the best way to do the work in order to get the machine back into operation as soon as possible and still do a serviceable job. When a machine is not operating satisfactorily he watches operation, talks with the operator, checks the product, locates the trouble and decides how it can be remedied. He must see that the necessary materials and supplies are ordered and on hand when needed, or use salvage materials whenever possible. *Supervision Received:* The 1st Millwright receives supervision from the Head Millwright as to assignment of jobs, sequence of jobs, methods, proper use of materials, inspection of completed jobs, etc.

**E. MINIMUM EXPERIENCE REQUIREMENTS:** The 1st Millwright requires five years of previous experience spread over the occupations of Millwright Helper, Millwright and Tour Millwright. After placement on this occupation he requires an additional year of experience before he becomes proficient. Total experience required is six years.

**F. MINIMUM EDUCATIONAL REQUIREMENT:** Eighth grade education required.

## INTERVIEWS HELD

OCCUPATION	NAME	DATE
Superintendent	B. G.	February 1, 1934

## APPROVALS

Prepared by	W. J.	Industrial Relations Dept.
Date		By
Approved	R. A. Z.	Head Millwright
Approved	B. G.	Superintendent
Approved	W. F. S.	Councilman
Approved	A. W. H.	1st Millwright
Approved	H. V. L.	1st Millwright
Approved	3-7-34 F. V. L.	Mill Manager

The six factors which appear in the headlines of this analysis (A to F respectively) were those which these analysts had sifted out by 1932, as the most useful within a longer list of items which they had collected about the jobs. And, by 1932, they had worked out a scheme of rating each occupation a suitable number of points, for each factor, by which procedure jobs were to be classified and evaluated. The point scoring method, however, was later discarded.

In 1933, the NRA and related circumstances focussed attention upon employee representation and collective dealing problems; this company made an earnest and successful effort to vitalize its mill and general councils;<sup>14</sup> and soon the fundamental step was taken of inviting employee representatives to participate actively in all the wage-surveying processes, through local and inter-mill Joint Committees. Procedures in this field, as in others of direct interest to the workers, go into effect only after they have been approved by the elected representatives of the employees concerned, on the basis of separate caucuses.

The method which has recently been approved by the General Council, representing all the mills, for "Male Hourly Paid Occupation Classification and Model Rate Assignment," is written up in a Standard Instruction, mimeographed and circulated to all concerned. After listing and elaborating on the six factors exemplified in our Millwright analysis, this document says:

It is understood that there can be no fixed weighting of these six major factors since the importance of any single factor may vary from occupation to occupation.

However, if Factor (a)—Supervision Exercised—is an insignificant feature of the two occupations being compared, advantages in either Factor (c) Probability and Consequence of Errors—or Factor (e) Minimum Experience Requirements—shall normally be more significant than similar advantages in any one of the three remaining factors.

On the other hand, a substantial advantage in Factor (a)—Supervision Exercised—may be sufficient to more than offset what appear to be significant advantages in any two of the remaining factors. Each comparison must be critically judged and weighed on its merits; there can be no vest-pocket formula.

At this point an insert was voted:

If any two occupations have been compared with respect to the six major factors and appear to be of equal importance, or very nearly so, on that basis, then and then only, working conditions involving physical effort, hazards, disagreeableness, etc., may be a determining factor in the classification of an occupation.

<sup>14</sup> As described by the company's industrial relations director, C. G. Eubank, in his article "Developing a Workable Representation Plan," *Personnel Journal*, Vol. 14, pp. 198-205 (Dec. 1935). I am greatly indebted to Mr. Eubank, and to Vice President S. F. Shattuck, for painstaking, complete, and unreservedly frank, answers to my many inquiries.

I imagine that this last simple proviso, which occasioned no debate in the General Council, has some significance for us. The earlier job analyses in this concern, which were naturally modelled somewhat on older ones like the Mead example cited above, contained a section devoted to disagreeable job-features; and quite likely the employees were disposed to talk about these a good deal, whereas the management representatives knew that in the real world it is not clear whether hazardous and disagreeable working conditions have much tendency to raise wages. Hence we find no heading of the sort in the job analysis scheme now in use. The factor may or may not be taken into account as indicated in evaluation of jobs after they have been analyzed.

Ratings are made of jobs, by comparing job with job, in regard to each factor. The instruction just referred to provides that each joint session on job classification shall compare two jobs at a time, factor by factor; and it provides a special blank form, with ruled lines and columns, for a written "Record of Factor by Factor Comparisons" for each pair of jobs. As all psychologists know, the "method of paired comparisons" is especially valuable for obtaining a rank-order among items which cannot be objectively graded. There is, of course, a hierarchy of such joint sessions and of various vetoes, amendments, and appeals. The entire 700 occupations have been sorted into sixteen zones, or—as they are officially designated—"families"; and each such "family" is confined within rather narrow limits of cents per hour<sup>15</sup> within each major department, region, and time of day.

Differentials like these have already been mentioned in Chapter 10, in connection with the NRA; and the subject is discussed at some length at the close of Chapter 12 below. Now we may gather some illustrations from the pulp and paper industry. In all mills of Kimberly-Clark it seems to be a long-standing practice that people who regularly work on night shifts, or are rotated through the various shifts, receive a uniform premium of a few cents per hour, whatever be the occupation. Doubtless a similar practice prevails in many other plants and

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<sup>15</sup> There is no piece or bonus work in this corporation.

industries. (In many instances, however, non-pecuniary privileges or longer weekly hours—and thus higher weekly earnings—are utilized to compensate the night workers for the inconveniences involved in their unconventional hours.) And, for many years, there has been higher pay, in most or all occupations common to the respective plants, in the Niagara Falls mills of this Corporation, as compared with its Wisconsin plants. This differential reflects the generally higher wage level in the Niagara Falls area, which might, in turn, be due in part, to higher cost of living in the Niagara region. One of the perplexing tasks of the comprehensive survey was to try to rationalize these inter-mill wage relations.

The management secured, through its trade association and through personal contacts, wage data from a number of pulp and paper plants in both these areas, and assisted the employee representatives to study the mass of figures. Some notion of the problem may be given by the comparative quotations received of wages paid "First Millwrights." In one Wisconsin plant in this industry, the wage of such craftsmen was reported, for 40 hours a week, at 45 cents per hour; and so on through the 13 plants in this area which gave wage data for this well-known occupation—53 cents at two plants; 54 at one; 56 at one; 59 at another; 61 at one; and quite a concentration within the range of 67 to 72 cents. In the Niagara territory, six outside plants were reported to employ "First Millwrights" at 68, 74, 80, 83, and (two plants) at 87 cents per hour. I have put this craft name in quotation marks, in this paragraph, because it seems improbable that much information was available on the competence or work of the men whose wages were thus cited, other than their normal and actual hours per week. How the single hourly rate was supposed to be selected, for each occupation in each plant, I do not know. Officials in this Corporation, however, have used their own occupational analyses to secure more meaningful quotations from the outside labor markets.

Some occupations, of course, in one or more of the company's mills are so special that "the going rate" for them is not merely a strained but a ridiculous concept; for these jobs the factor-to-factor comparisons enable rates to be set which are reasonably

related to jobs which, in turn, can be located with reference to outside bench-marks.

I have had to omit many vital details, and have only barely hinted at the interlocking of these wage survey activities with all other parts of the Corporation's philosophy and practices of management. Naturally but few of the procedures are directly usable by other organizations; but the Kimberly-Clark people say "Considering the educational by-product, we do not feel that the costs have been excessive. Practically every one of the 50-odd meetings [involved in job classification and rate determination] had its own peculiarities and its own problems. There were many conflicts of opinion and emotional outbursts. In spite of this, or perhaps because of it, the management and representatives of the rank and file employees have developed a feeling of joint proprietorship which probably could not have been otherwise attained."

**Choice of Qualities to be Rated.**—We must now get on to a more general and critical view of the problems involved in wage and salary surveys. On the question, which qualities or factors of jobs should be rated, and how should these be expressed in the questionnaire, we may observe first that the considerable variations of formulation among the different practitioners of this sort of job analysis demonstrate clearly the immaturity of the art. Each follows leads of his predecessors and colleagues to a considerable extent, and thereby is produced a semblance of uniformity in all the schedules; but each has no difficulty in devising plausible innovations.

This rating of *jobs* is related and analogous to the rating of *workers*, discussed in Chapter 7 above, in several ways; and both processes still offer great opportunities for originality and ingenuity in phraseology, as well as occasions for logical argument as to choice of qualities. Both commonly call for estimates on physical qualities, errors and responsibilities, leadership, cooperativeness, and so on. The basic relationship between the two sorts of ratings may perhaps be expressed thus: if we determine that a given job requires, for instance, a bright face or a bright mind, then it is important occasionally to esti-

mate the degree in which each worker in that job-class possesses brightness of face or of mind.<sup>16</sup>

The factors emphasized in such job analysis may well vary somewhat among types of work; and this variation will rationally account for some of the diversities of terminology which are to be found in practice. It is probably better to construct separate scales and conduct separate campaigns for two, or perhaps more, classes of employees. The manual jobs (usually on the hourly basis of pay) and the executive and specialist (salaried) posts each give rise to some distinctive problems in the construction and use of evaluation scales; also the more routine clerical employments, though they too are salaried, have some peculiarities. Physical qualities and uncomfortable working conditions, for example, may call for comparisons in evaluation of manual jobs, but play little part among the higher-salaried; while the reverse is true of supervision and financial responsibility. The line between hourly and salaried occupations, however, is rather arbitrary and shifting. It is very important to establish as soundly as possible the relations between all salaried and all hourly rates; hence some overlapping of these three types of remuneration-surveys may be needed.

The choice of qualities or factors which are to be assigned points—if points are to be used at all—is considerably bound up with technical possibilities of measuring and weighting. The preliminary plans of one company, for example, called for assignment of points on several other phases of the job than were finally rated, including physical qualities, working conditions, and opportunities for advancement. Points for the advancement factor were to be negative, on the theory that employees would accept such opportunities to some extent in lieu of present wages. These three factors were discarded in the final survey, on the grounds that (1) they were too difficult to

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<sup>16</sup> Though it is usual, in the job analyses considered in this chapter, to deal with each job-class or sub-occupation as a unit, and to set aside the relative remunerations of different workers of differing proficiencies, within each job-class as a distinct problem, the latter question should logically be dealt with at the same time as the former. Hence quantitative production standards, such as tests for typists, may gradually find their way into job specifications used for wage and salary control.

measure and (2) their influence on pay too uncertain. Some of the difficulties were thus expressed by one of the men in charge of that survey:

We are somewhat in doubt as to the utility of physical qualities required as an evaluation scale factor. I am inclined to believe that the scale is as well off without it. We are able to make but rough measurements of the qualities. For most hourly paid occupations all we know is that an "able bodied man" is required. If we did measure the qualities more accurately, and had more definite standards, we would be forced to compare, for instance, the worth of keener than average eyesight with the worth of stronger than average back. And that is a problem. Furthermore, do hourly paid occupations which have unusual physical requirements really command more pay than occupations which have but the usual physical requirements? We are not sure.

Some analysts are tempted to try to confine the scale to the qualities which are most objectively measurable, but this temptation should be resolutely resisted. The purposes will best be served if every effort is made to sift out a *manageable number of factors which seem to have most effect on pay*, and then to measure those factors as well as can be done practically. There is no difficulty whatever in spinning out indefinitely a list of matters which seem to affect pay; but—in the present state of the art, at least—those which are of doubtful or minor influence should be neglected—whatever their degree of objectivity. Lott, for example, included "monotony" as a separate factor, with a small weighting, in addition to three other separate factors concerned with working conditions. His example has not been widely imitated in this respect, the more common opinion being that the total effect of these factors is small enough, relative to others like supervision exercised and time of preparation for holding the job, so that it is not worth while to try to evaluate them separately. Many such items may be merely listed among the explanatory phrases under a main heading like "Working Conditions," to assure that they will not be entirely overlooked as possible determinants of pay for any given job.

A number of influences on wages which bear more or less uniformly on all members within a given establishment, and which need not be separately assessed for determination of relative wages *within* that organization, may require formal con-



sideration when comparisons are made between wages *inside and outside* the establishment. Thus, the Federal Personnel Classification Board, in its survey of salaries outside Federal service, made inquiry in each concern about possibilities as to bonuses, profit sharing, stock purchase and employee savings plans; also vacation and sick leave policies, group insurance of various sorts, health service, pensions, subsidies of meals and other supplies to employees, unemployment insurance, and even permission to smoke, to use telephone for private business, and "Do employees work under high pressure?" Apparently they did not attempt to rate these outside jobs, in comparison with governmental posts, on some other items which have bulked large in theoretical discussions, notably security of tenure and social status. Tenure seems of sufficient consequence, as a factor in the labor market, so that it should be explicitly brought into view, even if it cannot be accurately measured.<sup>17</sup>

**The Problem of Weighting Factors.**—Expressions like "material" and "minor" factors, which I have been using above, presumably convey some meaning, but we must now inquire how far these notions have been refined quantitatively. Any scheme which aspires to utilize mathematical methods, in any degree, must not only rate jobs comparatively within each factor, but must decide how heavily each factor is to count in the total score. Our correspondent, for example, hesitated to "compare the worth of keener than average eyesight with the worth of stronger than average back"; yet he undertook to compare quantitatively the value of higher than average supervisory responsibility with higher than average experience, education, and so on through his main factors. Lott's scheme assigns ten possible points to each of fifteen factors, and multiplies each

<sup>17</sup>The exhibits of this Federal Board, comparing salaries outside with Government pay for similar jobs, appear to confine the criterion of similarity of job entirely to operations of the job—duties of the employee. Probably the data collected, as indicated in the foregoing text, on private employers' non-wage attractions to labor, such as group insurance, were not found quantitatively usable in comparisons of Federal vs. other salaries; but these other attractions and repellents should be intuitively allowed for in interpretation of the bare comparative salary scales. Similar principles apply to any comparison of one private employer's wage scales with any other employer's.

factor-point-score by a definite weight for that factor. Out of a total weight of 100, he gives 23 to "time usually required to become highly skilled in the occupation" and 10 to "educational requirements." These together, therefore, count potentially for one-third of the total score. (Remember that his scheme is for shop workers, in whose pay formal education probably does not figure so largely as is the case with salaried specialists.)

Is this sort of procedure a legitimate or profitable use of mathematical methods? Or is the alleged accuracy of result largely fictitious? Such use of definite weights may be defended on somewhat the same grounds as weights and points used in scoring the examination-answers of a schoolboy; but we should become as clearly aware as possible of the limitations in accuracy of our results; and especially the limitations of our ability to "sell" mathematical schemes to wage-earners. The differences among the practitioners of wage and salary surveys, with respect to formulating, weighting and rating the factors, are sufficient proof of the lack of objectivity in the measurements. The apparent practical success of many of the diverse schemes may be partly or wholly accounted for by the process of trial and error or point-juggling which must take place in the course of every such analysis, and which finally brings out such total scores for the various jobs as will rank these jobs so that deviations of the new standard rates from the old actual rates are not so great as to be intolerable to management or workers.

It is instructive to notice that President R. C. Clothier, a former member of The Scott Company who very likely collaborated in the Mead paper plant wage survey, did not recommend definite weights of factors for a large-scale salary standardization at the War Department's experimental aeronautical station, McCook Field, Dayton, Ohio.<sup>18</sup>

"No mechanical method of determining wage ranges," he wrote, "can be successful. Formulae will not suffice. The problem calls for judgment, the best we can bring to bear upon it. Judgment is apt to be good when it is founded upon facts rather than upon approximations and guesswork. Our purpose in suggesting the approximate value of

<sup>18</sup> See his illuminating article, "Organization for an Occupational Survey," *J. of Personnel Research* (now *Personnel Journal*), Vol. I, pp. 427-450 (Feb. 1923).

these seven factors [education, experience, judgment, accuracy, supervision, physical qualities, working conditions] in each occupation is to yield some of the facts which the Employment Manager and the members of the Planning Division should consider when they sit down to set the salary ranges for the different occupations."

These McCook analysts made unusual efforts to objectify the grading of each factor, from the most valuable degree A to least valuable F, for each job; and in salary spot charts the results of the analysis were set before the salary authorities.

Clothier remarked further:

Obviously these seven factors cannot be considered alone, especially in wage study work. There are other factors demanding consideration, such as market conditions, etc. Yet we find that these latter factors rarely escape attention, whereas such factors inherent in each occupation as the seven we have named frequently are overlooked entirely or are summarized so briefly as to reduce wage determination to a matter of guesswork rather than of judgment.

The sample chart published by Clothier bears a superficial resemblance to the Mead chart shown in Figure VIII above, but we must notice that if the analyst abandons "mechanical formulae" altogether, he is precluded from making any but an intuitive hierarchy of occupations from highest to lowest. One might easily arrange these jobs according to their average rating among the seven factors, A to F, but that would simply amount to weighting the factors equally—it would still be a mechanical formula. Also nothing is easier, after such analysis, than to make a spot chart of actual wages to different workers in what prove to be *identical* occupations; such a chart is the fragment shown in Clothier's article. But that accomplishment falls far short of what is desired, namely, determination of the *proper relative ratings of different jobs or occupations*. Which of these are entitled to the same pay? And how much more or less is one occupation worth than another? Quite likely at McCook Field they did finally work out a standard hierarchy of occupational salary grades, not by means of summation of factor-points but rather by consensus of the judgments of executives who had studied the occupational descriptions, and who took into consideration, more or less, the summaries of the A

to F grades assigned to the seven factors. When such a spot chart is made, graphic interpolation is a useful aid in the evaluation process.

There appear to be several lines of experimentation which will tend to correct errors in the processes of definition, appraisal, and weighting of factors. The first sort of experimentation I have in mind—trying a variety of ratings and weights until the deviations of actual wages from the standard curves appear to approach a minimum—may be much more than mere “juggling” of point-scores; but by itself it cannot fully vindicate the methods of scoring finally employed. Application of the evaluation scheme to more than one employing organization is a valuable test of its quality. Kingsbury’s report that each of his two factor-groups independently ranked the same jobs in almost the same way, indicates that there is a considerable range of indifference as to weighting, when the factors are well chosen and well defined. Finally, these methods are further corrected in the course of time by successive wage surveys; they may acquire cumulative increase in validity. In the long run their validity must be tested by their success in keeping rates of pay, in the analyzing organizations, fairly in line with the pay rates of other employers who are competing for the same labor supply. The analytical procedure should be checked, so far as possible, by its capacity independently to give rates which correlate with whatever significant job-quotations can be obtained in outside labor markets.

#### **Employee-Management Cooperation in Job Analysis.—**

My last draft but one of this chapter, written about 1934, closed with the following paragraph, at the end of the summary:

“Cooperation of employees, through representatives of their own choosing, is desirable. Job analysis, like other innovations, needs to be ‘sold’ to the workers affected; otherwise their suspicions may for a time prevent the analysis from become fully effective. Nor can much be accomplished unless the higher management is solidly and intelligently behind the whole program of the wage survey.” One of my friendly critics, in the Kimberly-Clark organization, suggested deleting the last sen-

tence, as too obvious; and, with reference to the first part of this paragraph, as well as to my preceding comments on arithmetical processes in job evaluation, he commented further:

"The workers and their representatives must [not merely be "sold" on the survey-idea; they must] actually be parties to the decisions. Job analysis, classification, and rate setting should be a *cooperative* undertaking. You should forget all this stuff about points, curves, and weights, and dig into the collective bargaining and collective dealing aspects. It is true that there are economic and mathematical aspects to wage standardization. From the standpoint of the business manager in July 1936, however, the significant and troublous aspects are political and psychological. In the words of one of our hourly paid employees: 'What the hell do I care about points and parabolas? My job is just as important as that job over there. I want a square deal. I've got something to say about this rate business. If Jim is to get more than me, I want to know why.'"

In another few years, managers and men may become preoccupied with other issues, and the practicable spheres and methods of collective dealing may then call for somewhat different emphasis. And at present, of course, there is the greatest diversity among employing organizations in the numerous factors which determine what sorts of collective bargaining are feasible, in this or any other sphere. Job analysis of a thorough-going sort, for overhauling wage and salary rates, moreover, is such a complex problem, and has been so little worked upon, that it is fatuous at present to say that it should not be undertaken at all until management and employees have been thoroughly convinced of its value. Finally, with reference to the rôle of employee representatives, it seems to me that this kind of job analysis stands on the same footing as the other sort of job study which we examined in Chapter 8 above (motion and time study for task-setting). In both cases, if these representatives are made to appear to their constituents as taking the initiative in making constituents work harder, or get less pay, or sustain more unemployment,—then the whole representation scheme is placed in jeopardy. Theirs must be a frankly partisan

and critical position; the burden of proposing all such innovations must be assumed by the employer.

These considerations appear to lead to some such generalization as this: The more thoroughly all ranks of management and employee representatives understand and approve the general purposes of a job survey, the better is the chance that it can be carried far enough to solve numerous practical problems that cannot be foreseen in the preliminary planning, and far enough to demonstrate its worth to practical people, especially foremen and employees. The initiative throughout must come from the management. As the work proceeds, however, the critical and constructive suggestions of the persons whose jobs are affected, —especially of employee members of the joint committee— may well develop a considerable sense of partnership. The better the preliminary study, planning, and argumentation of the personnel and industrial relations specialists on the employer's staff, the better can they "sell" these plans to executives, supervisors, and employee representatives; and the better will the plans work out, as the survey proceeds.

**Recapitulation.**—The foregoing discussion may be condensed into the following generalizations:

Job analysis for base rate-setting, from one important point of view, is comparable to its cousin, the rating scale for individual workers. Judgments as to how important is the work and how valuable the worker must be made in any case, whether crudely or carefully. The main use of these newer methods is to strengthen the probability that vital points are not overlooked—that all essentials are given consideration by the people best competent to judge, that their judgments are made as frequently as necessary, and are compared systematically so that some average verdict or consensus can be had.

Normal minimum and maximum brackets for most occupations are needed, even though emergencies may arise when they must be disregarded. If tentative brackets are first set up by analysis, as they usually should be, without reference to more than a minimum number of key rates actually being paid; and finally all model rates are compared with the actual rates, there

are sure to be a number of actual rates which fall outside the new brackets. Reinvestigation will show that some of these actual rates are quite justified, which means that either the brackets or the classification must be reset. But other cases are pretty sure to be found when it is the actual rates which are wrong. Correction of these, and especially their prevention in the future, is exactly the purpose of the analysis.

There is a much closer agreement as to which qualities should be considered than as to methods of evaluating them. Supervisory responsibilities, minimum requirements of training and experience and seriousness of likely errors, are the more crucial factors. The plan of rating the main job factors by letters, and putting each rating into the Control Chart where it may be intuitively considered whenever rates or salaries are being scrutinized, is conservative, and may be recommended to those who are most skeptical of more mathematical methods of factor-evaluation.

Job analysis, by overhauling titles, is pretty sure to establish a desirable standardization of job names, which step will promote equal pay for the *same* work. This is a good end in itself. There remains, however, the vastly more difficult problem of determining how much this "same work" is worth in dollars and cents, at a given time and place.

A step in the direction of determining what the pay should be is to decide on *ranking*,—whether Job A should be paid higher or lower than, or equal to, Job B which has been found genuinely distinct from Job A. Sometimes the mere ranking from lowest to highest will be useful in calling attention to actual rates which are out of the analytical rank-order without sufficiently good reason.

On the crucial practical question, how much should each of these genuinely distinct jobs be paid, here and now in dollars and cents, the following observations may be useful:

(a) Analytical determinations more or less like those cited, based on the extent to which Job X differs in various qualities from common labor and from other key-jobs, is perhaps the best that can be done if no quotations, or only a chaos of quotations,

for work clearly equivalent to Job X can be found in the local labor market.

(b) The qualitative analysis, however, deals with factors which tend to determine competitive wages *only in the long run*. It was argued in Chapter 10 above that short-run "market price" often differs sharply from long-run "supply price," due to some sudden shift of demand or supply. Thus, if a shortage of common or semi-skilled labor quickly develops in the market, we have to pay the market price for it, regardless of what our analysis says about the differential which in the long run must be paid for skill and "responsibility." The labor market, on the whole and especially in times of fairly stable price level, weights these and the innumerable other factors influencing wages, vastly better than can any group of analysts, assigning points to each factor for each job.

(c) These analytical rates, therefore, are always subject to correction as far as possible by relevant quotations from the labor market. Job analysis will give us more exact specifications than we had before as to *just what kind of labor we want quotations on*.

Cooperation of employees, through representatives of their own choosing, is desirable; in many situations indispensable.



## CHAPTER 12

### INTERPRETATION OF WAGE AND SALARY STATISTICS

The preceding chapters have given us some reason to suspect that, due to misleading titles and unspecified differences among jobs and workers, it is always difficult and often impossible to find out what is being paid for such-and-such work, in almost any labor market. Very likely job analyses will make increasingly reliable and valid quotations available in the future; meanwhile, let us see what sorts of statistical information on wages and salaries are available now. In the present chapter we shall review some of the more common series in this field, and consider briefly their characteristics and uses. Beginning with some vocabulary exercises, we shall proceed to indications of the extent of variability of earnings within what seems to be a single occupation and time and place, and then take up various of the bureaus and other agencies which collect and publish wage and salary statistics in the United States. These will be regarded from two points of view, namely: current labor quotations, and historical trends in labor incomes. At the end of the chapter something will be said about wage differentials in relation to such factors as sex and region.

**Measures of Wages, Money and Real.**—A few technical terms relating to wage statistics must first be fixed in our minds. One leading device is index numbers, or relatives, which may be calculated for any quantitative series, such as money wages, cost of living, or physical output. The index most commonly used is a percentage figure,—the wage, for example, in whatever year or years is used for a “base” being reckoned as 100%. Thus Douglas, after comparing data published by the New York Federal Reserve Bank and other sources, concluded that the average hourly wage of common labor in the United States in 1914 was

20.7 cents; and that in 1920 it was 47.5 cents. Hence his common labor wage index for 1920, using 1914 as the base, is  $\frac{47.5}{20.7} \times 100$ , or 229.

In order to obtain indexes for corresponding workers and years of *real wages*, we must compare our money wage indexes with suitable cost of living index numbers. The result may be illustrated by a few further items from Professor Douglas's monumental work:

SELECTED REAL WAGE INDEXES, COMMON LABOR, UNITED STATES <sup>1</sup>

Year	Avg. Hourly Rate, Cents	Indexes (1914 = 100) of		
		Hourly Money Wage Rates	Cost of Living	Real Hourly Rates
1920.....	47.5	229	206	112
1921.....	37.0	179	177	101
1922.....	36.0	174	165	105
1923.....	40.7	197	168	117
1926.....	43.3	209	174	121

If we thumb through recent numbers of the *Monthly Labor Review* of the U. S. Bureau of Labor Statistics, we find an embarrassing wealth of materials, but the indexes here are based on other years than 1914. The story in the above table, however, can be approximately brought through later years by the report that the average hourly rate for newly-hired adult common labor, in all industries covered by this Bureau, was (July of each year) in 1929, 43.7 cents; in 1933, 35.0 cents; in 1934, 43.0 cents; and in 1935, 45.1 cents. And, taking the Bureau's principal index of cost of living for 1929 as 100, in June 1933 it would be about 75; in 1934 about 78; and in July 1935 about 81.<sup>2</sup>

<sup>1</sup> From Paul H. Douglas, *Real Wages in the United States, 1890-1926*, pp. 60, 182 (1930).

<sup>2</sup> *Mo. Lab. Rev.*, April 1936, pp. 876, 877. The Bureau's series for July 1st of 1926, 1927, and 1928 (42.8 cents, 42.6 cents, and 44.9 cents, respectively), are slightly different from those used by Douglas for the same years.

According to these data, the real hourly wage of common laborers who had jobs was somewhat higher in mid-1933 than in 1929, and over 25% higher in 1935 than in 1929. This advantage, of course, was more or less offset by fewer hours of work in the later years as compared with 1929—weekly and annual real wages may even have decreased.

**Their Limitations.**—Some limitations of the data used in these illustrative computations should immediately be mentioned. The “average hourly entrance wage rates for adult male common labor” of the U. S. Bureau of Labor Statistics (USBLS) refer primarily to manufacturing industries, within which the averages varied (in 1935) from 61.2 cents in the automobile industry to 35.6 cents in lumber sawmills. The average for general contracting also tends to increase the grand average during boom times; in 1929 general contracting was 48.3 cents (automobiles 49.9 cents), and the grand average was reduced from 43.7 to 42.1 by leaving general contracting out of account. These indexes, moreover, refer mainly to common labor in the northern states; such rates appear to be much lower in southern industry, and in agriculture everywhere.<sup>3</sup> And probably these quotations refer, to a considerable extent, to casual jobs or to work the duration of which is uncertain; men who have relatively steady work, like a watchman’s, may obtain lower hourly rates.

Finally, the index of “cost of living” cited above was not well adapted to common labor, even when it was new; and its weights had become more and more questionable as the years went by. New indexes, for several social classes, are now being developed by the Department of Labor in cooperation with other agencies.<sup>4</sup> In this book I shall not attempt much further discussion of the application of cost of living indexes to wage problems; I hope to deal with many of the problems involved in a

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<sup>3</sup> See *Mo. Lab. Rev.*, Aug. 1930, pp. 179-181; Nov. 1930, pp. 186-189.

<sup>4</sup> Methods and results of this line of investigations are given by Miss Faith M. Williams in various articles. See, for example, “Measuring Changes in Cost of Living of Federal Employees Living in Washington,” *Mo. Lab. Rev.*, March 1934; “Money Disbursements of Wage-Earners and Clerical Workers in 11 New Hampshire Communities,” *ibid.*, March 1936.

later volume on comprehensive or collective wage adjustments. In the remainder of this chapter, therefore, we shall be concerned only with money wages and salaries.<sup>5</sup>

Money wage statistics are compiled from raw data gathered usually from employers, but sometimes from individual workers or their associations. Depending somewhat upon conditions of employment and remuneration in the industry, and much more upon funds available for collection and other statistical work, the published statistics will give one or more fundamental types of wage measurement. Whatever fundamentals are gathered may, of course, be analyzed by many types of tables and charts.

**Hourly and Weekly Rates and Earnings.**—The standard or normal or minimum *hourly rates*, by occupations, are sometimes the only systematic wage information available, for example in the building trades, in which the work is usually on a straight time or day work basis, employment is irregular, and comprehensive sample payrolls may not be available to the statistical agency. The USBLS gathers and publishes a number of "union wage scales" annually, by occupations and principal cities; and these can be checked, to some extent, by publications of private agencies, such as those which specialize in building and construction statistics. Sometimes there is considerable discrepancy between these reports for the same occupations, dates, and cities; perhaps because different qualities of labor are being reported on, perhaps because the effectively "prevailing wage" has departed from the nominal union scale.<sup>6</sup>

Other, and rather more common, units in wage statistics are the *average hourly and weekly earnings*. Such averages can be easily and quickly computed, for a single establishment or group, by dividing the total payroll or wage payments, during a given period, by the total number of hours worked, and the average number of separate names on the payroll during this period. This method of computing "average weekly earnings" has been

<sup>5</sup> See note at end of Chapter 13.

<sup>6</sup> See page 68 for an illustration of premiums paid to printers *above* their union scale.

much used in the past by state departments of labor, by the National Industrial Conference Board, and by some other agencies,—usually with reference to industries, not occupations. Since about 1929, many employing establishments have kept accurate and comprehensive records of total man-hours worked during each pay-period; hence can readily compute average hourly earnings during such period. In this way we have a trend toward increasingly comprehensive records of actual average hourly earnings by industry groups of plants, retail stores, and so on.

The principal reports of wages by *occupations* are those, worked up every few years for each of a number of industries, by the USBLS, which sends field representatives to the cooperating establishments to copy off sample payrolls and investigate local variations in job terminology. From these materials the Bureau tabulates and publishes *average hourly earnings* by industries and geographical districts, also by sex of worker, for a similar weekly, fortnightly, or other payroll period, in each of the years to which the investigations refer. In the past this Bureau has usually computed also, for each such group, the "*full-time earnings per week*,"—multiplying the average hourly earnings by the normal hours worked per week in the industry and region. This latter index is highly abstract, yet it is a simple and effective means of showing approximately how much the average regular worker in each occupation and district was likely to earn at the time to which the records refer (usually a year or more before such data can be worked up and published). Remember, however, that there are nearly always a number of extra or substitute workers included on each payroll, who have had only part-time work, and frequently some regulars also who were absent part of the period; moreover, during prosperity the regular employees may obtain higher than "full-time weekly earnings" by means of overtime, and of course in depression many have to be content with less than full normal weekly hours of work. The more realistic figure of *actual average weekly earnings* conceals all these variables.

Hourly and weekly earnings are desired, for piece or bonus workers, as well as for time workers, by nearly all users of wage

statistics. No one who is not familiar with the spot, for instance, could tell whether a miner's one dollar a ton (or whatever his piece rate may be) is a high or low wage; whereas if we are told it yields the average miner at that point one dollar an hour, that is more enlightening to most people. In the past, many employers have not systematically recorded the hours worked by their piece workers; but nearly all do record them now.

*Actual annual earnings* is a figure of great social-economic importance, and one in which employers are becoming increasingly interested, partly because income tax laws tend to hold them responsible for reporting total annual wage and salary receipts of all employees subject to income tax. Each automobile manufacturer, for example, maintains a cumulative annual record for each name on his payroll, and publications based on these records are issued from time to time by the Automobile Manufacturers' Association and by the USBLS.<sup>7</sup> To piece together the story of each worker's total earnings, which may come from several employers and perhaps from bits of self-employment, is, however, a difficult and expensive matter; and so estimates on these points, particularly for people who do not work regularly for a single employer throughout the year, are subject to appreciable margins of error.<sup>8</sup>

<sup>7</sup> See the Association's press releases and pamphlets; and article by Tolles and LaFever, "Wages, Hours, Employment, and Annual Earnings in the Motor-Vehicle Industry, 1934," in *Mo. Lab. Rev.*, March 1936.

<sup>8</sup> On the probability that household canvasses will tend to secure reports which understate, on the average, the family's income, see L. Houghteling, *Income and Standard of Living of Unskilled Laborers in Chicago*, pp. 32 ff. (Univ. of Chicago Press, 1927). Visits to the homes of 3,538 automobile workers with reference to their own total earnings in 1934, indicated that "one-quarter of the workers, who earned the smallest amounts, received less than \$527 per year from the plants surveyed, less than \$562 from all motor-vehicle plants which employed them during the year and less than \$591 per year from all types of work taken together [income from work-relief, if any, also income in kind from gardens, etc. being disregarded]. This broad group with low incomes thus added an average of \$35 per year by finding additional employment within the industry and they added, besides, an average of \$29 per year by securing [non-relief] employment outside the industry." The highest-earning quarter of these people, earning \$1225 or more from single employers, secured only \$30 a year, on the average, from sources other than the principal employer.—Tolles and LaFever, *op. cit.*, p. 546. Other investigations have indicated that from 5% to 10% of wage-earning families' incomes is derived from

**Variations of Earnings in an Occupation, Within and Among Plants.**—In the various statistical reports of earnings by occupations,—which series are of most significance for theory and policy in industrial incentives—we should look for measurements of the variations in hourly earnings of individuals, within what appear to be well-defined occupations and labor markets. Many of the better-known wage statistics are not broken down sufficiently to bring out these dispersions clearly, but a special research on the point was made by H. LaRue Frain, who collected from 43 metal plants in Philadelphia the total earnings and hours actually worked for each of the 1,456 men engaged in seven machine tool occupations which are considered to be “standard,” as to name and content of job (drill press, milling machines, turret lathe, screw machine, engine lathe, planer and boring mill operating), for a week in April, 1927, and also for a similar period in 1929.<sup>9</sup> In each man’s case, moreover, the basis of wage payment was reported—time, piece, or bonus. Trade union influence on these wages was probably slight.

The variations among these plants in average, highest, and lowest earnings, for each occupation are rather striking. Among the 420 engine lathe operators, for example (see Figure IX), 5 were employed in Plant Number 57 at average earnings of 48.8 cents per hour, the range being from 40 cents to about 56 cents. At the other extreme is Plant 37, with 21 engine lathe operators, average earnings 98.6 cents per hour, ranging from 72 cents to \$1.38. (Plant 37 paid 13 men of the 7 occupations by straight time, and 33 by a bonus scheme). When attention is confined to those engine lathe operators who are

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odd sources such as incomes and profits from property, lodgers and boarders. (See, e.g., P. F. Brissenden, *Earnings of Factory Workers, 1899 to 1927*, pp. 6, 7—U. S. Bureau of the Census, Monograph X, 1930). The largest of such items—earnings of wife and other members which are merged into the family fund—are extremely variable elements among families.

<sup>9</sup> See his “Two Errors in Interpreting Wage Data,” *Am. Econ. Rev.*, Sept. 1929, pp. 378-392; *Earnings in Certain Standard Machine-Tool Occupations in Philadelphia* (Univ. of Pennsylvania Press, 1929); and article in *Personnel Journal*, Oct. 1931. See page 84, for other findings of Frain, in these researches.

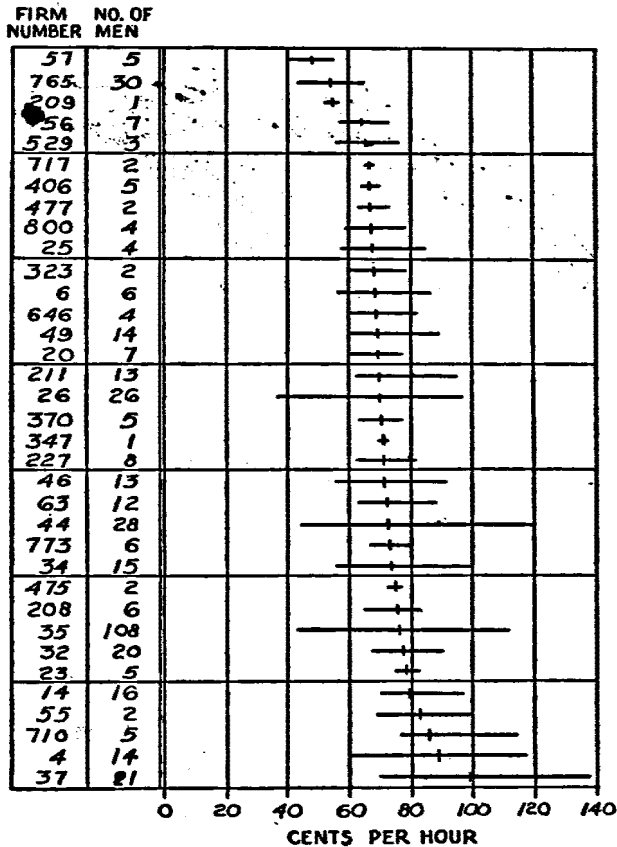


Figure IX. Spread of Earnings of Engine Lathe Operators, Philadelphia, 1927. (After Frain) Light vertical lines show average plant rates; longer horizontal lines show ranges of earnings within plants.

paid on the straight time basis, one finds average hourly rates for day work in this occupation varying among the plants from 56 to 84 cents; hence it is not merely the extra exertion of the piece and bonus workers that accounts for the variations in earnings within such occupations. Frain has also shown that the earnings of men who had been in their plants for something



like two years averaged higher than men in the same occupations with shorter service records.<sup>10</sup>

Quite likely differences in earnings like these are due, in large measure, to corresponding differences in efficiency displayed by the individual men. There is another factor also, however, whose influence on men's earnings is not widely realized, namely, differences among plants in equipment, materials, and management methods. The latter variations enable an identical workman, Jones, working always with his best skill and effort (and allowing time for him to become habituated to each job) to turn out far more pieces of a given sort in Plant X than he can in Plant Y. And, as has been brought out in Chapter 8, in the practical operation of the "standard rate" policies of some piece working trade unions, as also in many non-union payment-by-results schemes, the result has been that workers in some shops and mines have been able to earn these rates more easily than their fellows in other establishments. Unless the former men restricted their output more than the latter, a further result would be greater variations in hourly earnings throughout all establishments, in a single occupation, than would appear if all these people did their best under standard conditions of equipment, materials, and management.<sup>11</sup>

**Current Quotations Less Available than Historical Trends.**—Frain's research will illustrate some important differences between wage statistics, regarded as indications of the historical trends of wages, and the same type of data, regarded as current labor market quotations. If our engine lathe employers were to report periodically to statistical bureaus their average plant earnings in this occupation, the periodic mean values of their plant averages would show whether wages in this trade were persistently drifting upward or downward, or

<sup>10</sup> *Earnings in Certain Standard Machine-Tool Occupations*, Ch. VI. Another significant point is that the men working longer weekly hours were willing to accept somewhat lower *hourly earnings* for the sake of the higher *weekly earnings*.—*ibid.*, Ch. IV.

<sup>11</sup> Some important statistical evidence on this matter is to be found in the monograph by Dr. Frain's colleague, Dr. Anne Bezanson, entitled *Earnings of Upholstery Weavers, etc.*, especially Ch. VI (Univ. of Pennsylvania Press, 1928).

remaining about constant. In the past, consumers of wage statistics have been mainly interested in such historical trends. But if, in 1927, some one had attempted to learn what the full effort of engine lathe operator Jones was then worth on the Philadelphia labor market, he would have found the current quotations very inadequate for his purpose. Suppose he had obtained a comprehensive report from the appropriate trade associations, as Lott and our paper manufacturer did.<sup>12</sup> Like these, our Philadelphia inquirer would have been puzzled by his uncertainty as to where Jones's capacity and earning opportunity should be ranked, between the engine lathe operators who earned respectively 40 cents and \$1.38 per hour.

Improvement in the quality of current quotations of labor may be hoped for from several directions, especially from the development of productivity standards which are inter-plant in scope and developed in conjunction with inter-plant job analysis. Trade associations and trade journals, labor organizations and journals, and governmental wage statistical bureaus—all these may aid in this development.

#### **Agencies Collecting Wage Statistics: Trade Sources.—**

The foregoing remarks on qualities of some of the commoner varieties of wage and salary data may now be supplemented by a few comments on the principal agencies at work in this field. I shall not attempt any general discussion of non-recurrent collections, which are very heterogeneous, but shall deal here with organizations which recurrently gather primary and quantitative information about payments for labor. Most of the more important special surveys, no doubt, are made with facilities and funds supplied by or through bureaus of some sort, for such work is expensive and employers and employees are most willing to report to a well-known organization. Such surveys, moreover, are nowadays likely to be carried out by agencies which also make regular and periodic collections of other types of wage statistics. In the aggregate, special and non-recurrent surveys are very important; some of them, e.g., that of the Personnel Classification Board, are cited elsewhere in this book.

<sup>12</sup> See pages 188, 207.

Trade journals have been mentioned, in connection with wage rate quotations. They are ordinarily privately financed ventures, I believe, and probably not often able to assure us of the comprehensiveness or representativeness of their sampling. What materials they gather, however, they can publish more promptly than more scientific organizations publish data on similar workers.

Also the reports of trade unions and their associates, like The Labor Bureau, Inc., in New York, must be considered. Trade associations, too, are of considerable and growing significance as collectors of wage and salary material. A great many, if not most, of the more than 500 "industries" which were codified in the NRA period started rather comprehensive reporting of labor data to their respective "code authorities"; which code authorities were much like trade associations, both before and after the NRA. Among the more seasoned of such organizations are the Typothetae, or printing trade associations, the Bureau of Railway Economics at Washington, and the National Coal (mine operators') Association. Thus it is apparent that any one interested in wage or salary quotations or historical records in any industry would do well to consult that industry's trade journals, trade unions, and trade associations.

*The National Industrial Conference Board*, in New York, which is maintained chiefly by manufacturing trade associations, has published comprehensive data on wages, hours, cost of living, and other labor matters recurrently since 1920. In manufacturing and in a few other industries it secures original data directly from employers, and is thus able to publish indexes of hourly and weekly earnings for men and women separately. The Board's wage data are further classified into "Male—unskilled" and "Male—skilled and semi-skilled." It is not clear how intelligently and conscientiously this division is made by the plant people when they fill out their schedules. These figures are classified according to products, e.g., agricultural implements, automobiles, cotton—North. This Board might well publish, occasionally, supplementary tabulations showing variations in average earnings among plants, and within specified industries

and areas. One of its special investigations, on clerical salaries, will be noticed later in this chapter.

*State Departments of Labor and Industry* commonly publish statistics of employment and earnings, particularly in manufacturing. Those of Massachusetts, New York, and Wisconsin are most commonly used by labor statisticians, by reason of their continuity over long periods as well as their other points of excellence. Many such state departments are much handicapped by poor laws, spoils politics, and very inadequate funds. In Ohio unusually comprehensive wage and salary information appears to have been filed by employers with the state Division of Labor Statistics, but this division was long unable to publish much of it.<sup>18</sup> Many of the employers, moreover, send duplicate data to other agencies, such as their trade association and at least one Federal Government bureau. The state reports, however, are likely to cover some establishments which do not report elsewhere, and especially to tabulate all reports so that earnings by sub-industries and localities within the state are shown. The May 1936 Industrial Bulletin of New York State's Department of Labor, for example, gives average weekly earnings in 11 principal manufacturing groups (including water, light, and power as one such group) and more than 50 sub-groups, for shop workers only, and for all employees, including those in offices; for men and women separately; for various districts within the state. Somewhat less detailed information on employment and payrolls is also given in this bulletin, with respect to hotels, trade, and construction, as well as for some sub-divisions of the latter industries. Another special merit of this bulletin is the indicator of labor demand and supply which is supplied by reports of the state employment offices as to jobs wanted and help wanted.

#### **Federal Government Agencies: Census of Manufactures.**

—Various branches of our national government collect and pub-

<sup>18</sup> See *Wage Rates, Earnings, and Fluctuation of Employment in Ohio, 1914-1926*, published by Information Bureau on Women's Work, Toledo; also later materials collected by the Ohio Division of Labor Statistics, published in *Mo. Lab. Rev.* of USBLS.

lish periodically primary data on wages and salaries. These are, in general, the most important materials for historical and statistical research on such payments. Doubtless the oldest of the series is made up of reports on wages, which have been gathered in the Census of Manufactures since 1850. Little attention is now paid to the earlier of these; but after 1899, when this Census began to be taken at 5-year intervals, and especially after 1919, when it became biennial, it has been a rather important check upon other indexes of average annual earnings in the various divisions and areas of manufacture.<sup>14</sup>

The general procedure used in the Census of Manufactures, with reference to wages, may be briefly indicated by reference to the schedule of 1935, which is somewhat more elaborate on these points, as well as others, than most of the previous similar inquiries. Each plant must report, for each month of the year, the "number of wage-earners who worked during any part of a week of normal activity in each month, preferably the week ended nearest the 15th day of the month"; and the total amount of money paid during the whole year to such wage-earners. In somewhat analogous fashion reports are made on the same schedule as to the annual compensation of (a) proprietor or firm members, or (b) officers, if the concern is a corporation; (c) supervisors; (d) technical employees; and (e) clerical workers. Summaries of all these items invite computations of "census average wage," or salary as the case may be; but such computations should be used with great caution. The Census Bureau's procedure and instructions with reference to "average number of wage-earners," in the month and especially in the year, involve many debatable points; moreover these procedures have varied somewhat from one census to another.<sup>15</sup>

During the last two or three decades regular censuses have been extended to other industries beside manufacturing, with the result that census reports on wage and salary payments in these

<sup>14</sup> See P. F. Brissenden, *op. cit.*, for analysis of Census data since 1899, and Douglas, *Real Wages, etc.*, for comments on Brissenden's monograph.

<sup>15</sup> Brissenden, *op. cit.*, Ch. 13 ("The Census Average Wage"), discusses these problems. In 1933 the Census of Manufactures collected data on man-hours worked, which were compiled cooperatively by the Bureau of the Census and of Labor Statistics, for 32 selected industries.

other industries are becoming available, every two or five years, or whatever the interval is. Agriculture was one of the earliest of these instances; electric light and power, mines and quarries are other illustrations; and great strides toward covering the employments of the whole population were taken, a few years ago, when the census of trade or distribution was launched, which quickly grew into a larger census of business.

**Interstate Commerce Commission.**—Among the more frequent Federal publications in the field of wages and salaries, doubtless the most thoroughgoing is the Interstate Commerce Commission's monthly sheets entitled "Wage Statistics—Class I Steam Railways in the United States," which give perhaps 95% to 99% coverage of this whole industry, employing over a million people. In these reports, some 128 categories of employees were used in March 1936 (including presidents and a few other occupations paid on a "daily basis" rather than an "hourly basis"). Here is one of the very few instances of comparable and comprehensive *occupational* wage statistics which become available within two or three months after the wages are paid.

**U. S. Department of Labor.**—In this Department, the Women's Bureau makes special investigations of women's earnings in various industries and localities; and the Bureau of Labor Statistics (USBLS) also makes many special surveys, for example, relative to operations of the NRA. Its *Monthly Labor Review*, moreover, reprints a great wealth of material on wages and other labor matters from all manner of American and foreign sources. But let us now concentrate attention on the latter Bureau's regular and recurrent collection of primary wage statistics. These are of two chief sorts, (1) the monthly indexes of employment, payrolls, and average earnings, and (2) the recurrent surveys by industries—at yearly or less regular intervals—as to wages and hours.

The monthly report of the USBLS on "The Trend of Employment and Payrolls" now covers a very wide range of industries, public as well as private. This part of the Bureau's work has developed quite rapidly of late, chiefly because of the widespread demand for improved measures of unemployment,

and in part due to the able administration of the Bureau's chief, Dr. Isador Lubin. These employment and payroll figures are similar in essence to the monthly data in reports of the state departments of labor and of the Census Bureau—no doubt a considerable fraction of the establishments in the various industries submit reports which are identical, or nearly so, to these and other wage statistical agencies. And, in all the publications mentioned in this paragraph, little or no attempt is made to report *occupational* rates or earnings.

Some of the principal characteristics of these monthly articles may be illustrated by reference to the *Monthly Labor Review* of the USBLS for May 1936, which reached me about the middle of June.<sup>18</sup> It contains preliminary summaries on employment and payrolls for mid-March 1936, and more final and detailed data for February and preceding months. Nearly all of the figures, except those relating to railway employment and wages, are derived from sample reports made voluntarily by the employing agency directly to the Bureau of Labor Statistics. Some major categories of private employment are broken down into sub-industries: 90 types of manufacturing, four sorts of mining, in addition to crude petroleum production; three public utilities beside railways; four subdivisions of trade. Hotels, laundries, dyeing and cleaning, brokerage, insurance, building construction complete the list for March 1936; and in the course of a year various others appear in the Review, for instance banking and firemen's and policemen's salaries. In general, however, it is always the oldest and biggest-scale employments for which statistics on employment and earnings are most readily gathered; and the newer and smaller occupations and industries are sufficiently important in the aggregate to make somewhat unreliable those estimates of unemployment which are based merely upon *employment* indexes.

For most of the industries thus reported on by the USBLS, absolute rates as well as indexes are given, not only for weekly earnings (as in state bureau reports) but also for hourly earn-

<sup>18</sup> An extensive mimeographed press release is issued monthly, considerably in advance of the printed publication cited above. Such a release, e.g., on July 23, 1936, gave wage and employment data for mid-June, 1936.

ings. The hourly earnings figures, however, are based upon smaller numbers of establishments than the measures of weekly earnings, since fewer concerns can report total man-hours worked than can furnish the mere number of names on the payroll at a given date. All, of course, can give the total amount of wages paid during the nearest payroll period. Other useful break-downs in these tables are for durable and nondurable manufactured goods, for states and groups of states, and annual comparisons of reports from identical establishments in specified large cities. My readers can doubtless obtain, gratis, from the Bureau a reprint of the latest article on "Trend of Employment and Payrolls," and thereby secure further details.

**Occupational Studies of USBLS.**—Reprints may also be secured from the Bureau of articles which summarize results of the wage and hour studies by industries; and the more detailed bulletins in this series are also easily come by. They are the result of field work in which agents of the Bureau visit numerous sample establishments and copy sample payrolls, recording the number of hours worked in the payroll period by each worker and his occupation. The "glossaries of occupations" included in these bulletins are miniature job analyses, which nowadays attempt to take some account of regional variations in contents and names of occupations. This Wages and Hours Series of bulletins and articles give us information on occupational earnings, gathered at irregular intervals, extending some years back in many manufacturing industries; and it may be hoped that similar surveys, more frequently made, will be extended to more and more non-manufacturing employments. The difficulty is that scientific people who care much about such matters are a weak political pressure group, and so this sort of activity of the Bureau is vulnerable to demands for governmental "economy." The bulletins hitherto published in this series have contained surprisingly little information about methods of payment and productivity of labor, in relation to earnings; though some important beginnings have been made by the Bureau on both these matters. A recent study of earnings and hours in the baking industry, for instance, contains sub-tabulations as to



region, sex, skill, degree of mechanization, and prevalence of trade unions;<sup>17</sup> and consideration is being given to possible separate tabulations of earnings of piece workers and time workers. Improvement of its job analysis, for increasingly accurate and useful occupational nomenclature, will be an endless but necessary task for the Bureau. It might, perhaps, gain added political support by publishing *current* earnings per hour, by occupations, or at least making a start in that direction.

**National Income Studies.**—Any serious student of wage and salary statistics will find handy guides in the rapidly growing literature on national income or production, and its distribution.<sup>18</sup> These publications give estimates, for specified calendar years, of wage, salary, and other incomes by "industries," including agriculture, government, and sundry trades and professions, as industries. Usually the average annual earnings of wage-earners and salaried persons in each industry and sub-industry are separately estimated, as well as the percentage which such labor payments form of the net value-product of the industry. This literature is valuable to our wage student, to some extent as a source of original data, but more largely for its bibliographies and commentaries on the various sources which were used by the national income estimators.

**Wage Variations and Differentials.**—After these wanderings in various fields of raw material, let us return for a moment to some problems of differences of hourly or monthly earnings *in the same-named occupations*. We have already given some attention to this matter, in connection with Dr. Frain's data; and now a few more illustrations will emphasize the importance of supplementing bare averages with sub-tabulations and frequency-tables, or other measures of variability. Notice, how-

<sup>17</sup> See *Mo. Lab. Rev.* of USBLS, Dec. 1935.

<sup>18</sup> See, for instance, W. I. King, *The National Income and its Purchasing Power* (N. Y.: National Bureau of Economic Research, 1930); Fed. Trade Comm., *National Wealth and Income* (69th Cong., 1st sess., Sen. Doc. No. 126), 1926; S. Kuznets and others, *National Income, 1929-32* (73d Cong., 2d sess., Sen. Doc. No. 124), 1934. Estimates for later years, like the last-named of these, are being issued by the Division of Economic Research of the Bureau of Foreign and Domestic Commerce—see *Survey of Current Business*.

ever, that our topic in this section is only a very limited part of the subject of wage and salary variations of all sorts. Yet I believe other sorts of wage differences can be more successfully analyzed after intra-occupational differences are firmly realized, for otherwise we are in danger of unwittingly comparing an exceptionally well-paid person in one occupation with a mediocre or poor representative of another.

However that may be, we are herein attempting, so far as possible, to eliminate the important factors of (1) differences in occupation and (2) differences in unemployment, as causes of variability in earnings. Important factors which remain, after these are ruled out, are (3) differing efficiency among workers and plants, (4) sex, (5) location throughout the nation, and (6) density of population. The last three can, to some extent, be controlled by sub-tabulations; and the variability which remains is more largely due to the third factor listed above—namely, efficiency differences.

These three latter factors, as was explained in Chapter 10, were explicitly invoked in many of the NRA codes. Out of 695 codes and supplements which were analyzed with reference to common or unskilled productive labor, 231 provided for a geographical differential, 31 for a population differential (by size-of-city categories), and 122 for a combination of these two factors.<sup>19</sup> The general effect of these differentials was to set minimum wage rates about five to ten cents higher, per hour, in northern and western states than in the old South, and higher minimum rates in the largest cities than elsewhere. To a much lesser extent the codes made explicit provisions for differentials in similar occupations, above the minimum wages. If the matter of men and women in the same occupation was mentioned, it was nearly always in a proviso that equal pay should prevail for equal work; so that the influence of the NRA was thrown against mere sex differentials in identical job categories. These code differentials, however, are not to be taken too seriously as

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<sup>19</sup> See *Geographic and Population Differentials in Minimum Wages*, prepared under the supervision of L. C. Marshall (early in 1935), lithoprinted by the NRA. It contains maps for many of the codes which included geographic differentials.

evidence of what sorts of wage differences actually prevailed within occupations in more "normal" times, or even immediately before the NRA; for they applied mostly to common labor, and moreover were drafted under great heat and pressure and with little light from statistical research.

The Wage and Hours studies which the USBLS has been making for years contain much material on such variability, especially in factory occupations. Doubtless it would be subject to some adverse criticism on such matters as representativeness of the establishments used as samples, with reference to their respective geographic sections, and the adequacy of the job vocabularies used; nevertheless a student can gather from it a great deal of valuable information about sex and geographic differences of intra-occupational earnings, in the years and industries in which these surveys were made. The bulletins contain, separately for each sex, frequency-tables of hourly earnings within selected occupations, by states.

**Examples of Sex Differences.**—In the boot and shoe industry, for example, in 1932, there were appreciable numbers of both men and women "upper skivers," in the cutting departments; though in this industry, as elsewhere, what is called an occupation is usually predominantly either men's or women's work. This "division of labor" makes it very difficult to learn to what extent the "equal pay for equal work" principle prevails in the labor market. And when the two sexes are both largely represented in an occupation, for example school teaching, there may be some intra-occupational specialization which makes the sex-differences in earnings more nearly in accordance with individual efficiency than is apparent at first glance.

Among these upper skivers in 1932, of 28 men in 16 Massachusetts plant, whose earnings averaged 62 cents per hour, one earned as much as 40 and under 50 cents; 5, 50—; 12, 60—; 4, 70—; 1, 80—; 2, 90—; and of 145 women, in 38 plants in the same state, whose hourly earnings in this sample payroll period averaged 46.5 cents, the frequency distribution was as follows: 1, 12—; 5, 16—; 3, 20—; 12, 25—; 29, 30—; 37, 40—; 22, 50—;

35, 60—; 1, 70—.<sup>20</sup> This last curve is so negatively skewed that it suggests restriction of output, especially since the corresponding curve for New York women upper skivers is much nearer symmetrical and the average hourly earnings for the latter women was only 39 cents. Some other interesting comparisons might be made among the states, in any of the numerous tables like this; but I shall not linger over them.

A more recent and special study was made by the USBLS, comparing New England and South-Atlantic-and-Alabama average hourly earnings in cotton goods manufacturing, by principal occupations, in various years.<sup>21</sup> The accompanying table brings out one of the comparisons thus made. It will be noticed

AVERAGE HOURLY EARNINGS OF COTTON WEAVERS, BY REGION AND SEX, 1924-34

	Cents Per Hour							
	1924	1926	1928	1930	1932	July 1933	August 1933	July 1934
Males, New England.....	53.8	46.7	44.7	46.2	35.3	29.9	43.9	44.2
Females, New England.....	48.6	42.8	41.8	42.6	33.1	28.0	42.6	43.5
Males, S. Atlantic and Ala....	35.9	33.2	34.1	34.9	28.9	23.8	39.6	40.3
Females, S. Atlantic and Ala..	31.3	29.8	30.8	31.9	27.3	21.5	38.6	38.4

that the differentials between regions and sexes had narrowed considerably, from 1924 to 1932, and were still smaller on the eve (July 1933) of the NRA, whose influence apparently cut the geographical differentials much further and also brought earnings of male and female weavers closer toward equality.

<sup>20</sup> USBLS, Bull. No. 579, pp. 79, 80.

<sup>21</sup> See article by A. F. Hinrichs, in *Mo. Lab. Rev.*, May 1935.

Probably the sex and regional differences have increased, since the NRA passed away.<sup>22</sup>

**Geographical Variations in Productivity, in Relation to Earnings.**—Within any one plant, differences in hourly earnings within an occupation are likely to be accounted for, in a considerable degree, by differences in the respective workers' efficiencies—though, as was shown in Chapters 2 and 7, such efficiency differences usually cannot be very accurately measured. Within a single labor market, too, it is probable that the most efficient persons tend to make the highest earnings—subject to qualifications such as have been introduced on page 227. But is the same sort of economic harmony at the bottom of inter-regional differences? Not a few shrewd observers claim that the lower wages and earnings in the south are due, not merely to lower living costs, which in part may be ascribed to the small number of very large cities in the south, but also to differences in labor efficiency. When efficiency wages become lower in one region than in another, these people say, the industry grows more rapidly in the low-cost section, as illustrated by textile manufacturing in the south in recent years.

In 1924 the USBLS issued a bulletin which tackled this problem in the common brick industry.<sup>23</sup> It gives the usual detailed tabulations of hours and earnings, and in addition some data on output of brick per man-hour—all by regions. From several of its summary tables I have abstracted materials for the following tabulation:

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<sup>22</sup> An article, "Wage Differentials in Manufacturing Industry," in the National Industrial Conference Board's *Service Letter* of April 30, 1936, by R. P. Falkner, analyzes hourly earnings by region and by size of city, using data from the 1933 Census of Manufactures. In 11 industries which are important in both north and south, the average wage per man-hour was: south, 31.6 cents; north, 47.5 cents; west, 54.4 cents. See also C. Heer, *Income and Wages in the South* (Univ. of No. Carolina Press, 1930). Conceivably these differences are mitigated by inverse average amounts of unemployment in a year, as well as by other circumstances, such as are mentioned below.

<sup>23</sup> Bull. No. 356, *Productivity Costs in Common Brick Industry*, by W. F. Kirk.

HOURLY EARNINGS, LABOR COSTS, AND "TOTAL COSTS," IN U. S.  
 COMMON BRICK INDUSTRY, 1922—STIFF-MUD PROCESS

District	No. of Establishments Furnishing Data <sup>a</sup> (1)	Avg. Hourly Earnings, All Occupations <sup>f</sup> (2)	Output Per Man-Hour, Bricks (3)	Labor Cost Per 1,000 Brick <sup>g</sup> (4)	"Total Cost" Per 1,000 Brick <sup>g</sup> (5)
1. Kansas, Kentucky, Nebraska, New Jersey, Ohio, Pennsylvania, Wisconsin....	17, 11, 4	\$0.428	130.5	\$3.59	\$7.56
2. Florida, Georgia, Louisiana, Mississippi, South Carolina.....	9, 8, 2	.195	85.9	2.20	6.74
3. Maryland, North Carolina, Virginia....	10, 8, 3	.279	119.8	3.01	6.83
4. Illinois.....	6, 4, 5	.765	359.9	3.38	5.79
5. Arkansas, Missouri..	3, 2, 1	.310	98.5	4.54	8.78

<sup>a</sup> First figure in this column is number of plants reporting data for hourly earnings; second figure (after first comma) is number of plants furnishing data on rate of output, in brick, per man-hour (all departments combined); third figure (after second comma) is number of establishments furnishing other cost data. See Tables 2, 4, and 5 of Bull. 356.

<sup>b</sup> From Table 5, p. 11 of Bull. 356.

<sup>c</sup> From *ibid.*, Table 4, p. 8. Compare *ibid.*, Table 3, p. 7, which gives, by districts, for 29 plants using stiff-mud process, the over-all "manufacturing cost per 1,000 brick." In this latter tabulation, e.g., 8 plants in District 1 as above [presumably including the 4 plants to which my Cols. (4) and (5) refer], with 334 employees, reported an average manufacturing cost of \$8.11 per 1,000 brick; and two plants in District 5 (Arkansas and Missouri), with 147 employees, reported an average manufacturing cost of \$7.60 per 1,000 brick. It seems, therefore, that the four concerns in District 1 which did not furnish detailed cost data were higher-cost plants than those which did; but in District 5 it was the other way round.

The Bureau has published a number of other studies of physical productivity per man-hour, in various industries, including shoe manufacturing,<sup>24</sup> and I have not studied them very carefully; but it is my impression that they have not attempted, with respect to any other industry than common brick, to piece together the wage and output and other cost data in order to show production cost variations by districts. At any rate, the statistical problems involved in measuring cost-variations in more than a superficial way are obviously very difficult, especially in the earlier stages of such endeavors. Aside from the peren-

<sup>24</sup> Bulletin 360, 1924.

nial puzzles of representativeness of the sample plants, there is the question of controlling or allowing properly for such factors as styles, qualities, and so on, of product. Doubtless common brick was particularly easy in both these matters. Again, I have put "Total Cost" in quotation marks, at the head of my Column (5) in opposite table, because the figure given is composed merely of labor, materials, and repairs—apparently omitting production overhead, as well as sales and financial costs. We are told that in Illinois "The low cost is due to the improved machinery used in making and handling the product, to the method of burning, and to the great capacity of the plants, . . ." <sup>25</sup> And, as subtractions of items in my Column (4) from those in Column (5) will show, the charges for materials and repairs were exceptionally low in Illinois. This common brick study, therefore, is significant, not as a solution of these problems, or as a real demonstration that high hourly earnings are likely to accompany low total costs (as in these few Illinois brick plants), but rather as a pioneer attempt to replace hazy opinions by more exact and quantitative observations. <sup>26</sup>

**Differentials Among White-Collar Workers.**—These differences in earnings (within occupations, between the sexes and according to region and density of population) may be studied statistically, not only with reference to factory wage-earners such as we have been considering, but also through more scattering data relating to other types of employees. Let me cite a few examples of such sources, and of what may be found in them.

The Federal Trade Commission's report on chain store wages, <sup>27</sup> classifies average weekly wages for a week in early

<sup>25</sup> Bull. 356, p. 6.

<sup>26</sup> The frequency tables of hourly earnings, by occupation and district, in this bulletin (No. 356) on the common brick industry show differences in such earnings, within each occupation, which seem remarkably small, considering the great sizes of most of the districts. The information given on p. 10 of the bulletin about the prevalence of the "task or stint system" suggests that the tables may not show accurately the earnings for hours actually worked: "Under the task system, the rate of pay is so much per day, regardless of the number of hours required to do (produce) the day's 'stint'." In many occupations, of course, workers prize highly the privilege of leaving work ahead of normal quitting time, if their task is done.

<sup>27</sup> 73d Cong., 2d sess., Sen. Doc. 82 (1933).

1929 and also for a week in early 1931, for ordinary employees, for supervisors, and for managers, by Census geographic divisions and types of chain. (Some data are also given, in this report, on wages of independent stores.) Such wages tended to be lowest in the southeastern and New England areas, and highest in Middle Atlantic and Pacific states; but many irregularities appear if the tables for the two years are examined. The lowest earnings were found in the chains in which percentage of women employees was highest; probably in part because the latter stores' women are apt to be young, inexperienced, holding very simple jobs.

The National Industrial Conference Board made a survey of office workers' pay, covering over 25,000 workers (including numerous railway employees) in 18 of the largest American cities, and published tabulations by occupations and sex, for each city. The southern data are too few to be significant, but the frequency tables by cities are valuable, especially for men-women comparisons. Men and boys in appreciable numbers were found in a few "women's" occupations, such as order clerks, file clerks, and labor-saving machine operators; receiving on the average even less than the women; but in about eight types of job the median man's pay exceeded that of the median women, by 30% to 50%.<sup>28</sup>

Elliott and Manson, using data for 1927, found that the median earnings of women teachers progressed regularly with increasing size of community; and that in clerical and in sales and publicity occupations—in which, as with teachers, the numbers of cases were probably large enough to be significant—the medians progressed from around \$1,250 and \$1,120 respectively, both for 2,500-5,000 communities and for villages under 2,500, by fairly regular stages to \$1,875 and \$2,417 in cities of 250,000 and over. These occupational categories are not homogeneous, however; for instance, there are relatively many more office managers, private secretaries, and department store buyers in large cities than in small towns. Also, the factor of

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<sup>28</sup> N. I. C. Bd., *Clerical Salaries in the United States*, Ch. II (1926).



region in the nation is not well controlled, in this study of influence of density of population.<sup>29</sup>

In view of the bits of evidence discussed above, which generally tend to support the popular belief that geographic and population wage differentials are large and persistent, through most occupations, it is surprising to read the following statement, by the Federal Government's Personnel Classification Board:

. . . we have analyzed the statistics on the salaries and wages received by approximately 500,000 office employees in the different sections of the United States and have been unable to detect any appreciable and measurable differences in the salaries they receive which correspond with the place of employment. So far as we have observed there is, for instance, the same general spread in salaries for stenographers in the southeastern section of the country as in New England, and no outstanding differences exist between the ranges of pay prevailing for groups of employees like typists in cities of different size.<sup>30</sup>

Considerable weight must be given to the tabulations exhibited in the report just cited, e.g., of earnings of some 30,000 routine female stenographers, who received (about 1928) on the average, some \$1,317 a year in private employments, excluding railroads. (Data are also given in this survey for 6,749 railway stenographers, apparently doing routine work—proportions between the sexes not specified—who received average annual pay of nearly \$1,500 a year.) Among the 30,000 women stenographers, the regional group showing largest negative deviation from the grand average was not in the south but in the West North Central States—in the latter region the average pay was \$1,184. With reference to population density, also, this exceptionally homogeneous occupational and female group varied less than we should expect. Only in cities of one million and over was the average wage decidedly higher (\$1,432) than the grand average of all cities and regions. It may be that there is more nearly equal pay for equal work, among regions and among cities of varying size, for clerical occupations

<sup>29</sup> *Earnings of Women in Business and the Professions*, pp. 40, 41 (Univ. of Mich., Bureau of Bus. Res., 1930). The recent USBLS surveys of salaries of police and fire department employees also show evidences of regional and population-density differentials.

<sup>30</sup> *Wage and Personnel Survey*, p. 79. See also the Board's tables and discussion of them, *ibid.*, pp. 92 ff.

than for others—at least among members of each sex separately. And so we are left with these puzzles largely unsolved: To what extent are sex and regional and population wage differentials accounted for by variations in quantity and quality of work? And, so far as such differences are not thus explicable, to what extent are they effects, to what extent causes, of corresponding differences in living costs? Progress toward the solution of these problems, incidentally, would develop data and techniques which should be useful in tackling the related issue: to what extent are the wages of union and non-union people different, after other factors making for wage variations have been duly allowed for?

**Summary.**—We have noticed some characteristics of the wage and salary data published by the U. S. Bureau of Labor Statistics and other agencies, and discussed their use and improvement. One set of problems common to all agencies is how best to supplement averages of large and heterogeneous groups by breakdowns or sub-tabulations, which sift out more homogeneous groups—e.g., industries and sub-industries, within the general category of manufacturing; and breakdowns by territories, by sex, by occupations, by unionism, by method of payment, and so on. Another problem-group, closely related to the first, is to supplement the averages within these sub-groups by suitable measures of dispersion or variability among individual wage receivers. We have also emphasized the two relatively distinct functions of wage and salary statistics,—their rôles as *current* market quotations, and as materials for research on *past* events. Tables showing individual variability of earnings have hitherto been more slow in coming out than over-all averages like “average weekly earnings by industries,” and the former are also much the more expensive to prepare. As we read the averages, however, we should bear in mind that any particular person in the group, or looking for a job in that group, may earn and/or be worth, considerably more or less than that average. Reports of pay by occupations may be improved greatly by cooperative effort toward standardization of nomenclature—in short, by the progress of job analysis.

## CHAPTER 13

### WAGE PLANS AS FORMULAE TO DETERMINE EARNINGS

We have dealt separately with three essentials of any wage or salary situation, namely: measure of accomplishment, standard time allowance or task, and the money rate which the worker is paid for his time. We have noticed that these matters are not entirely independent of each other. The standard output or task set for a given job and time period will tend to be comparatively low, if the wage which the management expects to pay for achieving that standard is low; whereas if a high wage is to be paid for doing the job within the time allowed, then this task will be set according to the estimated capacity of a "first-class man." Hence we have already had to give some attention to a fourth wage essential,—the formula or scheme for combining the three others into some time work or piece work or bonus plan. The present chapter carries this latter study further, in two principal sections. Through the first part we shall suppose that a *single* measure of the worker's achievement is used (e.g., pages of acceptable typescript or dollars' worth of goods sold). Then, in the latter part, we shall consider how supplementary and indirect measures of the worker's total service to his employer may be taken into account.

#### A. Wage and Salary Formulae Using a Single Index of Production

**Some of the Simpler Plans.**—A few of the more widely used formulae for determining what wage a worker shall receive for a given output are graphically represented in the accompanying Figures X, XI, and XII.<sup>1</sup> Figure X purports

<sup>1</sup>To save space I am omitting algebraic formulations of most of the schemes, and am giving only a few arithmetical illustrations. More of

to show, on the vertical scale, relative (total hourly) earnings for varying outputs according to the horizontal scale, in the wage plans noted on the respective curves—using certain assumptions as to the standard tasks or time allowances employed

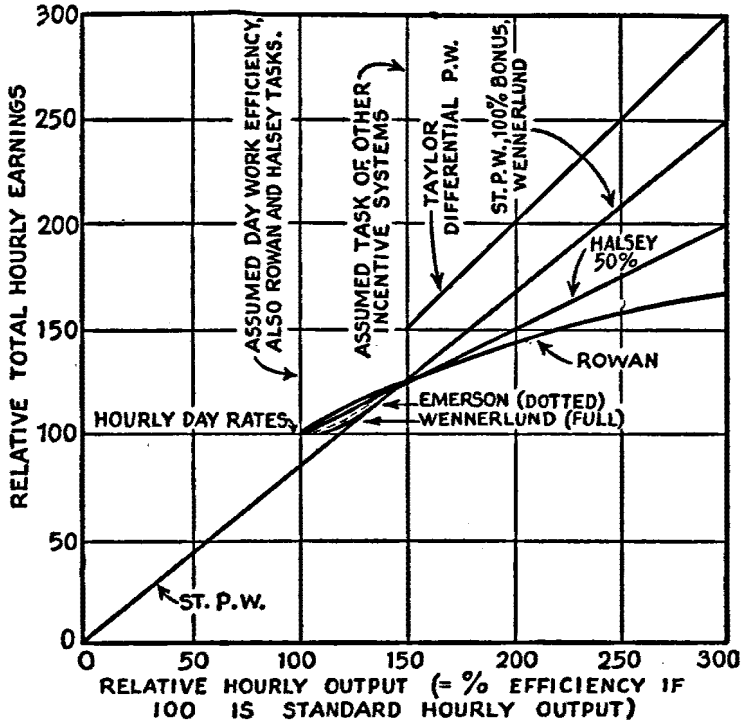


Figure X. Relations of Total Hourly Earnings to Output. Assuming: (1) Rowan and Halsey tasks at day work efficiency; (2) other tasks 50% above; and (3) other systems pay 125% of day rate for 150% of day work efficiency.

by each plan. The simplest chart would exhibit these schemes as if all used the same production standard and same hourly

these particulars are to be found in various publications, e.g., C. W. Lytle's *Wage Incentive Methods*, C. C. Balderston's *Group Incentives*, the National Industrial Conference Board's *Systems of Wage Payment*, the National Metal Trades Ass'n survey cited in Chapter 5 above, or any industrial engineering textbook. Or see *Wage Payment Plans*, etc., ed. by Diemer, cited frequently in Chapter 14.

base rate for a given job; but in practice the difficulty of attaining standard output varies greatly, not only among wage systems but also among establishments using the same system; moreover, payments for a given output vary considerably. In general it seems that the task time standards (time allowances) have usually been set more leniently for the Halsey and Rowan systems than for the others shown in this chart; and I think my assumptions (1) that the Halsey and Rowan standard outputs are equal to average day work efficiency and their hourly base

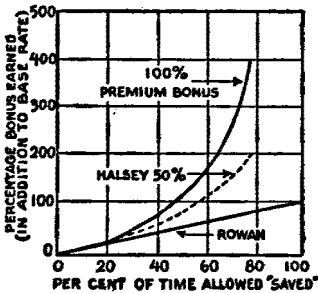


Fig. XI. Relation between Percentage of Bonus Earned and Task Time Saved.

Shows how the percentage of bonus, added to the man's day rate for the time he works, varies with the per cent of task time he saves—in 3 plans.

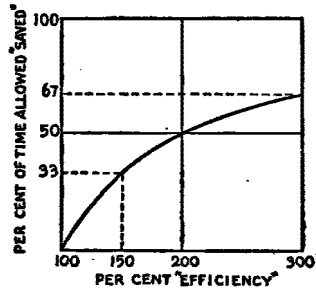


Fig. XII. Relations between "Per Cent Efficiency" and "Per Cent of (Task) Time Saved."

Per cent efficiency may be found by dividing standard hours for the job by hours actually taken.

rates are ordinary day rates; (2) that the other wage incentive system standards are 50% higher; and (3) that these latter systems pay 125% of day rate for attainment of this 150% efficiency, are fairly realistic. It should be remembered, however, that we may compare the systems accurately only as to how earnings vary, in each, with reference to its own task or 100% efficiency or time allowance; and that this standard, in comparison with a given effort and skill in a given worker, varies considerably among wage systems, among plants, and also among jobs within a plant.

Notice now how Figures XI and XII supplement Figure X, by showing alternative views of the same situation. A number

of wage schemes, usually called "So-and-So's Bonus," are formulated (1) in terms of "time saved," which is computed by comparing "time actually taken" with "time allowed" with reference to a given job; and (2) the earnings variable on which attention is concentrated is not total earnings but "percentage of bonus earned," i.e., percentage *addition* to the worker's base or minimum time rate, for the time he works. Figure XI compares the Rowan Scheme, also the Halsey 50% bonus plan, with a "100% bonus" plan, from this point of view; and Figure XII shows how "per cent efficiency" varies, in relation to "per cent of time saved."

The ROWAN SCHEME pays a percentage of bonus equal to the ratio of time saved to time allowed.

#### EXAMPLE OF ROWAN BONUS CALCULATION

Time allowed for Job A.....	2 hours
Base rate of Worker X.....	50 cents per hour
Time taken by Worker X in doing Job A.....	1 hour
Percentage of time saved	$\left\{ \frac{\text{time allowed} - \text{time taken}}{\text{time allowed}} \right\} = \left\{ \frac{2 \text{ hr.} - 1 \text{ hr.}}{2 \text{ hr.}} \right\}$
	$= \frac{1 \text{ hr.}}{2 \text{ hr.}} = 50\%$

Percentage bonus = 50

Total earnings for this hour's work = 150% of the 50-cent hourly minimum rate = 75 cents.

The "100% BONUS PLAN," on the other hand, pays for "all the time saved" at full base rate, i.e., it pays for completion of the job, the worker's hourly base rate multiplied by the task time or time allowed for that job, without necessarily any reference to the time actually taken by this workman in this instance. Or, otherwise stated, the percentage of bonus earned, in addition to the worker's base rate for the time he actually works, may be calculated by dividing time saved by time *taken*.

Using the same basic data as in the Rowan computation,

#### EXAMPLE OF 100% BONUS CALCULATION

$$\begin{aligned}
 (1) \text{ Total earnings} &= \text{Time allowed (task time)} \times \text{worker's base rate} \\
 &= 2 \text{ hrs.} \times \$ .50 \\
 &= \$1.00
 \end{aligned}$$

## Alternative Method of Calculation

$$(2) \text{ Total earnings} = (\text{Time taken} \times \text{base rate}) + (\text{Per cent bonus})$$

$$\begin{aligned} \text{Per cent bonus} &= \frac{\text{Time saved}}{\text{Time taken}} \\ &= \frac{(2 \text{ hr.} - 1 \text{ hr.})}{(1 \text{ hr.})} = 100 \end{aligned}$$

$$\begin{aligned} \text{Total earnings} &= (1 \text{ hr.} \times \$0.50 \text{ per hr.} = \$0.50) + (100 \times \$0.50) \\ &= \$0.50 + \$0.50 = \$1.00. \end{aligned}$$

The HALSEY "50% BONUS" PLAN pays for "half the time saved," in addition to the workman's base rate for the time he actually works. (Various other fractions are also used in variant Halsey Schemes, e.g., one-third, two-thirds, three-fourths, of time saved.) Such modification of the "100% bonus" plan necessitates that time actually taken be recorded, and compared with time allowed or task time. In a 50% Halsey bonus plan, the two alternative methods used above for 100% bonus calculation require the following modifications:

$$(1-A) \text{ Total earnings} = (\text{Time taken} + \frac{1}{2} \text{ time saved}) \times \text{worker's base rate:}$$

$$\text{Or, (2-A) Per cent bonus (added to payment at employee's base rate for time actually worked)} = \frac{1}{2} \frac{(\text{Time saved})}{(\text{Time taken})}$$

At all rates of efficiency above 200%, Rowan's bonus is lower than Halsey's 50% bonus,—assuming the same standard task time for both.

It will be observed that, in Figure X, Rowan (total) earnings vary according to a curve, which approaches but never reaches the 200 line (i.e., double the day rate); and that the piece rate line in this same chart is a straight diagonal—earnings vary indefinitely and directly with output. In Figure XI, on the other hand, it is the Rowan curve which is a straight line, and the 100% bonus plan (which is like straight piece work, in that earnings vary directly and indefinitely with output) which is the rounded curve. Such is the graphic result of shifting the point of view and the basis of computation, from units of output in a fixed time, in relation to total earnings, to the basis of per-

centage bonus *added* to the worker's time rate, in relation to the time he saves on a fixed number of units of output.

**Percentage Efficiency vs. Per Cent of Time Saved.**—Figure XII gives another comparison of these two points of view, introducing on the horizontal scale the expression which is so common in American wage plans—"percentage of efficiency" (first used, apparently, by Emerson). This percentage is derived from comparison of standard with actual performance, using either (time taken) or (units of output) as the variable. As we have seen, the standard task must be defined in terms of both—it must be an amount of output in a defined unit of time. Thus, if time allowed (task time) for a fixed output is two hours, and time taken is one hour,

$$\text{Efficiency} = \frac{2 \text{ hrs.}}{1 \text{ hr.}} = 200\%.$$

Otherwise viewed, 200% efficiency means that in one hour of actual work (at this rate) the man turns out twice the standard output. But in terms of "time saved," as a *percentage of time allowed*, which is the Rowan basis of calculation, efficiency of 200% means the *saving* of 50% of allowed time.

The line marked "Hourly rate of day worker" (= *plain or straight time basis of payment*) on Figure X is completely parallel to the base-line, indicating that whatever be the output of this time worker, his hour's pay is the same. Such is not literally the case, of course; for if his production is considered to be unreasonably low he will soon be separated from the payroll; and if his output maintains a high rate, he may be promoted to a higher hourly wage. In fact, a wage plan which is often tacitly or explicitly used is fixation of the time rates of different workers in accordance with some presumption of their respective average outputs. Among garment workers this has been called "*week work with production standards*"; and in this case individuals could be sorted into the various weekly wage-categories by actual counts of the pieces they turned out. Graphically this scheme would be shown by *stairstep straight horizontal lines*, rising from lower left (low production and low time wage) toward upper right. Within considerable limits, especially when the management knows that the day worker is hampered in



variable degrees by matters beyond his control, his production may vary without any immediate effect on the content of his pay envelope.

Another outstanding and simple wage method, *straight piece work*, is represented by a diagonal straight line. Payment is strictly proportional to output, and, with reference to the output and pay *at any point on the curve*, one may say that an increase of one or any other per cent in production means a rise of a corresponding per cent in earnings. If the straight piece worker is held up by lack of materials or by any other cause outside his control, his earnings will thereby suffer and he is likely to complain that he "can't make out." "Straight" day work and "straight" piece work are the only methods whose curves are unbending throughout their course. Other systems are less simple, usually being compounds of the time work and piece work principles.

**Other Wage Schemes.**—Consideration of the compound plans may begin with one which is shown graphically by a zig-zag line whose changes of direction are due, not to any use of a minimum time rate but to differing straight piece rates within various ranges of production. F. W. Taylor's Differential Piece Rate curve (see Figure X) illustrates the case; it offers a lower piece rate for production below the standard task (set by time study of a "first class man") than for production at or above this standard. The same general principle is employed in Gantt's Task and Bonus scheme, except that usually the latter (a) allows a minimum time rate or base rate to each worker, and (b) expresses his efficiency—or incentive—earnings in terms of "per cent bonus." Both these systems, in their original forms, caused earnings to make a sudden jump when standard output was reached; and beyond this latter point earnings increased indefinitely in direct proportion to production. Gantt later added a transitional table, somewhat like those of Emerson and Wennerlund.

The numerous other bonus plans will be sufficiently characterized for our present purposes if we notice only the two just mentioned; those of Emerson and Wennerlund. *Harrington*

*Emerson*, a pioneer "efficiency engineer," devised his bonus scheme, like those of his contemporaries Halsey and Rowan, to operate with standard tasks set rather loosely, and to supplement a minimum hourly base rate for each employee. Whereas Halsey and Rowan in effect paid no bonus for any production which was *under* standard, however little it fell short (for there was no "time saved," hence no bonus, when "time taken" was more than "time allowed"), Emerson started his bonus payments when the worker achieved 67% of his standard efficiency. (His standard was probably higher than Rowan's or Halsey's, but lower than Taylor's.) From this point of 67% Emerson's table fixed "empiric" bonuses increasing with each one per cent rise in efficiency, until at 100% efficiency the bonus added to the worker's time rate was 20%. In other words, the man was paid 120% of his base rate, multiplied by the hours actually worked, if his "time taken" was just equal to the "time allowed" for the work done.

With respect to production at an efficiency higher than 100%, Emerson's most recent writings recommend a plan like Werneriund's—payment for all "time allowed" (task time) at 120% of the worker's base rate, regardless of time actually taken. A quite different scheme, however, has been rather widely used for these higher orders of output, and known as the "EMERSON PLAN." I refer now to systems which pay, according to Emerson's table, 20% bonus for 100% efficiency, and for still higher production, some such rate as "an additional one per cent bonus for each additional one per cent increase in efficiency." This statement sounds superficially like the principle of straight piece work or 100% bonus, i.e., increase in earnings, beyond standard rate of output, strictly proportionate to increase in production. This last-mentioned "Emerson" scheme, however, resembles the Halsey and Rowan plans in being less than 100% bonus—above the standard rate of production, earnings increase less than proportionally to efficiency. For production 50% better than standard, for example, the worker gets, not 150% of the pay which he would get *for just standard output*, but 150% of his *base rate*, which he is guaranteed for any production up to 67% of standard.

In the WENNERLUND PLAN bonus begins at 76% of standard output, and rises through an empirical table until at 100% efficiency the worker earns 20% bonus on his base rate. Above this point 1.2% extra bonus on base rate is provided for each added 1% efficiency. Take, for example, a man whose base rate is 60 cents per hour, on a job whose standard output is 60 pieces per hour. While his production averages 60 pieces, he is working at 100% efficiency, earning 60 cents base rate plus 20% bonus—total 72 cents per hour. An output rate of 66 pieces per hour, however, in this case means 110% efficiency and 32% bonus [ $20\% + (10 \times 1.2\%)$ ], or 79.2 cents. This resembles a 100% premium bonus plan, in rewarding worker in full proportion to output above standard; like piecework, in that above standard efficiency direct labor cost is constant.

Practices differ, among the various applications of the various bonus schemes, on the extent to which a worker's high performance in one work period may be cancelled by his low performance in another. Each hour or day may be a unit by itself, in which a man may earn a bonus even if next hour or day he fails to "earn" his minimum time rate. Or his total remuneration for a longer period, such as a week, may depend upon comparison of total "standard hours" (represented by his output of bonus work) with his actual hours spent on that work. One of Taylor's favorite ideas, which recent researches appear to corroborate, is that most piece or bonus workers will be most effectively stimulated if they are notified not later than the next day how much were their total earnings in any one day.

**Labor and Overhead Costs in the Wage Plans.**—The general behavior of *direct* labor costs per unit, with widely varying rates of production, is shown comparatively for six wage plans in the accompanying table, which is based upon Figure X. Little or no practical significance attaches to detailed comparison *between* systems, with each horizontal line of this table, since seldom or never would they use task times and other standards, of just the same difficulty of attainment. The vertical columns, however, serve to bring out at a glance how unit direct labor costs vary with production *within* each plan. Such variations were shown graphically for straight piece work and

straight day work in Figure IV, on page 60; and a little study will show that unit labor costs and total earnings per hour are related reciprocally so that those portions of the earnings curves in Figure X which have a slope more nearly parallel to the horizontal or x-axis than the straight piece work curve yield *decreasing* unit direct labor costs with increasing output, while those portions whose slope is steeper than the straight

DIRECT LABOR COSTS, UNDER VARIOUS WAGE PLANS  
(According to data and assumptions of Figure X)

Relative Output per hour (a)	Day Work (b)	Straight Piece Work (c)	Differential Piece Rate (d)	100% Bonus (e)	Wennerlund (f)	Halsey 50% Premium (g)	Rowan Premium (h)
100 (assumed day work efficiency, and Halsey and Rowan tasks)...	1.00	.83	.83	1.00	1.00	1.00	1.00
125.....	.80	.83	.83	.80	.803	.88	.813
150 (assumed task of other systems).....	.67	.83	1.00	.83	.83	.83	.89
200.....	.50	.83	1.00	.83	.83	.75	.75
300.....	.33	.83	1.00	.83	.83	.67	.56

piece work curve mean *increasing* unit direct labor cost with increasing production.

One characteristic of a straight piece rate, for individual or for gang work—that, so long as it remains in force, the direct labor cost of that operation remains fixed in dollars or cents per piece—has some attraction for the accountants concerned. All other systems, including piece work with guaranteed minimum time earnings, are subject to some variability in unit costs, if production goes below the standard level. If it seldom or never goes below, then any of a number of wage systems (e.g., Taylor and Gantt, 100% premium bonus, Emerson and Wennerlund) tend toward practically constant unit direct labor costs. Any

bonus scheme, however, which calculates pay on the basis of *the worker's individual time rate* will give somewhat variable labor cost for an operation, unless all employees on that operation have the same base rates and all produce at 100% efficiency or above.

In Chapter 4 above we have indicated some relations between direct labor cost and overhead cost, which together make up total unit cost (exclusive of direct material cost). The overhead unit costs affected by the service of any direct worker tend always to decrease as that worker's rate of production increases; and the modern tendency toward an increasing ratio of overhead expense to other expense gives managements a growing inducement to get maximum production per hour out of direct workers. Emphasis on this tendency underlies the schemes of Taylor, Gantt, and others which pay more per piece, to the direct worker, for high production than for low. Taylor referred to his low piece rate, paid for sub-standard production, as "punitive"; he intended it to discourage to the quitting point any operatives who could not become standard and super-standard producers and thereby earn the higher piece rate,—and thereby also reduce the employer's overhead unit cost on equipment, floor space, etc., used by each worker.

**Efficiency Control Index.**—Another important aspect of a wage scheme is its place in the control of efficiency throughout the various departments of a business, day by day. This feature has been much exploited in the Bedaux and other "Point" plans, which designate the standard output for one minute, in any operation for which such standard has been set by time study, as a "B" or "point" or "manit" of work. Forms and procedures are established by these consultants for reporting each day to a central control office, the performance of the previous day in each job category in terms of (a) points, or minutes of allowed time, represented by work accomplished; and (b) minutes of time actually worked and paid for. Comparison of these two factors for each department or other unit of production readily shows where efficiency has been high (time taken, less than time allowed) and where efficiency has

been low (time taken, more than time allowed). Also, by ratios of these two variables, it shows *how* good or how bad the performance was. At those points where performance was substandard, the management is losing; overhead unit cost is high, and direct labor cost is apt also to be higher than standard. High performance means low unit overhead cost; and, in some versions of the Bedaux plan, also low direct labor cost—less than 100% premium bonus being paid.<sup>3</sup>

If straight piece rates or commissions on sales are paid, the employer does not necessarily have to keep records of the time actually spent by his workers in turning out the pieces for which he pays. If time-taken records are not kept, however, the employer does not know accurately which workers, at which times, are occasioning him high unit overhead cost by their slow work. But, since most shops nowadays have to pay some minimum time wage to each employee, they are thereby obliged (if not otherwise) to keep record of all hours actually worked. And for any jobs on which time allowances have been set, it is a matter extremely simple in principle to make daily or even hourly comparisons between time allowed and time taken. Thus this efficiency-index and control feature is not peculiar to any one wage plan, but is readily available wherever standard task times are set. An establishment like Ford's, in fact, in mass production at day wages, inevitably determines (in effect) standard time allowances, for its several operations, and uses the comparison of time allowed with time taken as a control index for each department.

**Other Objectives of Wage Plan.**—Among qualities generally desired in a wage formula, beside those connected with

<sup>3</sup> Some employers using this plan pay direct workers for all time saved; others pay less—commonly for 75% of time saved. These latter establishments often use the remaining 25% of value of direct labor saved for bonuses to the indirect workers involved. These latter bonuses, however, seem to many employers as well as laborers a poor excuse for paying direct labor for less than all the time saved, especially if production standards are set by capable officials. Numerous establishments pay bonuses to foremen and other "unproductive" workers for super-standard output, in addition to wages to direct labor for all time saved. These managements still make more profit on super-standard than on merely standard production, because of lower unit overhead costs, other than indirect labor.

unit costs and efficiency-control indexes, are (1) simplicity, (2) protection of the worker, especially during the learning period, and (3) improvement of production methods. These matters are given some attention elsewhere in this book, notably in Chapter 4, hence we shall notice them only briefly now.

1. The feature of simplicity, ease of understanding and calculating earnings, is in itself desirable not only to the worker but to the employer, since it means low clerical costs in figuring payrolls and wage statistics. The two simplest systems, however—straight day work and straight piece work—are often inadequate on other important grounds. Day work may give insufficient incentive to the worker, while straight piece work may insufficiently protect his interest if other factors than his own efforts hold down his production abnormally. Hence, it is very common to guarantee to the person who is on a piece work job some minimum hourly rate, at least during the normal learning period. In this case the worker must be paid by either the time rate or the piece rate, whichever gives higher earnings for the period in question; and thus we have a departure from the simplest possible wage arrangement. In the numerous instances where such a worker does not earn his pay according to the regular piece rate, the management sustains a "loss" which may be held to justify a diminishing piece rate on any super-standard output which it may obtain from him or from other workers. Such "losses," however, are only in part inevitable. By careful attention to equipment and supplies for skilled piece or bonus workers, and by various methods which combat labor turnover, the alert management may regard these occasional abnormally high labor costs as needful stimuli, arousing it to take care of its own end of the job.

2. The differential relations between earnings of straight time workers (wage or salaried) and workers paid on an output basis present many puzzling problems. The workman naturally presses for a guaranteed time rate as high as he can obtain, especially if occasionally he demonstrates good earning capacity on measured production. In the Glasgow shipbuilding industries the workmen are often given "lieu rates," higher than the regular day rates for their occupations, for plain time work,

which "lieu rates" purport to equalize their earning opportunities with those of themselves and comrades when "paid by results." But there is an evident possibility that the base rate may thus become high enough to impair the worker's will to "earn" it. Hourly base rates which are low enough, in relation to piece or bonus rates, so that the average worker can make say 20% to 50% bonus on measured production without hurting himself, not only make it more probable that he will produce up to standard when he is on measured work, but also tend to make those employees whose operations have not yet been time studied welcome such study rather than oppose it. Even the foremen and other indirect workers can be given relatively low base wages or salaries, and in addition be provided opportunity for supplementary earnings as production in their group increases.<sup>3</sup>

3. A factor which has played no small part in making wage schemes depart from a plain and apparently equitable combination of base rate and full payment for all time saved is uncertainty as to the proper time allowance, particularly as time goes on and methods are improved. The Rowan and Halsey and other less than 100% premium bonus plans solve this problem by "sharing the saving" between worker and employer; and they thus appear to neutralize the harm done by faulty standard-setting. These two problems will long exist, for the employer cannot practicably determine a proper task time to a high degree of precision, even assuming as standard the methods of doing

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<sup>3</sup>"When financial incentives were first employed, it was assumed that faster-than-average workers should earn more than the customary day rate for the type of labor they performed. F. W. Taylor advised additional earnings of 30% to 100% of the day rate.

"But it is obvious that when a whole labor market, such as that in Detroit, is paid largely on an incentive basis, there is no customary day rate for many occupations. Actual hourly earnings, no matter by what payment system they are figured, become the only reliable basis of comparison. The question of how much actual incentive is offered is not answered by comparing the hourly earnings with a non-existent day rate. *Probably the best index is obtained by comparing actual earnings with the rate which is guaranteed as protection.* In automobile and other concerns where the factors are under close control, the guaranteed rate is often kept low. It is usually between 60% and 70% of the earnings. But in plants where conditions are less stable, the protection is increased and the differential which comprises the incentive is reduced."—C. C. Balderston, *Group Incentives*, p. 76 (1930). See Chapter 14 below, however, on the recent reversion to day rates in the automotive industry.



the job that are used during the time study; still less can this boss "nibble" at the time allowance whenever some change occurs in method, by reason of the worker's shrewdness or otherwise. Advances in the art of setting task times, however, seem to have furnished better modes of attack on these problems than the "sharing" wage formulae. Tasks may now be set more accurately than in the days of Rowan, Halsey, and Emerson; and they may be reset as frequently as is necessary to prevent effort-and-skill earnings in one job getting far out of line from earnings in other jobs.

**Wennerlund Principles Sound.**—All told, then, there does not appear to be sound reason for departing far from the relatively simple combination of base rate and output bonus which is recommended by untutored common sense. The modification introduced by Wennerlund is perhaps especially worthy of attention. It smooths the transition between guaranteed base rate and attainment of standard output, beyond which earnings vary directly with production; also it provides a rather wide differential between the low producers, who may be learners or shirkers, and the effective producers. (In Wennerlund's system the workman who is only 75% or 80% efficient gets a small bonus added to his (low) base rate; and he who does the job in just the time allowed receives a bonus of 20% in addition to his base rate; whereas in the plain 100% bonus plan the output incentive does not begin to operate until the job is done within the task time.)

Supposing it is agreed that payment should be proportional to output at standard production or above, what may be said as to whether *payment per piece* should be the same to the Paid-by-Results worker who achieves his time study standard, as for the day worker in the same occupation who achieves just "average day work efficiency"? Here is a matter with which it is very difficult to come to grips, since practically we seldom find day workers and piece (or bonus) workers whose jobs are similar in every important respect except in method of payment. (An exception to this proposition might be presented by day workers of the Ford type, whose equipment, etc., is highly standardized,

and whose output might be compared with bonus workmen using similar equipment.) The opinion seems to be rather general that piece and bonus workers will ordinarily exert themselves more than proportionately to their higher earnings. That many workmen will strive strongly for high total earnings is shown statistically by Frain's demonstration, cited in Chapter 12 above, that his machine tool operators with the longer work weeks (50 hours and over) secured somewhat lower *hourly* earnings than those with shorter weeks; though the longer-week people obtained the higher *weekly* wage.

What is fair, as well as businesslike, as to earnings per piece depends considerably upon how well the management performs its functions of assisting the direct worker. If the day workers are hampered so that their output for a unit of effort or willingness is small, while the piece work employers provide better facilities, then it is surely reasonable that the latter managers should pay a lower wage per piece than the bosses of the day workers. If, however, the differences in output are substantially due to the differing efforts of the workers, then it is hard to justify rationally or morally a lower wage per piece for high production than for low production.

### B. Calculating Earnings With More Than One Measure of Productiveness

In Chapter 7 above it was argued that *one* wholly satisfactory measure of the worker's total accomplishment for his employer is seldom or never available, and a number of partial measures were there discussed. We have now to consider schemes for incorporating some of these partial measures into formulae for computing an employee's earnings for a given period, and also to consider the relative merits of fixed formulae versus the more general process of intuitively "taking into account" all that the manager can find out about the employee.

**Joseph and Feiss Combination.**—For this purpose let us start with an illustration from the wage practice of Joseph and Feiss, clothing manufacturers at Cleveland (as described by the late Keppele Hall in a pamphlet entitled *Wage Systems*, printed

by the company in 1923). In this system the earnings of an employee working on measured production were determined, in definite proportions, by four variables: output, quality, attendance, and length of service. The "Output bonus" was in effect a differential piece rate—the nominal piece rate applied to all production up to standard or 100% efficiency; but if the operative reached or passed this standard, and if the quality of his work was up to some minimum standard, then he received 15% in addition to the standard piece rate. The quality bonus was also 15% of regular piece work earnings, provided that quantity-efficiency in the period was 80% or more and that 100% of the quality standard was reached. The quality bonus scaled down to nothing for 95% quality or less. The attendance bonus was 50 cents for each day of attendance without tardiness, provided the next day's attendance bonus was also earned. Length of service bonus was 5 cents a day for each year of service up to 30 years (stopping, however, at age 60). This last bonus was put into a savings fund for the employee's retirement, but he could draw it out on leaving the company.

It seems difficult to justify the automatic increase of pay with increasing length of service for as long as 30 years, even at the rate of 5 cents a day. It will be recalled that unchecked automatic advances with lengthening service is one of the evils attacked by wage standardization through job analysis; and the argument that no one should be paid more than his services are worth, regardless of how long he has been with the employer, is very strong. "Dry rot" is to be dreaded. Yet a satisfactory "merit system" is exceedingly difficult to establish, practically; and these difficulties shield the seniority principle, to which we find large masses of people firmly clinging. In the army and navy promotions below a few of the highest ranks are largely by seniority; in industry, layoffs are generally among the more lately hired. Researches of insurance companies appear to show that the more experience a man has had in selling, the more desirable he is as a prospective salesman—up to a certain point. Beyond that, on the average, "experience" may be a handicap.

Bonuses for attendance, and fines for absence and tardiness, have been experimented with a good deal, apparently without

any widely accepted and well-proven policy emerging. It is certainly clear that an employee whose attendance is regular and prompt is of more value to the employer, other things equal, than the opposite type.

**Other Quantity, Quality, Waste Bonuses.**—A fifth factor is used rather widely in complex bonus schemes, namely, material wastage. C. M. Bigelow (a management consultant) reports:

Eleven years ago the writer was confronted with a very difficult problem in controlling the material wastage of knitted fabric and the control of the labor involved in converting such fabric into the proper cuttings for the fabrication of garments. The application of incentive for either of these features reacted disastrously against the other. Finally, a method was developed where the workers were paid on a differential basis for reduction of material waste and increasing production effort. It was discovered that while the material involved was some sixteen times as valuable as the labor involved, the differential incentive must be limited to about two and one-half times the reward for material conservation as for productive effort. With the use of this ratio practically maximum efficiency was obtained for both phases. As a result of the discovery of this principle, practically every material-utilizing industry has been studied and hundreds of applications of this differential payment method for both material and labor control have been made, with almost universal success.<sup>4</sup>

A system illustrating this point of view is supplied by E. E. Brinkman, referring to inspectors in a hosiery factory.<sup>5</sup> These inspectors were paid according to three factors: quantity (on a 100% bonus plan), quality, and waste of material. The two latter bonuses depended on sample reinspections. The quality bonus was computed by the following formula: (Actual per cent of defective units in sample, minus standard per cent of imperfections allowed)  $\times 10 \times$  (pay earned on quantity of output). If the percentage of imperfections was above standard, this "bonus" is a penalty, deducted from the other elements in earnings. Likewise the "bonus" for material wastage, which likewise is based

<sup>4</sup>*Management Review* (American Management Association, September 1928).

<sup>5</sup>H. Diemer (ed.) *Wage-Payment Plans that Reduced Production Costs*, pp. 253-58 (1930).

on actual number of perfect units which have been improperly thrown out by this operator ("in her zeal to achieve high quality classification"), compared with a standard tolerance. Net earnings is the algebraic sum of these three factors.

So we might take up in detail numerous other factors that can be more or less successfully measured, including the utilization of rating scales on employees. The study of schemes which assign numerical values to such factors in particular jobs is a fascinating occupation, the materials for which are indefinitely numerous. As was intimated in Chapter 7 above, some sales managers compensate salesmen by "point systems," in which certain weights are assigned to number of calls made, demonstrations given, prospects' names reported, and so on, in addition to dollars' worth of goods sold. One of the most ambitious wage formulae is that of George D. Babcock.<sup>6</sup> In this scheme the Halsey 50% premium bonus plan was used, for measurable production, with an elaborate calculation to determine each man's hourly base rate. (His total record for each quarter-year determined his time rate for the next quarter.) Beside the more ordinary factors, this formula included cost of living index, number of jobs in which the man was competent, value of equipment and materials used, and "cooperation and conduct."

**Summary.**—Most of the factors employed by Babcock and the rest are important enough to be plausible; but I doubt if there are many combinations of managers, jobs, and men in which definite and elaborate formulae can be set up which will give mutual satisfaction for any great length of time. Rather few and simple bonuses seem best, in the majority of situations. Business managers, however, are developing new and useful quantitative instruments for dealing both with the base rate for a well-defined occupation, and with the problem of determining how much better or worse Smith and Jones are than the average men of their occupations. As time goes on, very likely quantitative formulae will drive further into the background the rule-

<sup>6</sup> Given and discussed in his *Taylor System in Franklin Management*, pp. 84-108 and Appendix I.

of-thumb judgments which are now needed to temper the quantitative partial measures available of the worths of jobs and men.

#### NOTE ON COST OF LIVING BONUSES

Proposals and practices in the line of automatic adjustment of wages to changes in cost of living have given rise to a rather large and perplexing body of literature. In the 1870's, before the days of indexes of cost of living, "sliding scale" wage schemes were tried in several sections of British coal and iron industries, by mutual agreement between employers and trade unions, in attempts to minimize industrial disputes. This type of sliding scale wage plan provides that whenever certain wholesale commodity prices which are vital to the industry in question (e.g., iron or coal) change in a specified degree, the whole wage scale is to be shifted in the same direction, and by an amount predetermined for each degree of price-change. Such plans have persisted or recurred in some parts of the American iron and steel industry until very recently, if not to the present day. Their economic aspects were dealt with at some length by L. L. Price, in his *Industrial Peace* (London, 1887), and by W. J. Ashley, in his *The Adjustment of Wages* (London, 1903). To Price's volume the great economist Alfred Marshall wrote a long preface, in which he recommended that wages should be made to vary both with such key-prices and with whatever other index of prices might best represent the cost of living for wage-earners. The Fall River cotton manufacturing industry tried a sliding scale wage plan from 1905 to 1910.

During the war of 1914-18, and the years immediately following, much use was made of cost-of-living bonuses; and some agreements were set up for automatic adjustments of wages in response to changes in specified living-cost indexes. Many factual data on this later period may be found in Elma B. Carr's Bulletin No. 369 of the U. S. Bureau of Labor Statistics, *The Use of Cost-of-Living Figures in Wage Adjustments* (1925). The disputes which soon arose over methods of applying the principle are illustrated, with reference to the printing industries, by materials given in *Wage Arbitration* (Macmillan, 1928), by George Soule, who was economic counsel for some of these unions, and by an article, "Cost of Living as a Factor in Wage Adjustments," by F. H. Bird, economic counsel for printing employers, *Am. Econ. Rev.*, Vol. 11, pp. 622-642 (1921). During 1933-34 the Federal Government changed salaries, to some extent, by reference to official cost of living indexes.

I think both employers and employees would ultimately benefit from further experimentation with such schemes, though they are far from panaceas for industrial disputes; indeed, in their pioneer stages they may seem to provoke more controversies than they settle. During the

1920's money wages tended to rise faster and further than the cost of living; whereas during a prolonged depression the employer's ability to pay may sink faster than the cost of living. The automatic sliding scale, therefore, cannot keep exact pace with the fundamental conditions of supply and demand for labor; hence new wage agreements are still necessary at annual or some such intervals. But if such agreements were made in terms of real, rather than money, wages, fuller employment would probably result, as well as increased security of purchasing power for the worker. This case is well stated by Alvin Hansen:

"So long as we have violent fluctuations in general prices, wage rigidity intensifies the maladjustments, and in the end such rigidity will have to give way. The final necessary adjustment could be reached with less disturbance and less disruption of the wage structure itself if wages were more flexible. And let it not be forgotten that such wage adjustment does not mean at all a lowering of real wage rates. Indeed, with continued increase in productivity and efficiency, money wages should not fall as much as prices. . . . All modern industrial countries are faced with the danger of finding only part-time employment at high wage rates for their industrial populations. But part-time employment, even at high wage rates, is likely to mean low annual earnings."—*Economic Stabilisation in an Unbalanced World*, p. 368.

## CHAPTER 14

### GROUP WAGE INCENTIVES

The phenomenal growth of the American automobile manufacturing industry, especially in the 1920's, was rather intimately associated with a rapid introduction of group piece work and group bonus schemes. Such methods became very general in that industry and its auxiliaries, so that in recent years probably the major portion of its workers (aside from those in the Ford shops) were thus remunerated. The same devices also spread among many other industries, and consequently they have received great stress in recent wage literature.<sup>1</sup> In 1934-35 occurred a wholesale reversion to day rates, in the motor car industry, for reasons which will shortly appear; but in spite of this retrogression, group wage plans appear likely to be rather widely used in the future. We shall now inquire into their origin and development, and shall try to ascertain under what conditions they are most and least satisfactory.

**Precedents; Novel Features.**—Most of the elements involved in these methods, to be sure, were developed much

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<sup>1</sup>The National Industrial Conference Board's survey of 1928, which covered some 777,000 workers, showed that 30,000 were employed on group piece rates and 45,000 on group bonus. These two categories, therefore, accounted for nearly 10% of all the workers, and formed a much larger fraction than all the other types of payment by results, exclusive of individual piece rates. The straight piece rate group contained 218,000 workers, or 28% of all; the piece rates with guaranteed time rate group contained 38,000 persons, or about 5% of all. See the Board's *Systems of Wage Payment*, p. 8, and Chapter 6.

The volume entitled *Wage-Payment Plans that Reduced Production Costs* (McGraw-Hill, 1930), edited by H. Diemer, (composed chiefly of articles published in business journals, about 1928), gives reports from about a dozen companies on their installations of group incentives—mostly favorable reports.

C. C. Balderston's *Group Incentives* (University of Pennsylvania Press, 1930) gives a rather extended analysis of methods and problems, based in part on questionnaires returned by 22 named companies.



earlier. The recent group wage incentives "movement" was foreshadowed in many respects, not only by older scattered schemes of group piece work, and bonuses based on extra-standard output or time saved, but also by Henry R. Towne's historic paper on *Gain Sharing*, in 1889. The latter plan, which bases the group reward not merely on the amount of output or the time taken, but on its performance with respect to costs other than labor costs, is a sort of half-way position between group piece work or bonus and profit sharing. For this reason, and because it is somewhat more complex than ordinary group piece work or bonus, we shall deal with it in a later section of this chapter.

More directly have the newer group plans grown out of the schemes of individual payment by results which we surveyed in the foregoing chapters. Group, as well as individual, wage plans must develop quantitative standards of production, or time allowances, or tasks; and of course time study now plays a prominent rôle in such task determination. The question of what is a "fair day's work," for what sort of "fair day's pay," must be explicitly faced in group as in individual payment by results. Group schemes present no essential novelties as to "bonus curves" or formulæ, according to which the worker's earnings for a given amount of work are computed; they use the Halsey, Emerson, Taylor, Wennerlund, Bedaux and other formulæ, such as were discussed in Chapter 13. Still less do these plans present the problems of base-rates in any new light; they take over such occupational market rates as they can find or can determine, just as individual wage schemes do.

The principal novelties of group wage incentives, then, are not in the three features of standards, base rates, or formulæ, but in the fourth feature—Measurement of the Worker's Accomplishment. The individual's output is gauged, for group wage purposes, not by a count of his own output but by a count of the output of his group. Hence this chapter continues the discussion of Measurement, which was begun in Chapter 7 above. A few qualifications to these generalizations will appear as we proceed, but roughly it is true that the group plans modify other wage situations by stressing the group output as an index

of the worker's productivity. They may also be looked upon as intermediate between time work and piece work; for each individual in most group plans has his own guaranteed base rate for the time he actually works, and no pretense may be made of measuring his individual output.

**Group Piece Work vs. Group Bonus.**—Superficially these two schemes are quite distinct, but a moment's consideration will show that they differ only in choice among the formulæ discussed in Chapter 13. Group or gang piece work uses the formula of a uniform money wage to the group for each unit of group output; double the standard output gives double earnings, as compared with the wage paid for *just* standard production. The term "bonus," on the other hand, in group as in individual payment-by-results schemes, signifies a reward which is *additional* to the worker's regular time wage or base rate, but not necessarily *proportional* to his output. In individual remuneration we may have "bonuses" for matters like attendance and avoidance of tardiness and accidents, but in group incentive parlance "bonus" nearly always refers to a payment which varies in some relation to the group's output efficiency, modifying the calculation of hours worked by the individual, times his basic hourly rate, but does not vary according to a uniform money price per unit of output. If members of the group are paid, at their regular base rates, for *half* of the "time saved" by the group (i.e. half of "time allowed" minus "time taken"), then they are working under a group application of the Halsey 50% premium bonus scheme. Some bonus curves, however, differ from the curve of straight piece work, not for production above the standard performance or 100% efficiency, but only for outputs below it. Such is the case, for example, in the widely used Wennerlund bonus curve, which has been discussed in Chapter 13. Piece workers, too, are often, if not usually, guaranteed minimum rates of earnings, for the hours during which they work. And, as was explained above, a "100% premium bonus" scheme is equivalent to piece work with a guaranteed base rate, except when different workers on the same job have different base rates. Bonus, therefore, is a general term, which refers to any within

a great variety of wage formulæ, other than straight hourly or piece price types of calculation.

**Sample Group Bonus Calculation.**—Simplified concrete examples of the data and computations involved in such schemes may be taken from an article by R. F. Whisler, of the National Cash Register Company, as shown in the accompanying table.<sup>2</sup>

## GROUP BONUS SUMMARY

Group No. 18—Week of.....

Ck. No.	MTWTF S	Total Hours	Hourly Rate	Day Wage	% Bonus	Bonus Earn's	Total Wage
222	9 8 7 8 9 5	46.0	.60	\$27.60	36.0	\$ 9.94	\$37.54
333	9 9 9 5 9 4	45.0	.50	22.50		8.10	30.60
Total		91.0		\$50.10		\$18.04	\$68.14
Standard Hours 101		Actual Hours 91.0		Efficiency % 111.0		Bonus % 36.0	

In this illustration, the group consists of two men, an operator and helper. The bonus curve is 75% premium, meaning that beyond "75% efficiency," 1% of bonus is added to the day wages for each point of gain on the efficiency scale. At "100% efficiency" the bonus added to day wages would be 25%; i.e., from the starting-point of the bonus, production has been increased  $25/75 = 33\frac{1}{3}\%$ , while earnings have increased 25%.

After three years' experience with such a bonus plan this company replaced it by a group piece work plan, with individual guaranteed day rates; the computations for which Mr. Whisler illustrates by a table very similar to the one given above. Supposing a piece rate of \$68.18 is set for the output which these two men have produced in their 91 hours, and their day rates

<sup>2</sup>H. Diemer (ed.), *op. cit.*, p. 164. See also Mr. Whisler's paper, and several others on group wage plans, in American Management Ass'n, Production Executives' series No. 73 (1928).

and day wages are as shown above, then their week's earnings of \$68.18 are practically the same as in the group bonus example. The difference here is in the method of calculation. The bottom lines of the group piece work table read, instead of "Standard Hours," "Actual Hours," etc., as follows:

Group Day Wage	Group Piece Earnings	Bonus Factor
\$50.10	\$68.18	1.3609

The "Bonus Factor" of 1.3609 is substituted in the third column from the right-hand edge, for the "% Bonus—36.0" in the "Group Bonus Summary." To compute the bonus factor, the piece earnings of the group (\$68.18) is divided by the day wages of the group (\$50.10), giving in this case a factor of 1.3609. Then this factor is applied to each man's day wage, to find his share of the further earnings—i.e., the \$18.08 surplus of the group piece rate over group day wages.

These illustrative data were so chosen that equal hours worked, with equal outputs, gave equal total earnings under the two plans. If the reader will substitute other actual hours, and corresponding efficiencies (standard hours, or task times remaining constant at 101), he will see that the piece work plan gives earnings strictly proportional to output, above the point where the day wage is barely earned, whereas the bonus plan does not. Suppose, for example, the same output was achieved in 80 hours—40 for each man. Under the bonus plan we compute their earnings as follows: Standard Hours 101, Actual Hours 80, Efficiency 126%. (Efficiency is here defined as group's output, in standard hours' worth of work, divided by group's input of actual hours.) No. 222's day wage would be 40 hours at 60 cents = \$24.00; No. 333's day wage 40 hours at 50 cents = \$20.00; total day wages \$44.00. Bonus of 51% (i.e., 126 - 75) on \$24.00 would be \$12.24; total earnings of No. 222, \$36.24. No. 333's bonus of 51% on his day wage of \$20.00 would amount to \$10.20 and his total earnings to \$30.20; the total earnings of both would come to \$36.24 + \$30.20 = \$66.44.

Under the piece work plan, on the other hand, the job always pays \$68.18 (unless the day wages are greater); and so on this assumption of 80 hours actually taken, and day wages totaling

\$44.00, the "bonus factor" would be  $\frac{\$68.18}{\$44.00} = 1.55$  plus.

Applying this factor to the day wage of \$24.00 for No. 222 would give him about \$13.14 bonus earnings, and total earnings around \$37.14; applying the same factor to the day wage of No. 333 would show for him bonus earnings of about \$11.00 and total earnings of about \$31.00. Thus, at the higher efficiencies the workers receive higher earnings under the piece work plan than under this particular bonus plan. A 100% bonus formula, on the other hand, would give the same results for all outputs as this group piece rate plan.

Choice of the formula or bonus curve, by which earnings are to be determined each pay period, is in itself a matter of considerable importance; but we have considered it at some length in Chapter 13, and shall return to it again in Chapter 15. Group piece work and group bonus arrangements, however, possess numerous important features in common; and to these we shall now give attention.

**Conditions Favoring Group Incentives.**—How may we account for the epidemic of group wage plans? Is it due mainly to novel processes in industry, or have older sorts of work also succumbed to it? Some rather novel conditions in the mass-production of automotive products did especially favor these methods of payment, yet many other occupations have been affected too. Among the factors involved, the following seem to me most significant: (1) relative practicability of measuring individual and group outputs, (2) clerical and inspection costs, (3) inventory of work in process, and (4) flexibility and mutual helpfulness of labor force, especially in the straight line or flow type of production. In many cases, as we shall see, group payment by results has superseded day work; but also in not a few instances it has superseded individual piece work or bonus schemes. We must attempt comparisons with both day work and individual piece work situations, as we explore these four influences which tend to favor group payment methods. Later we shall canvass some influences which oppose the extension of group wage plans.

1. In many cases it is easier to *measure the output* of the group, and to establish standards for group payment by results, than is the case for individual activities within that group. In power houses, for example, there are now available a number of indexes of the efficiency with which the fuel is converted into steam, such as stack temperature recorders, analysis of ashes, and carbon dioxide measurements in the escaping gases, as well as over-all comparisons of fuel consumed with electric current or steam pressures produced. Often these measures can be applied to individual boilers, so that the crew of the single boiler may be paid a group bonus dependent upon its own performance. By the development and application of new indexes of group accomplishment, large numbers of workers who had formerly been paid day wages solely have been brought into the fold of payment by results. Since a measurement of output does not have to be entirely accurate or fair to produce a notable increase in the energy of a former day worker, the results have tended to be gratifying to the employer by reason of lowered production costs, and to the employee by reason of higher earnings. The same sort of study and ingenuity which finds group measures, to be sure, also finds individual accomplishment indexes for more and more jobs, e.g., messengers, stockkeepers.

Sometimes an application of group payment by results will be made in a department or establishment where only day work has prevailed before; but probably more common is its application to groups of which the *direct* workers had previously been paid on some output basis. The individual productivity of these direct workers is relatively easy to measure, in contrast to the more variable services of auxiliary indirect or "unproductive" laborers, such as truckers, helpers, and timekeepers. Hence it has been common to pay direct workers by results, and indirect workers by straight day wages. But when the attention of managers is drawn to group schemes, they perceive that these plans offer possibilities of new stimulation to the indirect workers, by giving them an obvious stake in the productivity and efficiency of their respective teams.

2. Group wage incentives are recommended, not only by this quasi-measurement of accomplishment for former day workers,

but by the real or apparent influence of group wage plans on the "burden" of *clerical and inspection* costs. On this account they sometimes supplant individual piece work or bonus. We have noticed that the growth of mass production tends to develop the repetition of standard operations, and that this condition tends to promote payment by results. The National Cash Register Company's factory, for example, "with 425 different lines of work [products and models] has in active production over 44,600 different parts which involve 500,000 detail operations, 91% of which are paid for by piece work, group or individual." <sup>8</sup> If all these operations were paid by individual piece rates, the stations required for inspection and counting and recording (after each piece worker has finished his operation) presumably would not number half a million, because many a worker would perform more than one "detail operation" in a series. Yet the inspection and counting stations might well be numbered in thousands, since most "parts" require the attentions of more than one piece worker.

Compare this type of situation, as to inspection and clerical work (and opportunities for errors and collusions between piece workers and counters, to cheat the employer) with the corresponding costs to this factory for its "1,000 people in 100 groups working on . . . 'gang' or group piece work." Here inspection and counting must be provided for each of the 100 groups, not for each of the 1,000 workers. Each worker in effect inspects the work done within his group, for the final products of the group must pass inspection to receive credit, and defective output must be re-operated without pay. In general the formal inspection and counting now becomes confined to "assemblies" of smaller parts, e.g., motors or rear axles in an automotive plant. The larger the group, the smaller the clerical expense; but of course such economy is very soon offset by the dilution of incentive of the individual worker.

3. Allied to the saving in indirect labor cost which a group plan may often achieve, by comparison with an individual efficiency wage, is the corresponding saving in *working capital* tied up in pieces which are waiting for the inspectors and enumer-

<sup>8</sup> Whisler, *op. cit.*, p. 162.

ators. Sometimes, to be sure, it is possible by an automatic device to keep continuous record of the individual's quantity of output, and to control his quality adequately by sampling instead of inspection of every piece. In such a case he may be paid pretty closely in relation to his own output, although he passes each piece, after he has finished it, on to the operator who carries it a stage further. But usually individual piece work or bonus requires that each worker accumulate his little pile of product until it reaches the standard batch that is worth while for the inspectors and clerks to deal with, before these pieces may go forward to the next process. (Some extra transportation may be required for these batches, by the way, compared with the continuous flow layout to which most managers now aspire: here is another indirect cost of individual piece work, to be added to that of inspection and counting). The capital tied up in one of these batches, and the chance that the piece may become obsolete before it reaches the salesman's hands, may seem small matters; but for the aggregate of such batches these costs furnish a very strong motive to supersede individual piece work by group payment or day work. The cost accountants at the Packard Motor Car plant, for instance, regarded this saving as an outstanding gain from such changes.

4. The economies in work in process and transportation, just discussed, have played some part in developing the *flow lines of production*, often using mechanical conveyors, which are so characteristic of the automotive industries; and this type of production, in turn, provides some further conditions favorable to group payment.<sup>4</sup> One of these is the desirability of teamwork and flexibility in the labor force, to keep the work flowing steadily through the group's bailiwick. Individual piece work conduces to rather rigid demarcations among jobs, and to great reluctance of the individual piece worker to do anything which he regards as outside his normal vocation. Such standing on ceremony is obstructive to a continuous flow of production; for even in the best-regulated factories, "bottle-necks" will occasionally develop which call for alertness in other workers to help

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<sup>4</sup>See remarks on Production Control, in relation to wage methods, in Chapter 5 above.



out the man or men at the station which for the moment has become a bottle-neck. If you pay a worker with reference only to his own operation, you give him a strong interest in repeating that one operation as often as he can, without concerning himself whether all other operations are being carried on in the right proportions demanded by the finished product of his group. When you pay him according to his group's output, on the other hand, he becomes more concerned in having all parts in his department produced in such balance as to maximize the output of complete group-products. Such coordination and balancing, to be sure, is always primarily the responsibility of the management; yet efforts of the common workers, which can be influenced by group payment, are often found well worthy of attention.

The following further quotation from Mr. Whisler of the National Cash Register Company will supply a concrete epitome of many of the propositions given above, and will also point to another type of work where flexible and cooperative labor needs to be encouraged, besides the flowline type:

The most outstanding results were found on work formerly paid for on a day work basis. Individual piece work would also have brought about many of the results which group piece work has. However, the individual plan has one drawback which our group plan removed, namely, the difficulty of fixing definite individual standards for payment on certain grades of work.

In changing individual piece work jobs to group piece work the principal gain has been in absorbing and reducing the indirect labor such as helpers, truckers, clerks, job-setters, adjusters, and so on, who formerly were on day work. Our experience as a whole does not indicate that a well balanced, fairly priced, individual piece work job, wherein men are working on non-continuous work (such as punch presses), will show increased production on the group plan. We have better results where men run groups of machines (three or four power mills, four to eight screw machines) because they can relieve each other during various emergencies which cause a machine to "run-out" before the operator can get to it.

It seems to us that the conveyORIZED process offers the best field for group piece work or bonus because the very momentum of the flow of production keeps the individuals alert to their duty and compels them to hold up their end of the work. It also provides the field for

group or cooperative effort and makes group payment practically a necessity.<sup>5</sup>

**Conditions Limiting Group Payment.**—The advantages which we have just surveyed are counterbalanced in some degree, of course, by disadvantages, to which we must now turn attention. In many cases, after trials of group wage plans, they have been given up; and numerous sources of dissatisfaction have been reported. The difficulties appear to be of three general sorts: (1) those encountered in any change from day work to payment by results, individual or group; (2) fluctuations in composition of a group, as to number of members and their base rates; and (3) weakening of the self-interest of the worker, especially if his group is too large or too scattered.

1. Most of the objections voiced against group payment need no special discussion here, as they are similar in principle to *corresponding difficulties in systems of individual payment by results*, which we have already considered in the foregoing chapters. Group plans, we have noticed, are quite commonly applied to workers who were previously paid straight day wages; and so inevitably a new set of problems is presented both to management and to workers—problems of measurement of work done, setting of tasks or time allowances, and of selection of the “bonus curve,” for example. Abundant new opportunities for friction on these matters are bound to arise.

A large concern [for example] now finds that its plan, which gives all the labor savings to the employees, has “pegged” its labor costs so that it has not been able to take advantage of better supervision and technical improvement because many of the changes are not sufficiently clear-cut to justify lowering the task times. Consequently, the management is now considering the use of a bonus curve which will divide the labor savings between the company and the employees.<sup>6</sup>

Precisely the same problem is encountered in individual payment by results; and it is questionable whether the use of a less than 100% bonus plan is generally the best way of dealing with it. Similarly, the objection raised against many group schemes,—that they are too complex to secure the worker’s understanding

<sup>5</sup> *Op. cit.*, pp. 166, 167.

<sup>6</sup> C. C. Balderston, *op. cit.*, p. 24.

and full confidence—is but tiresomely familiar in all discussions of individual bonus schemes. Still another complaint is that clerical costs of a group scheme are high. The complainant in this instance probably is contrasting the group bonus scheme with straight day work. If he compared any well-considered group plan with any staple individual piece work or bonus plan, he would see that the group plan is less costly in administration. It is inevitable, in most situations, that payment by results and quick-acting controls of labor costs should involve new expenses of engineering and administration, by comparison with old-fashioned day work and absence of any cost accounting. These new expenses, of course, tend to justify themselves abundantly by the economies which they achieve elsewhere.<sup>7</sup>

2. Among the difficulties which are peculiar to group payment by results, are some which arise from *variations in the composition of the group* and in the base rates of its members. Within any one company, the practice as to what sort of supervisors or leading hands, if any, are included in pay groups is likely to be uniform; but differences of policy among companies may cause some dissatisfaction. New and inexperienced workers have to be introduced into a group sometimes; their lack of skill lowers the group output per man per hour. Attempts are often made to protect the older service people from decreased earnings in such cases.

Many employers follow the policy of dividing the burden equally between the company and the employees who remain in the group by carrying new employees on day rates for approximately one-half of the time necessary for the average person to reach normal output. The

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<sup>7</sup>A quantitative illustration of the change which has occurred in proportions of direct and indirect labor in manufacturing is supplied by Mr. Sam Mavor: "In our own Works, of the total number of operatives 26.4% are not engaged directly in production, but are occupied in facilitating and helping the work of the direct producers. For example, in the Toolroom alone there are about fifty operatives compared with nineteen in 1914; in addition the specialised departments of the Drawing Office, the Planning, Costing, Clerical, Purchasing and others, are also ancillary to the direct producers, and they are much more costly than formerly. The saving in total cost of production [from lowered direct labor cost] is therefore much less than may at first sight appear, because the expense of providing these aids, to which the individual direct producer's enlarged output is mainly due, must be added before comparison can be made with former costs."—*M. & C. Apprentices' Magazine*, Spring 1933, p. 9.

arrangement in these cases is for the company to pay the new employees on a day-work basis for a given period (which is often three days) and to credit their output during this time to the gangs [not debiting the gangs with the hours worked by the new people, during this initial period].<sup>8</sup>

And since the rate of production required by the employer from any group is generally fluctuating (on account of seasonal and other influences on his business, or interruptions from other departments, or what not), the group's membership will often be reduced by layoffs or by shiftings of members to other jobs. Factors like these influence considerably the efficiency of a group, as indicated by the fraction :

$$\frac{\text{Standard hours for the output}}{\text{Actual hours worked}}$$

Shifts of personnel also are likely to change the relations among base rates of members, and thus change the bonus earnings of individuals, even if their efficiency as measured by the fraction just mentioned remains constant. In the ordinary group bonus plan, standards and bonuses are calculated by references to totals of *hours worked by all members of the group*, with no reference to the skill or base rate paid for each hour. Hence an increase in average base rates tends to raise the labor cost to the employer; a decrease tends to lower it. This feature of the bonus plan illustrated by the table on page 269 caused that plan to be superseded by a group piece rate plan, which keeps the labor cost constant to the employer. This standard labor cost is based on a fixed expenditure of hours in fixed proportions as to the base rates of more and less skilled labor. Even in the latter scheme, however, there is a bonus to be divided among the group members (i.e., the amount by which the group piece rate exceeds the sum of the day work earnings), which sum is ordinarily divided in proportion to the day work earnings of the respective members. If any member, therefore, is replaced by a worker with higher base rate, and if total hours worked remain the same, the other workers find their shares of the bonus reduced in a two-fold manner: both the day work earnings and the bonus share of the new member will be larger than those of the former

<sup>8</sup> Balderston, *op. cit.*, p. 85.

member, while the total price to be divided is unchanged. The others would be similarly affected by an increase in the base rate of one member.

3. Doubtless the most important offset to the savings in counting parts, and other overhead services, to be derived from group efficiency-payment, as compared with individual payment by results, is the *dilution of incentive to effort* which generally increases as the pay group is enlarged. In both these qualities a group wage is intermediate between day work and individual piece work or bonus. Clerical and other indirect labor expenses are apt to be lowest with day work, but so also is the zeal of the worker. Individual payment by results, on the other hand, when effectively administered tends to give the maximum incentive, but at the cost of considerable administrative expense. This generalization, however, needs to be qualified in several ways. If a group of jobs gives scope for much flexibility and cooperative activity among the workers, for example, then some sort of group bonus may supply not less incentive toward the kind of thinking and acting which the employer wants from his men, but more. If the work of the individual, on the other hand, is sufficiently distinct from that of others so that he may always keep his nose to his own grindstone with advantage to his employer; and if, moreover, the costs involved for capital tied up in work in process, and for administration, are not too heavy,—in such a case individual piece work or bonus is indicated.

The balance between these opposing forces seems generally to favor rather small payment groups—say 5 to 20 members. Of the 22 companies who contributed data to Balderston's Appendix D, nearly all reported that they preferred groups of 20 or less. They also pointed out, of course, that the size of the group is determined quite largely by technical circumstances as to where a convenient product emerges for inspection and counting. Except one department store, all these 22 concerns are manufacturers,—mostly on a large scale. It is interesting that, in spite of the variety of operations and products (e.g., meat packing, electrical apparatus, rubber goods) these small groups are preferable and apparently usually feasible. Automobile manu-

facturing seems exceptional. The White Motor Company "has tried groups between 2 or 3 to 30; in the case of maintenance, groups of 100 have been tried." This report is similar to those received from other industries. But the other two motor concerns in the list show wide departures from such limits. Chevrolet was said to prefer gangs of 50, and to have tried groups as large as 400; Packard preferred about 125 and had gone as high as 600. The Chrysler plant "divided its assembly into five groups which handle the frame, chassis, and body assemblies, the final assembly, and the final inspection,"—probably all good-sized groups. That the largest groups should be found in the Packard plant is rather surprising, in view of the quality, styles, and rate of output of the product.

Prof. Balderston says<sup>9</sup> that the factor of *area* over which members of a group work is often discussed, but that he finds no clear evidence whether it is important. No doubt the answer depends on the facilities which members of a gang have for information as to the quantity and quality of work which each of their comrades is doing. Automatic conveyors or other transporting and reporting devices may enable workers to cooperate who cannot see or hear each other work, for with such facilities any shirking will readily be detected through interruptions in the flow of work. In general, however, group wage incentives depend on mutual "policing" of the group members, which will ordinarily be more effective when they are closely in touch with each other. Probably this circumstance largely explains why small groups are so generally recommended.

**Group vs. Individual Payment by Results.**—Even in small groups a group wage is sometimes so inferior to individual piece work or bonus that reversion is made to one of the latter schemes. Once more I quote significant testimony from Mr. Whisler, as to the experience of the National Cash Register Company—which has had exceptionally long and broad experience with individual piece work:

While we laid our plans carefully to provide for recognition and reward of the individual's relative value to others in the group, we soon

<sup>9</sup> *Op. cit.*, p. 35.

found that the faster operators tapered off from their previous individual records, and the slower operators showed little improvement, if any, with the result that the earnings and production of a group became less than on individual piece work and slower operators were somewhat overpaid and the faster operators were underpaid.

The principal reason for this, as we see it, is that in a group of ten or twenty men, one man can increase his production and not be directly and immediately rewarded, while another man feels that he can slow up and still get a good share of the group earnings. After operating six months to two or three years, these attitudes developed among the men and production suffered . . .

Some one will say "only a question of supervision to prevent or correct this condition." Which is true to a certain extent. Many of our foremen overcame this condition through closer supervision and detailed checking of the individual records. But what have we then? A new problem of supervision which would not be needed on the individual piece work plan. . . . this problem is strongest where group replaced individual piece work and in work of an individual nature. Where day work has been replaced by group work, these problems almost never arise. These former day work jobs are generally of a "collective" nature and most adaptable to group work.<sup>10</sup>

If you incur the expense of keeping record of each individual's output (where such record is feasible), you do indeed nullify much of the saving which is promised by the group method of payment. The individual's base rate, however, should in any case be adjusted to his general individual usefulness, so far as that can be economically estimated. For this purpose occasional sample counts of his work, trade tests, and carefully supervised ratings by his overseers, may be recommended. Along such lines as these may perhaps be achieved the best balance between the group scheme's economy of administration and the individual scheme's strong incentive to zealous work.<sup>11</sup>

<sup>10</sup> *Op. cit.*, pp. 168, 169.

<sup>11</sup> The International Bedaux Company stated in its pamphlet *Bedaux Measures Labor* (in 1929):

"Wherever practical, group payment is avoided. Its only advantage lies in increased simplicity, for experience has proved that individual productivity varies inversely with the number of operators in a group. Man instinctively seeks to distinguish himself, and his interest is defeated by submergence in a group where the best is undistinguished from the worst."

Another consultant, Mr. C. M. Bigelow, viewed the matter differently. In his practice, "The first approach to the reward of industrial workers is usually by the application of individual rates." Then, "With a solid experience of the application of properly used individual rates established there is

**Abandonment of Group Wage Plans in Automobile Manufacture.**<sup>12</sup>—In the spring of 1934 one automobile manufacturing plant discontinued the group wage system and replaced it by day work. Soon votes were being taken among workmen and works councils in other factories and departments, with the result that within a year group payment was no longer an outstanding characteristic of the automotive industries. This scramble must have afforded no little satisfaction to Mr. Henry Ford, who had always adhered steadily to day work. Why did his competitors give him this satisfaction? My answer to this question will stress, first, certain factors which led to demands for the change from the labor side; and, second, the reasons why managers acquiesced—and indeed sometimes took the initiative.

**Labor Arguments.**—On the labor side some weight may be given to the trade union organizers who were rapidly gaining power in the industry during this period. These organizers found some dissatisfaction existing among the workmen on account of group wage methods, a part of which was based on the individual's difficulty in verifying his employer's calculation as to how much he earned in a given day. There were also complaints, in the many instances where the groups were rather large, that a man lost the benefit of his own hard work by reason of the shirking of fellow-members of his group. From one point of view, these objections would seem to be best overcome by individual piece work; but that would be impracticable for most of the jobs involved, and anyhow these trade unionists are more conscious of the "speeding-up" aspects of piece work than of the possibilities of safeguarding the piece worker. One of

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an additional step which usually results in not only increasing efficiency, but in greatly eliminating clerical detail and expense. This is the use of group rates. I believe that any attempt to establish group rates without a proper background of the application of individual rates or very carefully compiled past performance records will not give the maximum possible results from this form of application. I do know, however, that given such proper background, the group rate brings about a coordinated effort on the part of the labor personnel which individual rates can never give."—*Management Review*, Sept. 1928. The public accounting firm, Ernst & Ernst, published in 1926 a pamphlet, *The Better Wage*, explaining group bonus practices.

<sup>13</sup> This change was discussed by my colleague, Prof. C. B. Gordy, under the title "Back to Day Rates," in the *American Machinist*, Feb. 13, 1935, pp. 161-164.



the indictments brought against the automobile group payment systems, in fact, was that task times were unreasonably cut by the managements, as production accelerated after the introduction of new models and processes. The labor leaders must have realized that change to a day wage might well bring a more driving sort of supervision by foremen; but they thought that by organization they could keep the working pace within limits acceptable to themselves.

A principal attraction of the new hourly rate to the workman is that it is likely to be much higher than the base rate which was guaranteed him under the preceding plans of payment by results. His hourly earnings, to be sure, including bonus, probably averaged at least as high, under the group plan, as the new day wage rate; but the base rate which he was guaranteed under the bonus régime was rather low. Now, each day that he goes to work he is assured of hourly earnings distinctly higher than was guaranteed by his base rate under the old plan. His hourly rate is now also his maximum rate of earning, it is true, for the current pay period; but on the other hand he can readily compute how much he earns, each day, and moreover his managers may hold before him the hope of rate increases, if and as he demonstrates his worth.

**Management Arguments.**—How could the employers afford to grant hourly day rates markedly higher than the old base rates? The men usually understood, and sometimes explicitly agreed, that efficiency must be maintained in order to carry on the new program; but a large part of the answer, in a nutshell, is Production Control. These managers reasoned that, by means of time studies and competitive prices of automobiles and parts, as well as by alert supervision, they could keep their workmen up to schedules of output which would enable them to pay hourly wages about as high as the hourly earnings had been under the group wage plans. Every morning labor efficiency is promptly computed for each operating unit, by comparing actual hours worked the previous day with standard hours for the product turned out; and this procedure readily shows where the current sore spots are located. Incidentally the manage-

ment benefits by some saving in clerical costs on payroll computations. It seems that in general labor costs have not been adversely affected by the change.

If we suggest to the motor makers that day rates tend to produce a dead level of efficiency among their men—though admittedly a high level—we may be told that their production schedules are so exactly interlocked that it would be almost as bad for any man to produce *more* than his appointed task, as less. The argument is plausible, but in my judgment fallacious. A great deal of production is not yet on such exact schedules, and even where it is, over a season the task can be fitted to the capacity of the man. The employer who allows many of his more capable people to feel that it is not worth their while to do much more than the poorer workers who are able to “get by” is accepting a business handicap.

**Net Results.**—What is the net import of these events? The change is somewhat greater in appearance than in reality, for there was no reversion to old-fashioned day work, with hit-or-miss supervision and measurement of the worker's efficiency. The time studies and production schedules remain, and in the end the workman is paid much more nearly according to his individual productivity than was the day worker of old. The real changes brought by the developments just outlined appear to boil down to two; some leveling of hourly earnings, and intensified supervision by foremen to compensate for the loss of some mutual supervision by members of each pay group. Remember, however, that under group bonus and group piece work, as the group becomes larger these same effects are produced—leveled earnings and laxity of mutual supervision. Very likely the bigness of the groups made the group plans particularly vulnerable in the automobile industry. If means are now found to reward the individual's good work promptly, by advancing his rate, as well as to punish poor work, the new day work systems will perhaps provide stronger incentives to effort, on the whole, than the group schemes which they displaced. Still greater efficiency, however, could probably be achieved if this same careful attention to individual rate adjustments were

combined with a group bonus, applied through small groups. In this way the ambitious individual (in particular the worker for whom individual piece work or bonus is inapplicable) could feel more confident of earning a good bonus by the exertions of himself and his few teammates; and he could also count on a relatively high base rate as part of his reward. If his base rate is raised, however, to the point where he is unable to earn an appreciable bonus, he is likely in time to work less effectively than if he had a lower guaranteed rate and a larger bonus element in his earnings.

Labor organizations would probably not long oppose this sort of payment by results, provided they had more opportunity to check and intelligently criticize time studies and other features of industrial administration.

**Towne's Gain Sharing Scheme.**—Group wage schemes of our own day owe part of their inspiration to the Gain Sharing plan, developed in the Yale and Towne plant and reported by Mr. Henry R. Towne to the American Society of Mechanical Engineers in 1889.<sup>18</sup> The older scheme, however, is logically intermediate between group piece work or bonus and profit sharing; hence I use it here as a transition to the latter topic. Group piece work or group bonus, as such, makes the earnings depend mainly or entirely upon the *output of acceptable units of production*; though sometimes bonuses for factors like quality, or saving in materials, or length of service, or attendance, are also made part of the whole wage scheme. Towne's plan, on the other hand, made group remuneration, in each pay period, dependent upon a comparison of the actual costs of production which that group had an opportunity to influence (e.g., for labor, materials, fuels, lubricants), with standards which were set up in the original agreement. Members of the group would also earn individual wages in their customary ways; some on the day wage or plain time basis, some on piece rates. (A length of service factor was also used in some individual base rates.)

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<sup>18</sup> See Proceedings of that Society for 1889. The paper was reprinted in *Economic Studies of the American Economic Association*, Vol. I, No. 2 (June 1896). I have used this latter reprint.

The new plan was like gang piece work in that during the life of the contract, say one year, a standard cost figure was set in dollars for each unit of each type of product on which the group might work. To the group's gain sharing account was credited each unit produced, at this standard price; and the same account was debited with the actual wage payments (direct and indirect), also the material, fuel, heat, light, power, maintenance, and other departmental costs which the workers could influence—supplies being figured at prices fixed on the basis of the preceding six months or year. (Thus the workmen were not in the position of speculating on rises or falls of material or fuel or oil prices during the life of the contract.) The totals of these items, and the resultant pool available for gain sharing, were posted monthly; the actual distribution of the dividend to labor was made annually.

**Sample Computation.**—Mr. Towne gave some specimen accounts, from which I shall cite an illustration. "Contract No. 3" was made for five years beginning with 1887, covering a

YALE & TOWNE GAIN SHARING ACCOUNT, GROUP 3, 1887<sup>14</sup>

Credit:	
Standard cost for operations performed in group.....	\$5,061.50*
Debit:	
Wage earnings of helpers.....	\$3,666.34
Tools .....	511.32
Supplies .....	43.79
Total charges .....	4,221.45
Net gain to be shared.....	\$ 840.05
Helpers' 25% of this amount is.....	210.00
(which is a dividend of 5.7% on each dollar of the \$3,666.34 earnings)	

\* I have deduced this figure from the others given by Mr. Towne.

certain group of "helpers"—apparently hired by a sub-contractor-foreman. These helpers received 25% of whatever gain might be made, by comparison with the standard costs adopted. (They were not required to share an annual loss; although monthly losses were deducted from the gains of other months in

<sup>14</sup> See Towne, *op. cit.*, Appendices A and B.

that year. Out of ten gain sharing contracts there were two in which there were small losses for the first year.) The results in 1887 for Group 3 were as given in the accompanying table. In the first year of their contracts, the eight groups which achieved better than standard costs earned dividends on wages of 1.8% to 12.3%. In its second year, Group 3 made 7% on wages.

**Towne's Explanation of His Method.**—Let us notice Mr. Towne's comments on the problems of determining standard cost for gain sharing, and of deciding what fractions of the gain are to go to employer and employees. He was one of the most progressive and enlightened business men of his time; to his encouragement F. W. Taylor owed a great deal. (Taylor's work on time study for determination of time allowances or task times was then in its early stages.)

Mr. Towne observed that the first requisite for the scheme was knowledge of the present average costs, controllable by the workmen, in the department. If existing records do not show them, then suitable records should be set up and maintained for six months to a year before a gain sharing contract may be proposed.

At the beginning of a contract [he remarked] the employer obviously has the right to adopt whatever "contract prices" he pleases, since their purpose is merely to serve as a basis from which to compute the "gain" in which he voluntarily tenders participation to the employees, and since the contract does not diminish the obligation of the employer to pay each employee his stipulated ["going rate"] wages. Presumably the employer will adopt reasonably low contract prices, that is, closely approximating to previous cost; because to do otherwise would be prejudicial to his own interests; although to fix them on too low a scale would defeat the object of the system by leaving no opportunity for "gain," and hence no stimulus to increased efficiency of the employee.

Later in the paper, however, he tells us that his own standards were generally more difficult to attain than the actual costs previous to the introduction of the gain sharing arrangement:

The "contract prices" adopted for these gain sharing accounts were in some cases the actual previous costs, but in a majority of cases the contract prices were fixed at rates which were a reduction of from 10% to 20%, and in one case of 30%, from previous costs. These reduc-

tions were made advisedly, and only in cases where there was good reason to believe that increased effort would result in very considerable reductions of costs. In most cases the results have justified the reductions, and even on the basis of the new prices the contracts have yielded fair profits or dividends.

This argument seems, on its face, to do rather scant justice to the employees; but a standard cost lower than previous actual costs might be justified by further considerations. The employer might show, for instance, that costs had declined from year to year in the past, due perhaps to improved equipment, processes, and management; and that he was proposing, as a standard, the cost which would probably be realized the coming year if no gain sharing contract were adopted.

With respect to division of the gain among the various parties, Mr. Towne said that in each of the 21 contracts he had instituted, "it has seemed proper to make this division an equal one,—one-half to the principal [Yale & Towne] and one-half to the operatives. . . . Obviously, however, different circumstances may justify or require a different basis of division." The "operatives' " fund was divided in various ways. If the foreman was on salary, he would receive 10% to 15%, and the non-supervisory workmen the remaining 35% to 40%. If the supervisor was a contractor who obtained a piece-price from the company, out of which his helpers were paid regular wages, he would receive a larger fraction than if he were a salaried foreman. Apparently Group 3 was supervised by a foreman-contractor, who probably received 25% of the gain, while his "helpers" received 25%.

**Possible Improvements.**—Wider and longer experience than was available to Mr. Towne in 1889 would doubtless bring up many arguments in favor of different methods of sharing the gain, if any. The supervisor's salary, for example, might be adjusted more frequently, in accordance with changes in his responsibilities; and he might then share in the gain only in the proportion which his salary formed of the total wage and salary payments. It might also be found in many cases that a fraction more or less than 50% to the employing company would give more satisfactory results. There are powerful arguments in

favor of giving the company part of the gain over preceding costs,—e.g., to compensate for the new record-keeping and other administration required, and to safeguard the employer against a standard cost which would unduly favor the workmen and handicap the employer in comparison with his competitors. Mr. Towne was doubtless familiar with the Halsey and Rowan schemes of bonus, and perhaps took this “sharing” feature from them. It is conceivable, however, that better results would be obtained if the employer shouldered the whole cost of administration (as the scheme might save him some supervision) and employed experts to study equipment and methods with a view to resetting the standard cost annually or perhaps oftener. If the men agree to this sort of progressively lower standard cost, the employer can well afford to give the employees all the gain which they achieve in each period.

**Prospects of Plan's Wider Use.**—Why has this Gain Sharing plan, which looks so well on paper, not been more widely used? Is there some “joker” in it? Possibly a few further comments may better indicate its possibilities. We have seen that Mr. Towne excluded gains or losses due to price fluctuations of materials and products from the computation, so that the workmen were relieved from speculations in those matters. In this respect he considered his plan superior to profit sharing. But the workman inevitably is a speculator in the prices connected with his work, because through his employer they spell employment or unemployment for him, as well as higher or lower wage rates. I shall argue in Chapters 16 and 17 that this speculative feature is not really a defect of profit sharing but on the contrary is a merit—in that the workman's job is safer, and his annual earnings likely to average higher, if his employer's total labor payments are somewhat contingent upon his profit.

As an immediate stimulus to the worker's effort and ingenuity, however, the gain sharing scheme is far superior to profit sharing; both because factors which, like prices, are beyond the worker's control, are excluded in the former, and because of the smaller groups whose extra wage incomes are determined by collective results.

**Summary—Gain Sharing and Other Group Wages.—** Finally, how does Gain Sharing compare with Group Wage Payment in net advantages and drawbacks? As practiced by Mr. Towne, gain sharing was unduly vulnerable to sudden changes in wages and prices. It set fixed standard dollar costs for labor, over a rather long period—a year or perhaps longer. If wages rise, during that period, the workmen have no chance of a gain to share and so the plan gives them no incentive. If wages fall, it creates a windfall for them and a handicap for the employer in his competition—unless the terms of the contract are revised when the wage change occurs. Commodity price changes would not have a similar effect, because the same price per unit of material, fuel, etc., is assumed on both debit and credit sides of the accounts during the period. If current actual prices were used, however, the employer would benefit by the automatic direction of employees' efforts at economy toward the things which, for the moment, offered best opportunities for savings. These same objections could also be urged against a group piece rate which should be guaranteed for a year or more. If a piece rate can be guaranteed only against minor changes in methods, why should a gain sharing scheme be further guaranteed? Compared with a group piece rate, the gain sharing plan has the important advantage of rewarding cooperative effort, not only as to quantity of output, but for economy of materials, maintenance and departmental costs generally. Its results are approximated, and perhaps in some respects improved upon, by many current schemes of quality bonus, scrap bonus, and so on; but compared with most of these it seems more logical and intelligible and likely to appeal to workmen as a fair arrangement. The recent wave of enthusiasm for small group systems of remuneration should lead to further experimentation, along lines surveyed by Mr. Towne.



## CHAPTER 15

### WAGE EXPERIMENTS

**Multiple Causation.**—No phenomena are more familiar than the vast variety of schemes of wage and salary payment, the announcements of what purport to be new methods from time to time, and the changes from one to another which employers so frequently make. A naïve person may well ask, why has not the “one best way” (or at most the few best methods) driven out of circulation all others? Those who are more conversant with practical situations, to be sure, can argue convincingly that differing conditions of employment rationally favor different wage plans, even in the same shop. The innumerable people who have been connected with the countless changes which have been made in wage systems can tell (and have told) more or less confidently what results seemed to be achieved by these changes. Installing new incentive plans has been an important occupation of efficiency or industrial engineers, and the management literature teems with their reports of achievement.<sup>1</sup>

These reports differ greatly among themselves in credibility and significance; but with few exceptions they do not satisfy scientific standards of evidence and interpretation. The authors are commonly production executives or consultants who are under pressure for financial results; hence they are apt to institute numerous reforms in equipment, supervision, selection and training of workers, shop routines, etc., as well as in payment methods—all at nearly the same time. Often they can report pretty accurately how production costs compare, before and after their whole campaign; but practically always it is impossible to

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<sup>1</sup>See, for example, collections of such articles, compiled and edited by D. Bloomfield, *Financial Incentives for Employees and Executives*, 2 vols. (H. W. Wilson, 1923); and by H. Diemer (*op. cit.*).

say with much assurance what effects are to be attributed to any particular innovation, such as a wage scheme.

In scientific laboratories, on the other hand, experimental investigations of factors in working efficiency have usually dealt with incentives only incidentally, or with non-pecuniary motivation such as competition or knowledge vs. ignorance by the subject, of his accomplishment in each trial.<sup>2</sup> Some of these academic researches are doubtless of considerable significance for the workaday world; but in many ways a closer alliance between scientific and practical people is advantageous for trials of incentives, particularly pecuniary.

In the present chapter attention will be given successively to four investigations, each of an unusually searching character, on comparative effects of differing methods of payment. Three are in as many factories; one refers to retail trade salespeople, in a number of separately owned stores. In all cases the workers studied were of the same types that are commonly hired for their jobs.

**Mavor and Coulson Wage Methods.**—Our first case is supplied by Mavor & Coulson, the Glasgow firm referred to in Chapter 8 above and Chapter 18 below, as well as elsewhere in this book—manufacturers of coal mining and other machinery, with some five hundred employees. Mr. Sam Mavor has published an account of his concern's experiences with the Rowan wage scheme, after 1899, and compared it with the operation of a new 100% premium plan (called "M. & C. Bonus"), which is based on time studies similar to those of the Taylor school.<sup>3</sup>

The accompanying table is taken from Mr. Mavor's first paper. For twenty staple operations, time allowances and times actually taken by the workers are compared, just before

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<sup>2</sup>A recent example of non-commercial investigation, which however is oriented with some reference to industrial conditions, is reported by C. A. Mace, under the title *Incentives; Some Experimental Studies*, Grt. Brit., Indust. Health Res. Bd., Rept. No. 72 (1935).

<sup>3</sup>See his three papers, read before the Institution of Engineers and Shipbuilders in Scotland, of which the first two were entitled, respectively, "Payment by Results and Rate-Fixing," and "Time Study in Engineering." Published by the Institution, Elmbank Crescent, Glasgow, 1930, 1931. The third (1932) paper, "The M. & C. System," etc., was cited in Chapter 8 above.

WAGE EXPERIMENTS

EXAMPLES OF TIMES ALLOWED AND TAKEN ON THE SAME JOBS BY ROWAN AND BY M. & C. SYSTEMS, DURING THE ABNORMAL PERIOD OF CHANGE OF SYSTEM

Fitting and Assembly Operation	Rowan System		M. & C. System	
	Allowed	Taken	Allowed	Taken
	Hours	Hours	Hours	Hours
1.....	70	53	13.75	9.25
2.....	48	31	17.25	9.5
3.....	225	140	29.5	20
4.....	45	28	7.75	4.25
5.....	75	47	25.5	16.5
6.....	28.5	18	5.25	3.25
7.....	13.5	7	1.5	1
8.....	20	23	6.5	4
9.....	8	4	4	2.5
10.....	80	33	13.3	8.75
11.....	30	16	5.6	3.75
12.....	45	29.75	6.2	4
13.....	48	31	17.1	11
14.....	6	4	1.25	1
15.....	64	40	8.8	6.25
16.....	5	4.5	1.48	2.5
17.....	50	27.5	7.34	4.5
18.....	30	25.75	11.53	7
19.....	195	68	20.37	14
20.....	195 } 90 }	272.5	25.15 } 23.18 }	21.5 16
Totals.....	1371	903	252.3	170.5

Reduction in total times allowed..... 81.5%  
 Reduction in total times taken..... 81 %  
 Bonus paid on Rowan System..... 33.5%  
 Bonus paid on M. & C. System..... 54 %

and just after the change from the Rowan plan of payment to the M. & C. bonus scheme. The former plan, it will be recalled (see on page 248), adds to the workman's regular hourly earnings a bonus which is a percentage equivalent to the per cent which he has saved of the time allowed for the job. Thus, time allowed for Operation 1 in this table, under the Rowan plan, was 70

hours; the men were actually doing this work in 53 hours, thereby saving 17 hours or  $17/70=24.3\%$  of the time allowed. If the worker's base rate on this job were 50 cents an hour, his earnings for the job would be found by the following computation:

53 hours taken at 50¢ per hour.....	\$26.50
Plus 24.3% of \$26.50, bonus.....	6.44
Total earnings in 53 hours.....	<u>\$32.94</u>

The M. & C. 100% premium scheme is easier to understand; it simply pays the workman, at his own base rate, for *all* the time allowed for the job, regardless of how much less time than this he actually took to finish it (unless he took more than the time allowed, in which case he is paid at his base rate for the time he actually worked). This latter plan is like piece work with a guaranteed time rate, in that for all production at standard performance or above, the worker receives equal pay for equal units of output. If the change of wage methods had been made on Job No. 1, *without change in the time allowance*, then these men (assuming their rates to be 50 cents per hour) would be paid under the new scheme  $70 \times .50 = \$35$  for completing the job, whether they actually took 70 or 53 or 25 hours to do it.

But, as the right-hand columns show, when the change was made the time allowances were radically shortened, as the new methods of time study showed that alterations in equipment and methods had made much less time necessary. The total of time allowances on the twenty illustrative jobs was cut from 1,371 hours to 252.3 hours—a reduction of 81.5%. Yet the times taken were soon reduced in the same proportion and the men's earnings per hour actually worked were increased by 15%, because they were now paid for *all* the time saved instead of for only a fraction of it. The men's output per hour was increased more than five-fold, so that their payment per piece was greatly reduced; in fact the saving in direct labor cost to the management was nearly 80%.

Mr. Mavor's comments, quoted in the following paragraph, show how this striking change became possible, and tell us that even further improvements were presently made:

[This] Table does not refer to the normal working of the Rowan system, but to the period of changing from it to another. The purpose of the Table here is to illustrate the almost incredible extent to which men will spin out their work under the noses of foremen, in a shop where rates have never been cut, and where the management and men have always been on friendly terms. The circumstances were that the time allowances (some of them pre-war) were originally given for fitting machines built individually to order. Post-war standardization involved complete jigging, gauging, and inspection of all machined parts to insure precision and free interchangeability; this was done part by part and was a gradual process, so that step by step the job became simply assembly, but the policy was to withhold transfer to the new system until the process affecting each size and type of product was complete. The management observed with considerable interest that the progress of simplification from fitting to assembling made no difference to the bonus earnings of the men, who continued to take the same time as formerly. The management, whose plans for transferring the work to the new bonus system were maturing, preferred to allow temporary continuance of the anomaly until the time was ripe for the change, because at that time it was extremely important that nothing avoidable should be done which would raise questions during the inaugural stage of the M. & C. system, with the working of which the men were not then familiar. It should be said that the enormous reduction of times was chiefly due to batch instead of individual production, to standardization and the jigging and gauging of all machined parts to insure free assembly and interchangeability, and to the tuning-up of the shop services, but the effects of all these were slumped and absorbed in the times taken. While it was known that the times taken were excessive, it was not known until time study was applied how exorbitant they were; the fair times for the jobs, as ascertained by time study, were a revelation alike to the management and to the men. Had the men been working on plain time, they would never have dreamed of holding back to the degree that was required to conform with the conventional percentage to which, in the view of the men, the bonus earned should be restricted. The M. & C. times taken as shown in the Table were from the *first* time studies, and all the times have since been largely reduced by tuning-up with the aid of time study. Such differences as are shown in this Table could not occur in machining work. Although the Table records what occurred under a special set of circumstances, it is illuminating.<sup>4</sup>

Some 45% to 50% of the workers in this establishment are engaged in "bonus work" (i.e., on jobs for which time allowances have been set), and, as was stated in Chapter 8, page 133

<sup>4</sup>"Payment by Results and Rate-fixing," *loc. cit.*, pp. 12-14.

ff., they earn an average of 50% bonus, or more, added to their guaranteed base rates.

**Significance.**—In spite of the peculiar circumstances which here provoked an amount of voluntary limitation of output which is doubtless quite exceptional, several points of very general significance are brought into relief by this experience and report. Most obvious is the need, in any scheme of payment by results, of a careful setting of task times or time allowances. The old M. & C. allowances had become excessive to an unusual degree; a general change like this from highly skilled and time-consuming fitting to more or less quantity-assembling of thoroughly interchangeable parts does not often come about. On a smaller scale, however, it is quite normal, under only moderately progressive management, that the time actually required to do almost any job shall be gradually reduced by improvements in routines and accessories and methods generally; and that many of these improvements are not of sufficiently obvious importance to make a re-timing of the job seem justifiable to the workman. Very likely some such improvements at Mavor & Coulson's were made in the course of the time studies; if so, this factor might make the table give a somewhat exaggerated impression of limitation of output by the workmen. It is apparent from the printed discussion by other Glasgow employers that they were in general dread of appearing in the eyes of their employees to be rate-cutters. Most of them expressed confidence that their own time allowances were kept at reasonable levels; and that whatever wage system they were using was operating satisfactorily. It seems likely, however, that few had conducted time studies so thorough as those of Mr. Mavor; and that if they did, like him they would be astonished at their findings.

**Defects of Rowan Plan, Today.**—Does the case shed any light on inherent tendencies in methods of wage payment? Do we have here a serious indictment of the Rowan scheme as such, and a validation of payment in strict proportion to output? Mr. Mavor thinks so; but, as indicated above, some of the confrères

thought the method of payment rather unimportant, provided only that time allowances are properly determined.<sup>5</sup> Others, however, agreed with him that the Rowan scheme has some inherently undesirable consequences, both to the management and to the men.

First, the fact that the worker can never make as much as "double time" (since he could obtain 100% bonus only by saving 100% of the time allowance—i.e., by doing the job in no time at all) inevitably makes the employer lax in setting time allowances, and tends toward procrastination in the overhauling of them. Even if the Rowan time allowance is closely and accurately set, however, it provides an insufficient inducement for the superior workman to do his best. The Glasgow men expect, and through their unions require, that allowances shall be set so that "the average man" can make, normally, time and one-third; so that in order to achieve this mark under the Rowan plan they must do the work in two-thirds of the allowed time. Not a few workmen under this scheme will reach 50% bonus, by completing the task in half the allowed time; but very seldom do they go further. The extra reward, beyond that point, is too small for the extra effort, particularly as they fear that higher performance would tempt the employer too strongly to cut the rate by shortening the time allowed.<sup>6</sup> At first blush it seems that the man who does the work in half the allowed time is doing very well indeed; but remember that under normal labor conditions at Glasgow, this man who takes just half of the time allowed is actually doing only about 12% better than the average worker, who can—under Rowan's plan—make 33⅓% bonus only by completing the job in two-thirds of the allowed time. At various points in Mr. Mavor's paper and its discussion it was argued that it is only fair

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<sup>5</sup> Mavor & Coulson still make some use of the Rowan scheme in repair work and other cases where it is not worth while to make better than a rough estimate of the time required, but in which it is desirable, of course, that the workman should have opportunity, by similar skill and effort, to make earnings as high as he could make on standardized jobs.

<sup>6</sup> Just before the change-over at Mavor & Coulson's it is apparent that the deterrent to increased production was not the effort required (it was more irksome to restrict output so much), but the workmen's tradition that their output should be pegged at an average of about 33% bonus. During the current depression the trade unions lowered the requirement mentioned above, so that their men must average only 25% bonus.

that extra-capable men should be paid in full proportion to their results; and that it is good business so to pay them, because in general the employer profits more from their work than from the output of the slower workers. Piece work, of course, when accompanied by a guaranteed minimum time rate, has nearly the same qualities as the 100% premium plan now used by Mavor & Coulson. The latter sort of bonus plan, however, is preferred by many employers to piece work, most rationally in order to avoid revision of the piece price list whenever shifts in the labor market make some change of base time rates necessary, and in order more adequately to insure suitable earnings to the better workers.

In the Society's discussion of Mr. Mavor's address, the late Mr. K. M. Sloan made an effective plea for the Halsey premium bonus plan, which pays the worker for less than 100% of the time he saves (from a rather liberal time allowance):

What justification is there for 33 $\frac{1}{3}$ % or 25% or 50% going to the employers? The possible reasons for increase in output, and a corresponding increase in wages, are:

- (a) Extra exertion, or skill on the part of the operator.
- (b) Improved methods of performance, originating from the operator or from others.
- (c) Improved supply of raw material.
- (d) Improved service on the part of the management.
- (e) Improved machinery and apparatus.

An examination of these factors will show that, in many cases, the increase in output is not attributable to the operator, but may be to a large extent, due to the management. Even if it were entirely due to the skill of the operator, the employer has a right to expect some improvement in the course of manufacture; otherwise, his progress would be curtailed, and he would not be in a favorable position to compete with another manufacturer who started at a later date.

Many of the difficulties may be overcome with fairness to both parties, if it be recognized that change of conditions necessitates change of time allowance. This, however, introduces rate-cutting, which is very apt to destroy any value a system may have as an incentive to increased production, on the part of the operators.

When the improvements are quite obvious and of not too frequent occurrence, the time allowance may be altered, but small improvements—the result of a progressive management—may be taking place all the



time. There is certainly a lack of incentive to introduce such improvements when the entire benefit is reaped by certain workmen, and the management has no share in it, beyond that of a saving in oncost [overhead] charges.

The advantages in equity and incentive which follow from a system which allows any worker to make earnings strictly proportional to his output, using as a base the average output and pay of the day workers in his occupation and his labor market, can perhaps be achieved, and the difficulties mentioned by Mr. Sloan surmounted, where there is a capable standards or rate-fixing department constantly at work, studying every job say once a year or once in two years. Such a routine is already employed in many plants. Time allowance setting must always be somewhat controversial; but if the general relations of earnings to effort and skill are satisfactory to the workers, and if the time studies are openly and intelligently made and explained to them, they can become habituated to re-timings of jobs, even when no outstanding changes in methods have occurred.

**Incentive Experiments at Western Electric Company.—**

The research which we have just examined was undertaken in the ordinary course of business; but it is of scientific importance because the situation was acutely observed and reported by Mr. Mavor. Let us consider now a more consciously experimental procedure, in the Western Electric Company's large (Hawthorne) factory at Chicago, during the six years 1927-32 inclusive. This research program grew out of studies with reference to the effect of lighting on working efficiency (made earlier than 1927); went on to rest pauses and lunches and other factors in fatigue; and led presently to preoccupation with interviewing employees and attempts to discern their general social-psychological attitude patterns. Special attention was given to supervisory methods, as factors in the worker's efficiency and welfare; and the outstanding impression gained by the investigators and commentators was that such efficiency and contentment were not closely correlated with any one or combination among the numerous variables which were measured and recorded. Only a few changes were made in the pecuniary incentives; yet

these call for comment here, if only because so few records have been made public of careful wage experiments.<sup>7</sup>

**Relay Assemblers.**—How did the experiments with which we are now concerned proceed? The outputs of five experienced relay assemblers, who were chosen “at random” as subjects, were recorded, without their knowledge, for two weeks in April-May 1927; during which “base period” they continued to work in a large department of 100 or more other female relay assemblers, who were all paid a group bonus or piece rate according to the performance of the whole department. Each of the five girls, during this base period, completed about 2,400 units a week, or around 50 relays per hour. It was customary for the supervisors to make occasional checks on the outputs of the individuals, as a means of keeping the group’s efficiency up to their standard or “bogey”; but continuous and complete production records were not ordinarily kept with reference to individuals.

These five subjects were then (early May, 1927) put into a special test room, in charge of a man from the piece rate setting department. It was explained to them that tests were to be made of changes in hours, rest periods, lunches, and so on; and “they were expressly cautioned to work at a comfortable pace, and under no circumstance to try to make a race out of the test.” Each operative, in the test room, dropped the completed relay into a chute which was connected with a device that instantly punched a hole in a slowly-moving tape; thus was produced a unique permanent record of the exact rate of output of each worker.

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<sup>7</sup> These researches, during 1927-29, were reported by G. A. Pennock and M. L. Putnam, in the *Personnel Journal*, Feb. 1930. I have to thank officials of the company for courtesies extended to me in connection with a visit in the summer of 1930, and by correspondence before and since. For other, and more complete, accounts, see various papers by Elton Mayo, especially Chs. 3-5 of his *Human Problems of an Industrial Civilisation* (1933); and by T. N. Whitehead, particularly his articles “The Scientific Study of the Industrial Worker,” *Harvard Business Rev.*, July 1934, and “Social Relationships in the Factory,” *The Human Factor* (London, Nov. 1935); also the report by F. J. Roethlisberger and W. J. Dickson, cited in Chapter 8 *supra*. In all this reporting, however, there is but little comment on the significance of such changes as were made in the wage methods.

After they had spent five weeks becoming accustomed to working in the test room, an experiment was made with change of pecuniary incentive—no other variation, apparently. Throughout the following eight weeks they were paid a group piece rate, based on the output of their own small group, and thus cut loose from the fortunes of the big department they had left. Their output rose slightly; about 4%. During the following years, until the test room operatives had all to be dismissed in mid-1932 for lack of seniority, various changes were made, for weeks and months at a time in respect to hours, rest pauses, lunches, work positions, and doubtless other circumstances; but apparently no further change occurred in the method of remuneration. Some adjustments were made in base rates of individual members of the group, presumably mainly in accordance with their respective production records; but the small group piece work arrangement was continued. By the latter part of January 1928, nearly nine months after this experiment began, the test room group had improved upon its base-period *hourly* output by perhaps 15%. Then, in January 1928, Operators 1a and 2a were replaced by Operators 1 and 2, who remained in the group until the layoffs of 1932. The hourly output curves of all these individuals (and of still other substitute operators) show many irregularities; yet unmistakable upward trends may be discerned, extending over several years' time, trends not to be well accounted for by any of the measured variables in the situation. Operator 3, for example, starting at about 50 relays an hour, got into the 60 to 70 class about a year after she entered the test room (which was in May 1927), and remained at that level until she left in 1932. Operator 5 required a much longer period to achieve a firm footing in the 60 to 70 rate; whereas Operator 2, who completed 60 to 70 an hour almost as soon as she entered the test room (early in 1928), within a year was seldom doing less than 70, and for some weeks averaged more than 80.

**Social Interactions: The Mica Splitters.**—These long trends in the relay assembly test room were supplemented by some other indications of modes in which pecuniary incentives

affected the work of such operatives as these. Home conditions were important; Operator 2, for instance, had a heavy dependency load; Operator 3 was dominated by her parents and had no control over the spending of the money she earned; and Operator 5 apparently increased her production markedly after some domestic crisis (in 1930) which aggravated her need of money. These reactions are not surprising; but we are less well prepared for the revelation that during several weeks in 1932, when they knew they were about to be dismissed for lack of seniority, and hence their need of high earnings was extreme, the discouragement of this situation produced marked slumps in the outputs of all these assemblers. Or—perhaps the expectation of a dismissal bonus made them feel less than normal immediate need for high current earnings.

Aside from relations like these between earnings and personal circumstances, several other factors are shown to have been important influences on these girls' day-to-day efficiency. Those most emphasized by Messrs. Pennock, Mayo, and Whitehead are (1) the more pleasant supervision in the test room, and (2) the social relations among the operatives themselves. This latter factor was studied by Wyatt, as is told in the last section of the present chapter. In some ways the Western Electric materials are superior to those of Wyatt, notably in extending over a much longer period, and in containing more comprehensive and detailed measurements of production, as well as of other matters, like physical examinations of the workers.

Two other investigations made by the Western Electric people in 1927-1929, give some further hints as to results which may be attributed to certain wage method changes. The first of these refers to a control group of five other relay assemblers, who were *not* taken out of their regular and large department. After a five-week base period, during which their individual rates of working were checked without their knowledge, they were told that thereafter they would be paid according to the output of their own little group, instead of according to the production of the big group. They responded with an immediate increase of output of 13.8%, and held up to that mark during the five weeks over which the arrangement was continued.

Then their method of payment was restored to its original status, whereupon their production fell, during the seven following weeks while it was counted, to a rate 5% to 10% below their base period. Thus, their improvement in output, during the five weeks while they were paid on the output of their small group, was greater than the improvement of the test room assemblers within a similar period after they were given a similar wage scheme—in fact, it seems to have been more than six months before the test room group was regularly producing as much as 14% over its base record.<sup>8</sup>

In the second of these supplementary experiments, five female mica splitters were transferred to a test room for experiments similar to those in the relay assembly test room, but without any change in the mica splitters' basis of pay. The latter workers were paid individual piece rates throughout. When Mr. Pennock's report was prepared, in the autumn of 1929, they had been working in their test room a year, and their production had increased to 20% above their eight-week base period. The inference usually drawn is that the more congenial supervision in the test rooms was the chief determinant of the increased output which occurred in both these rooms—in one of which a change in wage method was also made, while in the other no change was made in wage method.<sup>9</sup>

<sup>8</sup>See G. A. Pennock, "Test Studies in Industrial Research at Hawthorne," *Personnel Journal*, Feb. 1930. Remember that two of the original operators in this test room were replaced, before the first year was over, by girls who seem to have been more capable than the operators they displaced. This change of personnel probably vitiates comparisons of the group's output, after the change, with the group's production at any period before the change.

<sup>9</sup>*Ibid.* See also E. Mayo, *op. cit.*, Ch. 4, pp. 79 ff. The mica splitters worked overtime—5½ hours in a six-day week—during their base period, and throughout their first 35 weeks in their test room (until June 15, 1929). Apparently the relay assemblers in their test room never worked more than a 48-hour week. The mica splitting test room group was continued, with a 48-hour week, until May 19, 1930; then, owing to the depression, with a 40-hour week for about four months, when this experiment was discontinued. In both test rooms, I gather, during most of the experimental periods there was a rest pause about the middle of each half-day, usually ten minutes in the afternoon and fifteen minutes in the morning—and no such organized pauses in the regular relay assembly and mica splitting departments. During the morning pause a light lunch was in order, supplementing breakfasts which were often inadequate. The social atmosphere and supervision were more congenial to the girls in the test rooms than in the larger departments.

**Significance, re Pecuniary Incentives.**—These Western Electric researches at least throw very interesting sidelights on comparative effects of wage methods, even though very few changes in such methods were made. Interpretation of the material, from this wage-method point of view, is attended, however, by such difficulties as these: Statistically, how did the members of these various small experimental groups compare with other members of their occupations, in aptitude and in experience when they began to take part in the tests? It appears probable that some of the improvement in output which occurred in the relay assembly test room was due to the replacement of Operators 1a and 2a by more capable persons (Operators 1 and 2); and it would be desirable to compare the performances in both test rooms, week by week, with the man-hour (girl-hour) outputs in comparable work in the regular departments.

More attention should have been given, in the earlier years of the experimentation, to such evidence as could be secured on the degree, if any, of voluntary restriction of output during the base periods. In a department other than any of those named in this chapter, and in one of the later years of the research, restriction of output was found to be part of a larger problem, in a group of male workers;<sup>10</sup> otherwise the possibility of restriction is not explicitly dealt with in the published reports and comments.<sup>11</sup>

Finally, it would be interesting to see what effects might show up, in six months or so, from individual piece work by relay assemblers in the test room. Quite possibly such individual piece rates would not have affected the output much, for the adjustments which actually were made in the individuals'

<sup>10</sup> See F. J. Roethlisberger and W. J. Dickson, *Management and the Worker*, etc., Harvard Business School, Bureau of Business Research, 1934.

<sup>11</sup> Statistical materials presented by Whitehead, to be sure, in his "Scientific Study of the Industrial Worker" article, make it appear doubtful that willful restriction characterized the work of the test room relay assemblers. The gradualness of their improvement, after entering the test room, suggests that they did not abruptly release a brake on their rates of production; and their speeds while in the test room appear to show random or normal-probability variations which are inconsistent with self-restricted output.

base rates may have enabled each operator to feel, most of the time, that she was being paid pretty closely in accord with her own efficiency. Still, the differences between short-run and long-run, and individualist and collectivist, aspects of individual and group piece work are such as to make experimental comparisons between them of real significance. A meaningful trial of day work, or straight time basis of payment, on the other hand, is scarcely compatible with carefully measured output. So long as the workers know that their individual products are being recorded, the management can scarcely escape the reality of payment by results; though in form it may be a time rate which is only at long intervals adjusted to the individual's achievement record. In the relay assembly test room, no impressive results were immediately apparent when these few operatives were made a piece work payment group by themselves; but the effect of a similar measure with the control group, added to the continued use of the small group for payment, in the test room, reinforce the arguments advanced in Chapter 14, in favor of small units for group piece work or bonus.

**Department Store Investigation.**—The Western Electric case illustrated the application of natural science types of scientific research to problems of incentives. We may notice now a study of particular incentives which was conducted by methods more characteristic of quantitative social science. In social affairs, controlled experiments are seldom feasible, at least in the field and at the time when some one is prepared to make the study; in other words, the clear-cut "Method of Difference", as logicians say, is not then available. But to some extent this defect in quality of information can be compensated for by a sufficient quantity of measurable items; i.e., the "Methods of Agreement and of Difference" can in some sense be applied statistically. If the measurements of dominant factors are sufficiently precise, indeed, then by multiple and partial correlation methods such statistical results will be a reasonably complete substitute for (or even more significant than) laboratory controls which experimentally vary only one force at a time.

The statistical study from which we shall proceed to extract a few particulars, entitled *Wage Methods and Selling Costs*,<sup>12</sup> is mainly devoted to analysis of volume of sales in relation to amounts of wage payments, methods of wage payment, and other personnel data, in four departments of 31 retail stores during the year 1928-29. The methods of wage payment are very numerous in detail, and terminology is far from standardized; but four principal types may be distinguished; straight salary, salary plus commission on all sales, straight commission, and quota bonus. The first three terms need no explanation, but the quota bonus is perhaps not familiar to all. It is essentially a combination of salary plus a commission on sales over the salesperson's quota. ("Salary" and "drawing account" are often used interchangeably; but the latter term more accurately applies to advances against commissions that may be earned later.) The quota usually bears a close relation to the department's "selling cost," which is simply the percentage which wage payments in the department constitute of its total dollar volume of net sales. The individual's selling cost is the percentage which her wages represent of the net volume of sales credited to her. If her department's selling cost is budgeted at 6%, and if her weekly salary or base rate is \$10, then her annual salary is \$520, and her own annual quota might be \$8,660—for \$520 is 6% of \$8,660. (Sometimes, however, the sum of the individual quotas is made greater than that of the department, to allow for various shrinkages).

The salesperson working on this basis receives a percentage bonus, in addition to her salary, on all sales above her quota. The rate of bonus used, in the case of a quota based on 6% selling cost, might be 6%; in which case the plan would give earnings strictly proportional to sales when quota is reached or exceeded. But more probably it would be less—say 3% or 4%. (Salary payments to individuals who do not sell their quotas during the year, and other leakages, make it impossible to use

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<sup>12</sup> By Anne Bezanson and Miriam Hussey, of the Industrial Research Department, Wharton School, University of Pennsylvania, in cooperation with the National Retail Dry Goods Association (Philadelphia, University of Pennsylvania Press, 1930).

These authors have kindly read and criticized this part of my manuscript.



the departmental selling cost both for setting individual quotas and for paying bonuses on sales above quotas). If our clerk's salary is \$10 a week, her quota \$8,660, her bonus rate 4%, and her actual year's sales \$10,000, then her year's earnings will be computed somewhat as follows :

Salary .....	\$520.00
Bonus: $.04 \times \$1,340 (= \$10,000 - \$8,660)$ .....	53.60
Total earnings .....	<u>\$573.60</u>

A. DISTRIBUTION OF HOSIERY DEPARTMENTS BY SELLING COST AND METHOD OF PAYMENT <sup>18</sup>

Selling Cost Per Cent	Straight Salary	Salary Plus Commission on All Sales	Quota Bonus
3.2.....		21	
3.3.....	63	25	
3.4.....			
3.5.....			
3.6.....			79
3.7.....			99
3.8.....			
3.9.....	23	30	40
4.0.....	24		
4.1.....		20	57
4.2.....	59		66, 41
4.3.....	15	70	98
4.4.....	93, 71		48
4.5.....	85		
4.6.....			81
4.7.....	92		
4.8.....		12	49
4.9.....			
5.0.....	77		
5.1.....		72	
5.2.....			
5.3.....		54	
8.1.....			76

<sup>18</sup> Reproduced from Bezanson and Hussey, *op. cit.*, p. 66.

**Statistical Relations of Wage Methods, Selling Costs, and Earnings.**—What evidence was found as to results attributable specifically to the wage systems? Are there significant differences among the stores in earnings and selling costs, which can be correlated with methods of payment? The accompanying tables are derived from an intensive analysis of a year's weekly

**B. DISTRIBUTION OF HOSIERY DEPARTMENTS BY AVERAGE WEEKLY EARNINGS AND METHOD OF PAYMENT**<sup>15</sup>

Earnings	Straight Salary	Salary Plus Commission on All Sales	Quota Bonus
	(Key-numbers of stores)		
\$12 and under \$14.....	77		
14 " " 16.....	92, 59		66
16 " " 18.....	85, 63, 24		98
18 " " 20.....	15, 71	12, 70, 20	57, 41
20 " " 22.....	93	72, 30, 25	76, 49, 79
22 " " 24.....		54	99, 48
24 " " 26.....			81
26 " " 28.....	23	21	40
28 " " 30.....			
Median.....	\$17.90	\$20.96	\$20.93

records in the hosiery departments of 29 stores,—mostly large stores. It will be observed that none of the three payment methods is consistently associated with high or low selling costs; but there is some slight association between the straight salary method and low earnings. The latter association may not be directly causal, however, since the straight salary departments tend to be in the smaller stores, which are most inclined toward this method of payment. "An analysis of the departments of similar size shows that no one could give an unqualified answer to the question of the effect of the plan of payment upon the level of earnings. The same statement may be made of the relation of the effect of payment [method] to volume of net sales."<sup>14</sup>

<sup>14</sup> *Ibid.*, p. 67.

<sup>15</sup> Reproduced from *ibid.*, p. 67.

Almost equally detailed analyses are given, in the volume cited, for a few other departments,—ready to wear, men's clothing, and house furnishings. It appears that no more positive indications were found in these as to effects of wage method; although further difficulties of interpretation are offered by the small number of departments in these categories which use the straight salary plan.

**Nominal vs. Effective Wage Methods.**—Does this study really signify that employees who are working on "plain time" or straight salary, in the ordinary sense, are as productive and as well paid, on the average, as salespeople who are paid by results? Such a conclusion would run contrary to a vast body of practical lore as to the generally stimulating effect of a wage incentive based on measured output. And such a conclusion is indeed not warranted with reference to these stores; for in effect most of their salespeople are paid by results,—the sales made by all (or virtually all) selling employees are sedulously recorded and studied by the managements. The variations in method of payment among these departments, therefore, are variations in details of adjustment of earnings to sales and of frequency of adjustment, rather than in the fundamental point of payment according to a measurement of output which is independent of supervisors' opinions. Table A, on page 307, shows a closer approach to uniformity of selling cost than its companion (Table B) shows toward uniformity of earnings, doubtless because, in general, the stores cannot, or at least do not, get a large volume of sales without paying the salespeople almost proportionally for it. A striking fact is that Store No. 63, paying straight salary in the hosiery department, showed the lowest variation in selling costs among its individual employees (1.8% to 4.2%). Clearly these straight salaries in Store 63 were more closely adjusted to the clerks' respective volumes of sales than were the earnings in any of the departments which paid commissions on sales.

Another factor which tends in practice to submerge the nominal distinctions among these departments as to method of pay, is their habit of advancing the salary or drawing account (in

commission and quota bonus stores) in accordance with the employee's sales. In these commission and bonus departments the salespeople usually receive over 80% of their earnings in the form of salary or drawing accounts.<sup>16</sup> When we add that these relatively small bonuses and commissions are often paid less frequently and promptly than the salaries, the limited motivating effects of the former become still more apparent.

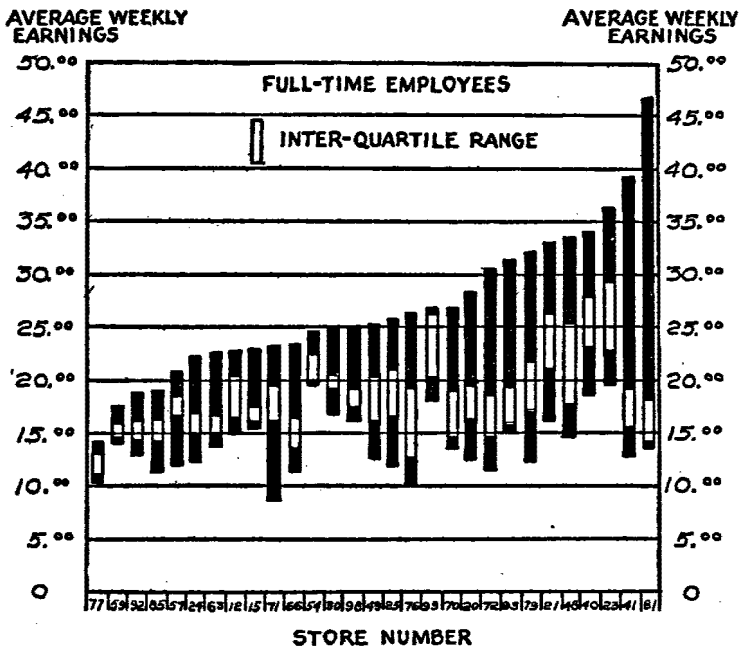


Figure XIII. Range of Average Weekly Earnings in 29 Hosiery Departments. (After Bezanson and Hussey)

The unusually complete information supplied by our authors on variations of earnings and of selling costs among individual salespeople within the same establishments, is worth noticing here. Figure XIII shows the range of earnings within each of the 29 hosiery departments, also the more significant inter-

<sup>16</sup> *Ibid.*, p. 32.

quartile ranges, containing the middle 50% of employees. (By referring to Table A, on page 307, the reader may ascertain which wage method is used in the hosiery department of each of these stores.) Notice that, if we disregard the highest and lowest earnings as possibly abnormal, still the top members of the middle 50% are usually getting 10% to 30% more than the average wage, and the bottom members of this group a similar percentage less than average. The 25% who are highest paid are, of course, much further removed from the 25% who are lowest paid. Another chart (*op. cit.*, p. 80, not shown here) compares earnings, sales, and selling costs, within each of 21 hosiery departments, of the upper, middle, and lower thirds of employees ranked according to their earnings. This chart shows, as does Table A, page 307, that in spite of many diversities of situation, of salaries, and of wage methods, the departmental selling costs among the stores do not depart far from the 4.3% which is the average for the 29 departments; and it shows also within each store a rather close approach to equality of selling cost among the individual employees, in spite of marked differences in their earnings. In nine instances the lowest-paid third of the workers are (according to the selling-cost test) the most expensive to their employers, while in seven cases the highest-paid group shows highest selling cost; but the differences are generally negligible. Most of the commission and bonus schemes in the stores purport to pay less than proportionally for sales beyond the quota or point where the individual is supposed to earn her salary or drawing account. This tapering-off plan, on its face, seems to provide less than maximum incentive to the able worker; but in practice the stores have nullified their detailed commission and bonus rates to a large extent by frequent adjustments of salaries and drawing accounts, so that employees may consider with reason that they are paid in the long run in fairly direct proportion to their sales.<sup>17</sup>

It is really this "week-work with production standards" (as some factory workers would say) whose effect is being tested in all these 29 stores; and the principal result which is demonstrated

<sup>17</sup> See *ibid.*, p. 312.

quantitatively is the variations of sales among individuals. These differences (apparently as pronounced in the "straight salary" departments as in the others) are surely much greater than those which are found among base rates (time wages or salaries) of people who are doing work as similar as this, *and where no objective measurement of output is available*. If the record of sales made by each person were not so conveniently accessible, and the supervisors' unsupported opinions had to be depended on exclusively for salary-setting, quite likely there would be a decidedly closer approach toward a dead level of effort, accomplishment, and pay.

It is easily demonstrated, to be sure, that the sales record is a very imperfect measure of effort and accomplishment. At some times, of course, it is easier to sell a dollar's worth than at other times; and the floor positions and merchandise within a department do not offer equal opportunities to all the workers in that department. Much remains to be done in modifying or allowing for such factors, and in the development of supplementary measures of the employee's worth, such as the number of transactions, which appears now to be growing in favor as a partial basis for payment or salary adjustment. The volume of sales, as a regulator of current earnings, however, has a merit in common with profit sharing which is easily overlooked: it registers fairly well the employer's current *ability to pay*. In slack times the worker has indeed to hustle harder to sell her quota; but it is only by virtue of such hustling and selling that the management can then meet its payrolls. Wages must in the long run depend upon financial results to the employer; only indirectly upon the laborer's efforts and potential capacity.

**British Health Board Experiment.**—The fourth and last "case study" to be examined in this chapter is furnished by a recent report of the British Government's Industrial Health Research Board, entitled *Incentives in Repetitive Work; a Practical Experiment in a Factory* (Report No. 69, published in 1934). Some reference to this study, made by S. Wyatt, assisted by L. Frost and F. G. L. Stock, has been made in Chapter 2. It grew out of a series of researches, under government auspices,

of industrial fatigue and efficiency, which began in relation to munition workers during the War. In the following paragraphs I shall reflect some of the lights which this recent document throws upon methods of payment, reserving some of its other aspects for treatment later in Chapter 20. Let us notice (1) the general conditions of the experiment; then (2) the average relations found between efficiency and method of payment; then (3) individual differences; and finally (4) other indications of workers' attitudes as affected by wage method.<sup>18</sup>

(1) Beginning with *general conditions*, it may be observed that the factory which cooperated with the British Government's Board to carry out this experiment was a large confectionery establishment, which had already assisted the Board in other studies on industrial health. Wyatt and his associates had also made a number of previous observations in other factories and laboratories, on various problems of monotony and fatigue—Wyatt is perhaps the outstanding scientific authority on these matters, at present. For the experiment on incentives, which is now our special concern, the candy factory took onto its payroll ten inexperienced girls of 15 and 16 years, whom the investigators selected so that a variety of temperaments and mental abilities would be included. These girls worked in a room by themselves, under the supervision of the experimenters, for a little more than a year. Each operative was rotated regularly, in the five work-days of the week, through five combinations of work-neighbors and different repetitive jobs.<sup>19</sup> Beside this rotation among neighbors and jobs, the principal experimental variations were made among three wage methods, namely: straight weekly time rate, competitive bonus rate, and straight piece rate. The first and last are self-explanatory—piece rates were based on the average output of the group during the last three weeks of the competitive bonus plan, so that continuation of the same rate of production, in each process, as during this

<sup>18</sup> Mr. Wyatt has kindly read my script and supplied me a few details which were not apparent to me in the published report.

<sup>19</sup> Saturday mornings, and five to ten minutes at the beginning and end of each other half-day, were devoted to special tests and questions; so that about 37½ of the 44 hours for which the girls were paid were devoted to actual production.

three-week base period would have maintained earnings at the same level as the actual earnings in this base period. The competitive bonus plan, which was thought especially suitable for a group of novices, during a limited period, ranked the girls each week according to their outputs. The slowest received the weekly wage which all had been paid during the time rate series; the next received sixpence in addition; and so on up to the high-

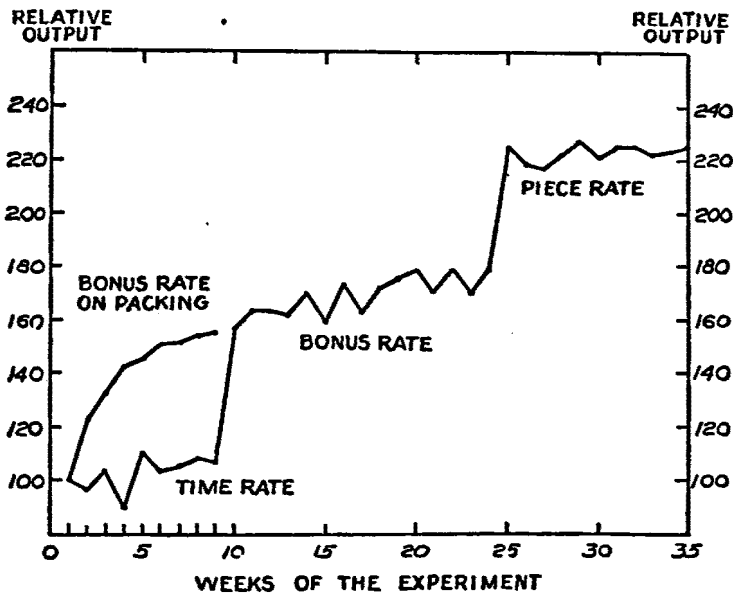


Figure XIV. Payment Systems in Relation to Rate of Improvement.  
(Adapted from Wyatt *et al.*—British confectionery factory study)

est producer for the week, who thus obtained 4s. 6d. more than the regular time wage. Therefore, during the competitive bonus period, which lasted fifteen weeks, the total wage bill for the group was stabilized at 22s. 6d. above that of the preceding nine-week time rate period. The time rate was approved by the Government's Trade Board of the industry, for such work.

(2) The *gross outputs* of this experimental group, by weeks, in relation to wage methods, are shown graphically in Figure



XIV. It is there apparent that production during the competitive bonus period ran about 60% above that of the preceding day work period; while the later piece work output ran about 120% above the time work phase.

Such a great difference in output between time work and piece work, other things equal, seems exceptional. How may we account for it?

One hypothesis which readily suggests itself is that the bonus period benefited by the cumulative effects of practice, and the piece rate period still more. At the beginning of the time work phase the girls were completely inexperienced in all the five operations; and at the end of the ninth week they had accumulated only nine days of experience on each job, since they worked at each job only one day a week. This argument no doubt is entitled to some weight, but not a great deal. The operations were all very simple and readily learned; and the low and erratic rate of improvement in the initial two months of the experiment is most plausibly accounted for by the neutralizing effects of increasing practice and increasing boredom. The upper curve in Figure XIV, marked "Bonus rate on packing," shows the much faster rate at which these girls improved when they were put on a new packing operation, comparable in difficulty with the old, and on a competitive bonus rate, after the 45th week of the experiment. They worked at this new operation as on all the others, only one day each week. In nine weeks their output had steadily increased to a level 60% above the first week; whereas in the initial packing operation, during the time wage series, after reaching a level in the fifth week which was only 20% above the first week, they slumped into lower ground until the bonus period began.<sup>20</sup> In the first two months of the experiment, to be sure, they were becoming adjusted to the whole situation, not merely to the packing operation.

If the practice-effect is not the principal cause of the differences in outputs of these three periods, may we reasonably conclude that the variations in wage methods were mainly responsible? In a sense "other things were equal" throughout this

<sup>20</sup> See Figure 3, on p. 7 of Report No. 69.

experiment; but they were by no means equal to other factors than wage method in other industrial situations. Any wage method is a chain which is only as strong as its weakest link; and these day workers were less stimulated than many or most day workers by exhortations of supervisors and by prospects of rate adjustments or other material rewards and penalties, in accordance with the individual's (real or supposed) productivity. A "hard-boiled" supervisor could probably have obtained a much higher output than is shown in Figure XIV, by the ninth week, even though he were restricted to a uniform and straight time wage; as could also a mild foreman who was governed by a policy of increments in wage rate for demonstrated efficiency, or penalties such as layoff or discharge for inefficiency, or some other combination among positive and negative incentives.

Some time after the 36th week, a combination of these wage methods was employed:

In this case the three methods already used were applied simultaneously to the different processes, while in unwrapping the original time rate was restored. The average output obtained under these three systems of payment, which were in force for a period of six weeks, may be compared with the average output recorded during the preceding six weeks when all the processes were paid by piece. (p. 5.)

The table (which I do not here reproduce) shows, as might be expected, that production dropped by some 25% in the unwrapping operation (one day a week), which was changed from piece rate to time rate, and which, moreover, was specially disliked by the workers. After this relapse, however, the girls were still turning out perhaps 75% more in this operation than they were accustomed to (for the same time wage) during the initial nine weeks.

A result that would hardly be anticipated was the effect of substituting the competitive bonus plan for the straight piece rate, in the operations weighing and wrapping. The output increased, in these jobs, by 9.6% and 14.6% respectively. In this bonus scheme, it should be recalled, the lowest producer for the week got only her weekly time wage; the next girl got a bonus of sixpence for the week; the next got one shilling; and so on. This stimulus is obviously much weaker than piece work, in the

long run, and these girls earned less, for larger production, at the restored bonus as compared with the piece work period; but anyhow for the six weeks in question (and for only one day in each of those weeks), as Wyatt says, "The change to the bonus scheme was regarded as an interesting diversion and tended to counteract the effects of the monotonous conditions of work."

These British investigators also collected a few figures on outputs in relation to wage methods, from other non-experimental groups of workers in the same factory. Ten machine-feeders, for example, who worked (apparently as novices) on a plain time rate for eight days, produced 40,000 units the first day and about 50,000 the sixth to eighth days; then they earned regularly a bonus for production above 60,000; and after 24 days, they were able to earn a bonus for output above 68,000. Nineteen workers employed at filling small cartons with tablets were paid plain time for five days, within which time their production increased from about  $7\frac{1}{2}$  gross to 9 gross a day. Thereupon ten of the workers remained on straight time and nine were put on a piece rate. The two production curves immediately diverged, and in three weeks from the beginning the piece workers were turning out about 15 gross—some 25% more than the time workers. Another group—experienced feeders—were changed from time to piece work, with the result that their production increased about 26% and became less variable. "During the time-rate," Wyatt tells us, "[these] operatives worked in a careless and indifferent manner. Minor stoppages of an avoidable nature, such as the choking of the mechanism by chocolate or paper, were numerous, and more serious breakdowns which required the help of a mechanic were unnecessarily prolonged. After the introduction of the piece rate the operatives gave more attention to the machines with the result that stoppages were both shorter and less frequent." These differentials in output, of 25% to 40% in favor of piece workers as compared with time workers, are more nearly in accord with traditional experience on these methods than the differential of 120% shown in Figure XIV on page 314. Part of this discrepancy was because the day workers elsewhere in the factory were more strictly supervised than the ten experimental operators. The

former workers, also, were somewhat older and more accustomed to "having to work for a living."

(3) The foregoing observations as to *average* results are valuable, but more novel and significant are the data on *variations in the development of individual members* of the test group of ten girls. From these data I select a few as examples. It may be remembered that Wyatt selected these operatives by means of psycho-physical tests, in such manner that a variety of human materials should be provided. They differed considerably in abstract intelligence, in manual speed and dexterity, and in temperaments. Vocational tests for aptitude in these particular jobs were then available; so that if Wyatt had been interested only in maximum productive efficiency in his test group, he could have picked a more suitable team—a group in which the range of capacity from poorest to best would have been smaller than in the group which was actually hired.

Two aspects of individual variability are illustrated by the following table, which shows individual outputs in the wrapping

CHANGES IN OUTPUT (WRAPPING), TWO WEEKS BEFORE AND AFTER REARRANGING WORKING POSITIONS IN 37TH WEEK <sup>21</sup>

Worker	Before Change	After Change	Per Cent Difference
A.....	423	444	+ 5.0
B.....	507	668	+31.8
C.....	576	445	-22.7
D.....	447	493	+10.3
E.....	456	465	+ 2.0
F.....	493	468	- 5.1
G.....	582	473	-18.7
H.....	383	425	+11.0
I.....	363	317	-12.7
J.....	409	483	+18.1
Totals.....	4639	4681	

<sup>21</sup> See *ibid.*, Table X, p. 40. Compare Whitehead's study of influence of work neighbors in the Western Electric experiments—"Social Relationships in the Factory," *The Human Factor* (London, Nov. 1935).

operation, during two weeks immediately before and after a rearrangement of the working positions. After this change, which was made in the 37th week after all were hired, each operative had a new neighbor for this job. Piece rates were paid throughout these four weeks.

It will be observed that Operative I was the slowest worker during both periods, with 363 "before" and 317 "after;" while the top place, occupied by G with 582 "before," was taken by B with 668 "after." When G was placed opposite I, the former's production slumped from 582 to 473; whereas J, when taken away from the adverse influences of I, increased her output from 409 to 483. Evidently the best workers in this operation, on piece rates in the 37th week, were turning out from 50% to 100% more than the poorest,—an indication, so far as it goes, that no concerted restriction of output was practiced in this group.

Individual differences were also examined, with reference to outputs within each wage method period. Two bits of evidence will illustrate these researches. The following table shows,

PERCENTAGE INCREASE (+) OR DECREASE (−) IN OUTPUT UNDER EACH METHOD OF PAYMENT <sup>22</sup>

Method of Payment	Operatives									
	A	B	C	D	E	F	G	H	I	J
Time rate..	+ 9.8	+6.2	+ 5.5	− 0.3	+11.9	+4.2	+16.6	+7.8	+0.4	+3.1
Bonus rate..	+16.2	+8.9	+ 3.6	+ 2.9	+17.0	+8.1	+15.3	+2.3	+1.8	+1.9
Piece rate..	+ 3.6	+4.2	+15.1	+13.0	+ 4.1	−2.1	+ 5.7	−8.0	−7.5	−7.3

<sup>22</sup> *Ibid.*, Table IV, p. 12. Comparisons are between first and last three weeks of each wage method.

for each worker, the percentage increase or decrease in output during each period of payment. This table reflects the respective steadiness of these workers; the extent to which each could work up to her capacity week in and week out. Other evidence in the report shows that, when a new wage method or other nov-

elty was introduced, Operatives H, I, and J were capable of marked improvement in output. At such times the index of variability within the group would go down; but as some of the members grew bored and indifferent, the variability-index would rise again.<sup>23</sup> The preceding table demonstrates that even the piece rate method of payment was not sufficient to make F, H, I, and J exert themselves in such fashion as to make sustained improvement. The experiment did not uncover any practicable means of motivating these individuals continuously (on this simple repetition work the problem might be especially difficult); and the experimenters considered, with good reason, that they had strengthened the case for scientific selection of workers with reference to their fundamental aptitudes for jobs. Suitable temperament and intelligence they emphasize as important aptitude factors. They noticed, however, that these ten workers did not fully demonstrate their relative fitness, by performance on these jobs, until they had worked several months.<sup>24</sup>

(4) The foregoing extracts from our British report are chiefly concerned with the apparent effects of wage methods, as such, directly upon production. Notice now some very useful auxiliary indexes, which show the bearing of wage systems on what we may call the *attitudes of the workers*. Chief among these indexes are the shapes of production curves by quarter-hours of the day, lost time, and personal frictions. The time work curves are typical "boredom curves"—showing marked dips during mid-morning and mid-afternoon; under bonus and piece work, production proceeded at a somewhat steadier pace. The lost time index was based on notes made by the investigators of the duration of each pause, and absence from the room,

<sup>23</sup> See *ibid.*, Figure 6, p. 10. Incidentally, this chart shows, as does the table of percentage increases and decreases, reproduced above, a marked absence of the "dead level" effect which is commonly expected from time work—the index of variability ran higher, each week except one, during the time wage series than during payment by results. The work, to be sure, was more novel during the nine weeks of the time rate series.

<sup>24</sup> "It was not until the workers had been employed for approximately six months that the correlation with final efficiency exceeded .9, and predictions based upon performance during the first few weeks would certainly have been misleading." (p. 14.) Among the misfits was Worker D, who exercised a disturbing effect on her fellows, though the table on page 318 shows that her own output was average or better.

of each operative. "In general," says the report, "the amount of lost time was undoubtedly inversely related to the strength of the inclination to work and the results show that stoppages of this type are by no means necessarily constant but reflect the attitude of the operatives towards the conditions of work." The chart (not reproduced here—see p. 18 of the report) shows a rather sharply rising trend in this index, week by week, after the introduction of each method of payment—as its novelty wore off. The trend of the piece work series was lower than the others. "As a rule those workers who lost most time in any period of payment also showed a relatively small increase in output in that period"—in other words, the low output of the most listless workers was due to pauses rather than to slow rates of production while they were working. Stricter supervision, to

COMPARATIVE FREQUENCY OR AMOUNT OF FRICTION AND TALKING <sup>25</sup>

	Disturbances	Quarrels	Complaints	Talking
Time rate.....	20.1	1.4	2.9	1.00
Bonus rate.....	16.6	6.9	7.1	0.79
Piece rate.....	11.3	4.2	10.8	0.71

be sure, would have kept efficiency at a higher level during the time work period; yet even the most effective of supervisors may find this problem of lost time easier to handle when workers are paid according to current output than when they earn a plain time wage.

The third set of indexes in this class, which I have designated "personal friction," refers to behavior of one worker which disturbed or distracted others, quarrels among the operatives, complaints about material or work conditions, and mere talking during work. The preceding table gives the beginnings of quantitative assessment of these collateral results of wage methods. Any output wage is apt to engender some jealousy and other bad feeling among the workers; that is one of its costs. It

<sup>25</sup> See *ibid.*, pp. 20, 21.

tends, however, to make everyone mind his own business; and the complaints about materials or apparatus serve the useful function of expediting those improvements which are within the management's power to make.<sup>26</sup>

Such are some main features of this exhaustive research, for which a practical employer furnished invaluable facilities and in which the investigators, being Government servants, were free from temptation to try for quick results that would gratify the business manager. The limitations within which the relations cited may be expected to hold should be kept firmly in mind, for example: (a) the investigation was confined to a few samples of light repetitive work (b) done by young girls who might not be adequately representative of such workers, even in Great Britain a few years ago, much less of male workers of varying ages and marital status. Also, (c) we cannot allow accurately for the effects of the other wage and personnel policies of this employer, nor, especially, for the supervisory methods and other features by which the occupations of the test group differed from ordinary workshop practice. While these test operatives were employed at time rates they were free from the pressure of two powerful pace-makers of modern industry, namely: the mechanical conveyor and the production schedule. These pace-makers are by no means confined to large motor-making establishments or other "planned economies." They have, indeed, pervaded American automobile manufacture; their power to motivate time workers was first shown there on a great scale by Ford's example, and later shown even more vividly in 1934-35, when other motor makers made the wholesale reversions from group bonus to day work, which were noticed in Chapter 14—apparently without appreciable loss in labor efficiency. Wyatt's time workers were able to respond to the promptings of fatigue and boredom, by a slackened rate of production; whereas a day worker on a conveyor-line, or on any operation for which the management has set a standard

<sup>26</sup> Most of these girls, when asked for comments on the wage methods, made remarks to the effect that "A time rate is unfair because a slacker can earn the same amount as a hard worker." During the periods of time work, however, they talked and joked in a more friendly fashion than during the periods of payment by results.



time allowance, is much more likely to endanger his job if he fails to attain standard efficiency.

**Some Inferences.**—These four investigations give many hints as to how scientific methods may be applied to the very complex problems of comparative effects of different wage methods. Each case-report offers many ambiguities of interpretation, yet each contributes some new bit of precision to older generalizations which were based on less scientific observations and experiments. Altogether a considerable range of workers and occupations and places are included in these four studies.

What do they show about the comparative effects of time wages versus output wages, other things equal? They do not offer us much positive and unequivocal evidence on this bald contrast, for when a straight time wage was nominally employed, as in the confectionery experiment and in many, if not all, of the merchandising departments, the experimenters or managers concerned were keeping records of the outputs of individual workers, and probably the workers generally knew that such records were being kept. A time wage or salary, under these conditions, approaches payment by results—especially if the individual's wage rate is rather frequently adjusted in accordance with such measurement of his output. Apparently adjustments of rate, by reference to the individual's volume of sales, are made rather generally in department stores; this hypothesis would explain why the efficiency of the workers, as measured by departmental selling costs, was not more definitely affected by variations in the nominal method of payment. During the time work series of the British confectionery factory, on the other hand, it appears that no unusual reward was made or promised for exceptionally good day work; hence whatever knowledge the operatives may have had about the measurement of their individual outputs did not stimulate them so effectively as did the later bonus and piece rates.

In the usual day work and straight salary situation, no objective measure of the worker's accomplishment is available; hence he tends to work more vigorously when the boss's eye is on him than at other times. The development of economical methods

of supplementing the supervisor's estimates by more objective indexes offers great scope for the ingenuity of all persons concerned with management; this notion was developed in Chapter 7 above. The investigations summarized in the present chapter do not, I believe, throw much, if any, new light on the techniques of such measurement.

Assuming that the individual's or small group's output can be economically measured (if only by a sampling process), it appears that the maximum stimulation is given to the ordinary manual worker—and perhaps to most white-collar people also—when his guaranteed base rate or salary does not exceed say eighty per cent of his total earnings. He will usually be pleased if he can get his time rate raised to a point higher than this, for his current output is sometimes low due to causes that are outside his control, and the immediate possibility of a fall in earnings is a source of worry to many workers. When his earnings are adjusted to his output only after a time-lag of weeks or months, however, the stimulus to effort is weakened; and moreover it is a disagreeable task for the employer to deal with an employee who slackens his pace and continues to fall short of earning his day wage or salary; whereas if this same worker were on a lower guaranteed rate, he would be automatically and promptly penalized for his slackness by failure to make piece or bonus or commission earnings.

The further notion of *standard* time allowance or output, for a given unit of pay, and the intimate connection between such a standard and the accompanying wage formula, are matters which are somewhat illuminated by the investigations cited in this chapter, particularly Mavor & Coulson's experience. Their skilled workmen had become so accustomed to the idea of keeping the Rowan bonus earnings within the bounds which tradition said would protect them from rate-cutting and running out of work, that they were finally taking five times as much time as was necessary. Doubtless this extreme would not have been reached had the management readjusted time allowances piecemeal, as the jobs were changed in character, even if the Rowan bonus scheme had been retained. Such readjustments of time allowances, however, would not overcome the outstanding ob-

jection to the Rowan plan—the geometrical increase of work required for arithmetical increase of bonus. On the other hand, if the 100% bonus plan (or straight piece rates, which also yield earnings directly proportional to the individual's output) had been installed without new time studies, much restriction of output would have persisted; for the men would have concealed over-generous time allowances attached to some jobs, by keeping their earnings within suitable limits. By changing time allowances and bonus plan simultaneously, this management gave its men the steadier wage incentive which is characteristic of piece work or a similar bonus curve, and also jarred them loose from their traditional ideas as to how much work and pay were proper and safe for them. No doubt some excessive time allowances would still occasionally be concealed by restriction of output; but the routine of repeated time studies, and the example of individual workmen being allowed to earn double their time rates or more, probably gives about the practical maximum of labor efficiency—so far as it is influenced by wage methods.

**PART III**  
**WAGES AND OTHER INCENTIVES**

## CHAPTER 16

### SHARING PROFITS WITH ORDINARY EMPLOYEES

Thus far we have been dealing mainly with *individualist* incentives, though Chapter 14 has taken us a little over the threshold of the collectivist sphere. In this and later chapters we are to explore further the possibilities of *teamwork* incentives, especially those which go beyond the attempt to reward each individual according to his own contribution to production. Let us begin with a bird's-eye view of the historical development of the various plans of profit sharing and management sharing or copartnership.

**Historical Background.**—The Paris house-painter Leclaire, who began his experiments in sharing profits and management with his employees around 1840, is known as the “father of profit sharing.” His scheme kept itself and the Maison Leclaire alive down to our own time, and it is likely that most modern “industrial partnership” plans were inspired, directly or indirectly, by this example. Long before Leclaire's venture, however, the American whale fishing industry was accustomed to pay all labor, from captain to cabin-boy, by shares in the net proceeds of the catch—such fractional shares being determined for each person at the beginning of the voyage.<sup>1</sup> The old agricultural practice of *métayage*, or share farming, is generally cited as a form of profit sharing; but the landlord-tenant relation, which we have here, is different in several vital respects from the employer-laborer relation.

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<sup>1</sup>This system is described and evaluated by Elmo P. Hohman, in his article, “Wages, Risk, and Profits in the Whaling Industry,” *Quarterly Journal of Economics*, Vol. 50 (1926), pp. 644-671. This system involved no management sharing.

After about 1860, profit sharing plans began to appear here and there in the Western world,—more in Britain than elsewhere. Some were in well-known establishments, like those of Carl Zeiss (Germany), the Bon Marché (Paris), and the Lever soap establishments (Great Britain); also, before 1914, profit sharing had become the usual thing in British city gas companies. The number of experiments has been small, however, by comparison with the total number of employers and employees; and the mortality has been high. Thus, the United States Bureau of Labor Statistics found only sixty employers sharing profits with wage-earners in 1916; and in 1919-20 the British Ministry of Labour learned that, of 380 schemes which had been born in previous years, 182 or less than half had survived.

Since 1920 the literature of our topic has been enriched from two directions: by new profit sharing schemes, and by other experiments directed at sharing management with employees. In Britain, the Ministry of Labour enlarged the titles of its reports to Profit Sharing and Labour Copartnership, of which it found 280 live specimens in 1926. In America, the second survey by Messrs. Burritt, Dennison, Gay, and Kendall (1926) dealt with stock ownership by employees as well as with profit sharing. And of course the notion of employee participation in management gradually thins out through a long series of works councils and committee schemes. In 1929 began the great depression whose adverse effects, particularly upon employees' stock ownership schemes, will come in for some discussion in Chapter 17.

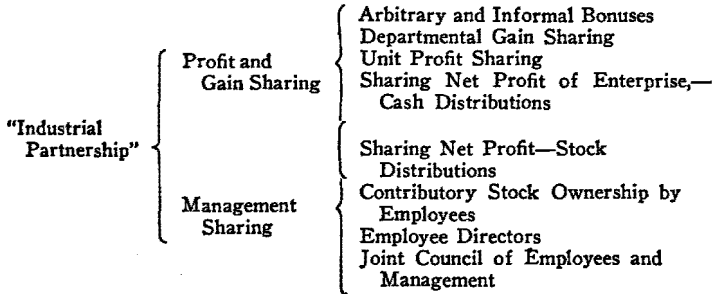
Labor organizations have usually opposed capitalistic profit sharing, though seldom to the extent of prohibiting individual members from participating in such schemes. Spokesmen of these groups, such as G. D. H. Cole,<sup>2</sup> have argued that profit sharing is an attempt to conceal from the worker the fundamental class conflict; also that it cheats him by offering him not more than half the extra profit which his increased exertions may produce. American labor union officials, as we shall see, have also emphasized disadvantages inherent in any worker's owning a few shares of stock in the concern which employs him. Some unions, however, have become hospitable to certain types

<sup>2</sup> See his book, *The Payment of Wages*, Ch. 13.

of management sharing—notably the “Union-Management Cooperation” plan of the American railway shop unions (discussed in Chapter 19 below).

**Logical Relations Among Various Profit and Management Sharing Practices.**—After this little orientation in historical time, it is well to make a brief analysis of the logical relations among the numerous schemes which are all loosely referred to as profit sharing or industrial partnership; for the same assertions cannot be made with equal truth or force about all:

VARIETIES OF PROFIT AND MANAGEMENT SHARING <sup>3</sup>



The older definition of “true” profit sharing included the following elements: “an agreement, freely entered into, by which the employees receive a share, fixed in advance, of the profits” of the enterprise in which they are employed.<sup>4</sup> This conception further stipulated that an appreciable fraction of employees must be profit sharers,—“not less than 75%”,<sup>5</sup> and that “profits” refers to the “net balance or gain realized by the financial operations of the undertaking.” It is usually assumed that the profit sharing employees first receive regular market wages, before any profits are reckoned; but there is a difficulty here. In

<sup>3</sup> Classes of employees affected are not distinguished in this diagram, but we shall presently take account of that factor.

<sup>4</sup> The above definition was laid down by the International Cooperative Congress, Paris, 1889. See citation and discussion of the Congress’s elaboration of its terms in U. S. Bureau of Labor Statistics Bulletin No. 208, *Profit Sharing in the United States*, by Boris Emmet, p. 8 (1917).

<sup>5</sup> Emmet restricted his attention to American schemes which made at least one-third of all employees profit sharers.

the innumerable cases where there is no objective "going rate" for the job, the stipulated wage may be deliberately or insensibly lowered because of the chance of extra earnings contingent on profits.

This profit sharing in the narrower sense, which has excited so much interest among labor reformers and humanitarians, should be distinguished from several of its cousins, such as Christmas bonuses, gain sharing, and profit sharing restricted to executives and specialists. Profit sharing does, indeed, imply an element of income to the employee, which is not fixed in absolute terms by day or hour or piece, at the beginning of the fiscal period, but is *contingent* on the other happenings after the work has been started. Contingencies, however, may be of the most various sorts. Annual bonuses and many other items of financial "welfare work" are in some sense paid *out of profits*, but generally not in any regular or predetermined *quantitative relation to profits*. Even if there is such a recurrent percentage relationship in fact, these payments may not be promised in advance by the employer, as is the case in the more fully developed profit sharing plans.

A similar shading into each other is apparent in the relations of profit sharing and gain sharing. As was explained in the latter part of Chapter 14, gain sharing is the name given by H. R. Towne to the scheme of payments to workers, contingent upon the behavior of those expenses within their own bailiwick or department which they have real opportunities to control. Profit sharing, on the other hand, most accurately refers to the contingency of net annual profit for all operations of the whole concern or enterprise, after deducting from gross income not only material and labor expense but depreciation, taxes, interest and so on. An intermediate position appears, however, when a large company with various plants or branches—e.g., Woolworth's or General Motors—adopts profit sharing. Such a company is apt to make the employee's profit share contingent on the net profit, not of the parent corporation, but of the district or subsidiary operation wherein he works. This arrangement is called "unit" profit sharing; and, like gain sharing, it is likely



to be adopted upon the theory that the employee's income from his employer should be contingent only upon factors which are not too far beyond his own knowledge and control.<sup>6</sup>

The last-mentioned analogy, between gain sharing and unit profit sharing, brings us to a third distinction,—between profit sharing for “rank and file,” or all but the more transient wage-earners, and profit sharing limited to chief executives, or perhaps to a larger group of “principal employees.” In the latter field, also, we find a great variety of contingent payments, ranging from bonuses which are not promised in advance, and which may remain arbitrary and uncertain, all the way to a legally enforceable promise of the company to distribute some specified percentage of profit among employees according to a predetermined procedure. Of course the lines between “executive,” “principal,” and “rank and file” employees must always be somewhat arbitrarily drawn, as is true also in excluding the “more transient” workers from any profit sharing plan whatever. Yet the relatively few higher salaried employees have so much greater capacity to influence profits, and to adapt themselves to earnings contingent on net profits, that the profit sharing idea is most frequently and most fully applied to managerial and salespeople.

**Purposes Sought.**—From this point we must pick our way toward other schemes for “partnership in industry” through the realm of general purposes, any or all of which have lain behind the diverse projects with which we are dealing. A good idea of the range of these philosophies is afforded by an important book, whose chapter headings contain the following phrases indicative of purposes among profit sharing employers:<sup>7</sup>

<sup>6</sup> Many applications of these principles, under the name “workshop autonomy,” are found in the great Bata shoe industry (Zlín, Czecho-Slovakia). A rather full account, by P. Devinat, is given in the International Labor Office's Studies and Reports, Series A (Industrial Relations) No. 33, pp. 218-263 (1930).

<sup>7</sup> Heilman, Burrirt, Dennison, Gay, and Kendall, *Profit Sharing, its Principles and Practice* (Harpers, 1918). Messrs. Burrirt, Dennison, and Kendall are business men, each (at that time) operating a profit sharing concern. Again collaborating with Professor Edwin F. Gay, they secured the assistance of Gorton James to produce a later volume, *Profit Sharing and Stock Ownership for Employees* (Harpers, 1926).

- To promote efficiency, when measurement of individual results or close supervision is impossible;
- To prevent waste;
- To prevent labor turnover;
- To promote industrial peace;
- To promote effective management;
- To insure the continuance of effective management; and
- For humanitarian purposes.

Some authorities would put the last of these first, from the standpoint of accounting for experiments in profit sharing, and for the attention they have attracted. How mingled may be the motives of the initiating employer is suggested by the observation that these schemes have generally been launched in periods of rising prices, when the employer finds that his profits are unusually large, and *also* that there is much labor unrest abroad—when strikes, labor turnover, and mutterings about the need of a whole new industrial order are prevalent to an exceptional degree. Another purpose which might be served by profit sharing, and which I am inclined to stress, is stabilization of employment.

**Varieties of Management Sharing.**—Among these purposes, of course, the desire to enlist a cooperative and “partnership” spirit among employees is outstanding. This purpose brings us to another group of cousins of profit sharing—I mean the various practices which in some degree share management with employees. These cousins include outright cooperative workshops, employees’ stockholdings (acquired from their own savings or otherwise), and various sorts of employee representation on boards of directors or joint industrial councils. Logically, to be sure, the purely cooperative productive organization which is owned entirely by its workers is a profit and management *sharing* establishment in a peculiar sense, for there are no outside owners to claim any share. In such a shop the worker experiences industrial partnership in the highest degree.<sup>8</sup> At

<sup>8</sup> “Self-governing workshops” of this character have been few and short-lived in the modern western world; but in some industries like fishing, forestry and handicrafts they were numerous and well-established in old Russia, and the Soviet régime has made extensive use of this organizational form.

the opposite extreme, perhaps, are the employee-stockholders with a few voting shares bought in the open market with their own resources. They have technical shares in appointing management and dividing profits, but they obtain these rather nominal rights in their capacity as small capitalists, not as laborers. It is with participation in profits and/or in management by workers *as such*, that we are concerned in these two chapters.

Notice now that profit sharing and management sharing are logically distinct, though practically intertwined. The profit share which is made over to employees may be paid entirely in cash, each year when there is any profit to divide, without any steps taken toward further partnership in management. Some schemes of profit sharing do operate in just this way. At the other extreme, employees are often allowed to participate in management (in some sense), by means of joint councils or even by employee-representatives on boards of directors, without any sharing of stock ownership or profits between capitalists and employees.

Nevertheless, all these devices in profit sharing and management sharing are directed toward a common end: the end of inspiring the employees to work more nearly as they would if the business were their own. All are, in a broad sense, experiments in partnership; and an effective partnership must accomplish some sharing of both profits and control of policies and administration.<sup>9</sup> The "voice in management" of the mere cash-profit-sharing employees may consist only in using their initiative, as far as they are able and willing, to increase production and decrease waste; and the "share in profits" of other workers who are merely "constituents" of representative committeemen in works councils may consist only in any wage increases which may follow upon demonstrated increases in the workmen's efficiency. An approach toward employee-partnership which was especially popular among large American concerns during the decade before 1929 used subsidies out of the employer's funds to assist employees to acquire the company's preferred or common stock. Procter and Gamble, the soap makers, have fol-

<sup>9</sup> Compare F. W. Rafferty (Hon. Treasurer of the Industrial Copartnership Association), *Partnership in Industry* (London, 1928).

lowed this policy for a generation, assisting employees to acquire and benefit from the company's common stock by paying such employees annual "profit sharing dividends" which were much more closely related to the recipient's length of service than to current earnings of the company. These contributory stock ownership schemes commonly attempt to kill at least two birds with one stone: to stimulate in the employee both thrift and efficiency at his job.

These numerous aspects of "industrial partnership" offer us many alluring and alternative vistas for exploration; our choice must be somewhat arbitrary. One special difficulty is that the managerial and other more discretionary employees present at every step problems in many respects different from the more routine workers, whether manual or clerical. Another source of perplexity is the need of weighing all the older generalizations anew, to take account of possibilities revealed by the great business depression which began in 1929. In view of our limited space, it seems best to recognize such special problems only where they are of greatest consequence; and to organize the remaining discussion about the following topics: (1) nature and (2) variation of profits; (3) profit sharing; and (4) co-partnership. In dealing with these forms of industrial partnership we shall consider several possible purposes and results, such as stimulus to efficiency, stability of employment, and some larger problems of the "status" of labor.

**Nature of Profits.**—Every one has an inkling of the significance of the merchant's "gross profit," and also of the net profit or net income of any business enterprise; yet it is difficult for students of the subject to develop and standardize accurate vocabularies which will keep pace with the changing business and legal situations. The accounting concept of net profit or income with reference to an unincorporated, closely owned business is relatively simple: net profit or loss is the accretion or decrement in value of the proprietor's equity in assets during the accounting period—allowing for any withdrawals by him during this period. If there is to be net profit instead of net loss, gross revenue from sales or other operations must be large

enough to cover all expenses, whether paid or accrued. Such expenses include materials, labor, interest on borrowed capital, rent on premises owned by others than the proprietor, and depreciation during the period. This gain or accretion in proprietor's equity is not necessarily available for immediate spending in cash; it may be tied up within plant, inventory, or other property.

If a tax is levied upon the net income of such a proprietor, his accountant would not necessarily enter such tax as a business expense, in order to arrive at a true figure of net income; he might rather look upon the tax as one of the numerous ways in which the proprietor spends his net income. Many taxes and fees, however, are quite clearly expenses of the enterprise, as such.

With modern developments in corporation finance and taxation, some new distinctions must be made; and numerous verbal disputes arise among economists and accountants as to how we should now define "true" profit. Four of these trends should be noticed: (1) priorities among ownership-equities, (2) salaries to active proprietors, (3) non-operating income, and (4) tax expenses. These general influences have left marks on terminology relating to profits, and some attention to them is needed for analysis of profit problems.

So long as there is either one proprietor, or the proprietors contribute personal services which are considered proportionate to their investments, there is no point in paying themselves salaries. But whenever any proprietor comes to give personal services disproportionately to his investment, then fairness requires that each of the working proprietors should be paid a salary. Each thus comes to lead a double life, for as investor he shares in the net profit like any other part-proprietor, in proportion to his degree of ownership. The accountant's concept of expense and profit may be thereby changed, as the enterprise becomes economically a more artificial person, "hiring" one or more of its proprietors; for, other things equal, the profit becomes less, since a wholly new expense—the part-proprietor's salary—has been introduced. The legal definition of partnership profit or loss, however, may not be affected by such division of

labor among partners; the "salary" of a working partner may be legally merely a contractual share of the profit.

The mysteries of "high finance" in corporations do not change the economic essentials of this little picture, though they do affect legal rights profoundly. The line between stockholders and actual creditors of the corporation becomes more and more blurred with the multiplying of new types of securities, yet it remains true that interest payments made to holders of notes and bonds are *costs* which must be deducted before proprietary profits are shown; and that dividends to preferred as well as common stockholders are paid *out of net income or profit*.

The third complication mentioned above is non-operating income. Large corporations quite commonly make their income statements show, first, the earnings, gross and net, attributable to their main business operations; then add or deduct the further profit or loss on account of investments or other ancillary elements in their current finances. This distinction between net earnings from a given part of the business, and net income from all parts, is important for many purposes; but when we speak simply of the "net profit" of a concern, we generally mean its legal net income from all sources, after deduction of all charges for the period, including accrued items like depreciation and interest. As in the old-fashioned single proprietorship, it is still a matter of the accretion or growth, if any, in the proprietors' (who are now preferred and common stockholders) equity during the accounting period.

Among these charges, as was suggested a moment ago, various *taxes* play an increasingly prominent part. Many subtle arguments are made about who ultimately pays this or that tax; but here it will suffice to say that the "net profit" of the business in which profit sharers are most interested is that which is left after paying all taxes assessed against the business as such. If the government collects "at the source" taxes on dividends of stockholders, such taxes are more properly regarded as levied against these individual incomes; and the net profit remains the source out of which dividends may be appropriated—before payment of taxes levied on stockholders' dividends or undistributed current earnings, or both. An employer who maintains a profit

sharing plan—or rather his Philadelphia lawyer—may, however, on occasion be able to convince legislators or tax collectors that all his payments to employees, including the profit shares (but presumably not including dividends on any stock which such employees may own), are really *wages*, and should be deducted from revenue before arriving at the net income which is taxable. This view would find some support in those court decisions which have sustained an employee's claim to "deferred salary" in "profit sharing" plans;<sup>10</sup> and in various ways the "profit" taken by the profit sharing employee does differ in economic as well as legal characteristics from the profit taken by the inactive stockholder.

**Variations in Profits by Years.**—Every one knows in a general way that profits are variable—among industries and among firms, for a given year, and from year to year in the same firm. Until rather recently, statistical details have been exceedingly scanty, due mainly to business secrecy and heterogeneous accounting procedures. It is still a controversial subject; for within limits and often very wide limits, profit and loss statements may be manipulated by "watering" capital accounts, paying undue salaries and bonuses to insiders, juggling depreciation charges, and so on. Standardization of accounting methods has proceeded rather rapidly of late, however, as has also governmental pressure against false and misleading accounts, in railroads, banks, and more recently in all concerns subject to income taxes. Hence, the following summaries from Federal income tax data relating to American business corporations give a good idea of general relations among profits and losses. The following table shows that, in the best of years, more than one-third of our active corporations report no taxable net income; that in the more prosperous war years the aggregate deficits or losses were less than 10% of the aggregate taxable net incomes, but in bad years like 1921 and 1930-34, total losses nearly equaled or even greatly exceeded aggregate net incomes.

True, the "statutory net incomes" used in these calculations are exclusive of incomes which are specifically tax-exempt, like

<sup>10</sup> See, for example, *Patton v. Babson* Statistical Organization, 259 Mass. 424 (1927).

interest on certain government bonds. These omissions, however, are perhaps offset by the Federal corporation income taxes, which still had to be paid out of the taxable net incomes included in the totals shown in the table.

NET TAXABLE INCOMES AND DEFICITS OF AMERICAN BUSINESS CORPORATIONS, 1916-1934<sup>11</sup>

Year	Number of Corporations				Total Deficit as Per Cent of Total Net Income
	Total	Per Cent Reporting Net Income	Per Cent Reporting Deficit	No Income Data <sup>a</sup>	
1916.....	341,253	61	39		8
1917.....	351,426	66	34		6
1918.....	317,579	64	36		8
1919.....	320,198	65	35		11
1920.....	345,595	59	41		26
1921.....	356,397	48	52		89
1922.....	382,883	56	44		32
1923.....	398,933	58	42		24
1924.....	417,421	57	43		29
1925.....	430,072	59	41		20
1926.....	455,320	57	43		22
1927.....	475,031	55	35	10	28
1928.....	495,892	54	35	11	23
1929.....	509,436	53	37	10	25
1930.....	518,736	43	47	10	76
1931.....	516,404	34	55	11	189
1932.....	508,636	16	73	11	362
1933.....	504,080	22	67	11	185
1934.....	528,882	27	62	11	97

<sup>a</sup> Inactive corporations—Not discriminated from others before 1927.

**Profit Differences Among Industries.**—The second type of variation of profits—among industries—is also indicated, in a general way, by available data. One means of comparison is net profit per dollar of sales; but generally a more significant

<sup>11</sup> Data taken from Federal Trade Commission, report on National Wealth and Income (69th Cong., 1st sess., Sen. Doc. 126), pp. 211-212; Statistics of Income, 1929, pp. 41-42; Preliminary Report for 1934, pp. 6, 7.



comparison is given by net income in relation to capital invested. In 1922 American corporations were required to report to the income tax authorities statements of the "fair value" of their outstanding capital stock. The Federal Trade Commission computed the aggregate of net incomes reported, less aggregate of net deficits, in each of 18 categories of industry; and in this fashion found the "average rate of return" on "fair value" of outstanding preferred and common stock, in each of the said industrial categories. These rates of return for 1922 varied from .9 of 1% in agricultural types, and 1.4 in mining and quarrying, to 29.2 in textiles and textile products. The bases of valuation of the stocks undoubtedly were not the same in all these groups, but other evidence indicates that in the aggregate the amount of "water" included in these "fair values" was not great. The total value put upon the stocks of all corporations, approximately 383,000 in number, in 1922, was nearly 76 billions of dollars; and the total net profits reported (before deductions of non-taxable incomes), in excess of aggregate net deficits, amounted to \$5,967 millions. Thus the average over-all rate of return to stockholders was 7.9%. The Trade Commission also estimated the total investment in tangible properties used in these businesses, as of 1922, including equities of bondholders as well as of stockholders. This total investment was put at \$102,399 millions; and the estimated net return on such investment for 1922 was \$6,590 millions; so that the rate earned by *stockholders and bondholders* as one body was some 6.4%.<sup>12</sup> In a year of bad trade the *currently earned* "return on capital" to stockholders is lower than to bondholders; though at such a time dividends paid out of surplus earned in previous years often sustain the cash "incomes" available for stockholders to spend individually.

Another index of these variations of corporate earnings among industries is furnished by the National City Bank's tabulations of earnings and deficits ("after interest, depreciation, taxes, and other charges and reserves, but before dividends"),

<sup>12</sup> *National Wealth and Income*, pp. 213, 215. The "estimated net return" last referred to above was computed as follows: From the total of interest paid as well as earnings available for dividends to stockholders was deducted net deficits.

in relation to net worth at the beginning of each year. (Net worth is the book value of outstanding preferred and common stock and surplus accounts; it probably corresponds rather closely with the "fair value" of preferred and common stock, referred to above.) By the year 1936 such figures were compiled by this bank for 2,010 large corporations, with aggregate net worth in January, 1935, of \$49.8 billions—using a considerable fraction of all business wealth in the nation. These were grouped into 62 industrial categories. In 1931, 22 of these categories showed an excess of deficits over profits; in 1932, 38 showed this condition; in 1934 and 1935, only 7. Although 24 of these industrial groups in 1932 made a larger aggregate of profits than of deficits, yet the 56 groups containing 1,410 manufacturing and trading companies as a whole sustained in that year a net deficit of \$105 millions. This was a little more than exceeded by profits in the public utility and finance company groups, so that the whole 1,810 corporations which were thus tabulated in 1932 earned about \$97 millions net, or .2 of 1% on the \$50 billions net worth of the stockholders at the beginning of the year. The negative rates of return, for net deficit groups, are not calculated by the bank; but the positive rates which it showed among the net profit groups varied in 1932 from .1 of 1%, in street railways, to 12.2% in 18 confectionery and beverage companies and 13.4% in 24 tobacco concerns.<sup>18</sup>

Such averages as were cited above for industrial groups convey important, if limited, information. They are capable of giving us more exact knowledge than we had before as to how each *category* of firms fares, year by year. The textile industries, for example, which showed the highest rate of return to stockholders in 1922, sustained one of the highest rates of net deficits in 1932,—judging from the National City Bank's sample. But these group averages, of course, conceal the variations which exist *among individual members of the group*. The

<sup>18</sup> Above data for 1932 from National City Bank's monthly economic letter, April 1933, p. 58. These corporations are more prosperous than the whole body of business corporations large and small. The City Bank's tabulation for 1931, for example, shows aggregate profits in excess of deficits, in the 1810 companies, amounting to \$1,275 millions; while the Government's comprehensive report for 1931 shows (see table above) aggregate deficits nearly twice as large as aggregate net incomes.

fluctuations in profits of single concerns, year by year, have not been extensively studied by economists. Common observation tells us that most or all firms have both their good and their bad years, relatively to other members of their own trades; also that appalling numbers sustain successions of misfortunes which finally force them into bankruptcy. It is to be hoped that the income tax authorities may soon conduct or allow statistical researches on the data which they collect, to show more clearly the year-to-year movements in profits of identical concerns.<sup>14</sup>

**Do Employees or Employers Create Profits?**—To what extent is the profit or loss of any enterprise, in a given year, attributable to the efforts of the workmen therein? To the efforts of the active managers? To efforts or decisions of the owners? A crude radical view is that labor is the only real producer; and that interest and rent, as well as profit, are obtained by those of superior power who "exploit" the worker. These radicals may experience some difficulty in explaining why Mr. Ford, hiring his men at rather high wages, has made many millions of dollars profit, while some other motor-makers, paying lesser wages, have sustained losses to the point of insolvency. The factors, legitimate and illegitimate, ethical and unethical, which influence the profits or net incomes of business enterprises are, in fact, bewildering in number and heterogeneity. In years when prices are steady, the managerial employees, including many presidents and directors who own little stock in the concerns over which they preside, undoubtedly have much larger opportunities to affect net profits than have the common workers; and at such a time they will tend to begrudge the profits which they must pay over to passive absentee shareholders. These executives, however, are not at all averse to receiving salaries, in bad years, out of the surplus or capital which is the property of such shareholders; this is one of the numerous risks of business which the mere shareholder must assume. The plain workers

<sup>14</sup> See also W. A. Paton, *Corporate Profits, as Shown by Audit Reports* (National Bureau of Economic Research, 1935). This volume gives statistical analysis of financial statements for 1927, 1928 and 1929, of some 700 companies, classified by industries and sub-industries. The data were supplied anonymously by public accountants, and reveal tendencies among relatively small concerns, which do not publish their financial statements.

and the higher-paid workers and the owners, all may influence their enterprise toward profit or loss in some degree, through contributions like routine and creative work, exercise of "abstinence," foresight and courage,—and on occasion by knavery, as in maneuvering for monopoly gains. Beyond all this there is an unfortunately large rôle played by chance factors, like convulsions in the general price level, which are beyond the control of either the capitalists or the laborers of any single enterprise.

The variability and heterogeneity of profits among industries and firms, which we have just noticed, present no impediment to the inauguration of profit sharing by any one concern; but they do suggest that each company presents special problems as to what figure, if any, would be most suitable for the workmen's profit share. Whatever the firm's profits have been in the past, they can usually be increased in the long future, if every one concerned works more enthusiastically; and so over a period of years, if the incentive operates successfully, there will be *some* new profit to divide. A rather common arrangement is that all capital shall first receive a return more or less based on what it has averaged in the past; and then the remaining profit, if any, is divided with employees.<sup>15</sup>

Another difficulty is involved in some unit profit sharing plans which apply to scattered branches or subsidiaries or stores of big corporations. Here it may be recognized that the company needs to employ some of its best managers in branches which are, for the time, least profitable, because they are subjected to more severe local competition than other branches, or for whatever other reason. If each manager received a uniform fraction of the profit of his own branch, these profit shares would be dis-

<sup>15</sup> The formula for division (after whatever prior standard return is provided for capital), of course is empirical. It may be half to capital, half to labor, as in Endicott-Johnson Company; or (a more usual arrangement) a uniform profit sharing dividend may be paid on both the par value of stock and on the wages and salaries earned in the year by profit sharing employees.

A novel principle is used by the Baker Manufacturing Co. (agricultural implements, 150 employees in 1919), Evansville, Wisconsin. After a 5% dividend is paid on all outstanding stock, the remaining profit is shared between the preferred stock (issued to original owners) and the profit sharing employees, at the same rate on base wages earned and the annual preferred dividend. Under this generous plan the profit sharers (i.e., all who had worked at least 4,500 hours for the company) received profit dividends averaging 70% of base wages over the 31-year period 1899-1930.

proportionate to ability and effort; and so the unit scheme may be tempered by resort to other principles, such as straight salaries, shares of net profits from all branches together, and local quotas which take local competition and other handicaps into account.

**Cash Profit Sharing.**—It is high time now that we examine the more specific bearings of the foregoing general features of profits and “industrial partnerships,” upon the practical programs in our field. As I write, in the summer of 1936, the atmosphere is still, in the main, one of bitter disillusionment with respect to all these schemes; yet a number of them have survived several other depressions almost as severe, and probably there will be renewed interest as better times come again. Moreover, we may now see once more, as did Professor Bowie in 1923,<sup>18</sup> that the growth of labor sentiment against the whole “wages system” makes it increasingly needful to inquire into the characteristics of various types of industrial partnerships, since these may be alternatives or complements to more socialistic measures. Each partnership device, and combinations among them, should be analyzed, in a fuller treatment, from the standpoint of each of numerous objectives of employer, employee, and the general public. Such a treatment would present evidence, for example, as to how effective these elements and combinations have been in preventing strikes and promoting a desirable degree of reduction of labor turnover. In these two chapters there is room only for much more limited remarks on the two general programs of sharing profits in cash, and sharing them by means of employee copartnership.

With respect to cash profit sharing, let us consider it now, for common workers; later (in Chapter 17) for executives and other higher-paid functionaries. In both of these cases outstanding problems are the effects on (1) the size of the employee's average income, via his efficiency and morale; and (2) on the constancy of said income, including stability of his job and investments.

<sup>18</sup> James A. Bowie, *Sharing Profits with Employees* (Pitman, 1923).

1. As a *stimulus to the efficiency* of wage-earners, cash profit sharing is generally regarded as weak, especially when the final net profit of an enterprise is shared with some thousands of workers. It may sometimes be a new broom which sweeps clean, not because it is a good device but because very poor incentives and supervision were previously employed. Leclair, the house-painter, found profit sharing immediately serviceable in reducing costs, partly because his workmen, scattered on small jobs about the city, could not be closely supervised. If he were beginning his efficiency studies now, he would doubtless give relatively more attention to the possibilities of time studies and production standards, whereby the *individual's* production might be more accurately measured, and each could be paid more nearly in accordance with his own accomplishment. Such payment, as was remarked in Chapter 14, is a more effective stimulus to the workman's effort than a group wage plan, even when the group is small and members are closely in contact with each other. As the group is enlarged, and as the reward base recedes from the immediate output to the year's net profit of the whole enterprise, so the stimulus is diluted into weaker and weaker potency.

Although profit sharing is a very poor substitute for wage payment based on individual efficiency, and hence offers no rational ground for relaxing the quest for economical indexes of the employee's net accomplishment, nevertheless, like a group bonus, profit sharing may put a pecuniary premium on *cooperation* among employees. Some individual incentives, like straight commission payments to salespeople, may lead to a competition among members of the force which is harmful to the business as a whole. "Star performers" are not always good teammates. Profit sharing may, in such circumstances, be the best available means of encouraging teamwork directed at the net profit result which the employer wants; for it is difficult indeed to measure the individual's cooperativeness. One attraction of profit sharing and gain sharing to an independent-spirited salaried employee, in fact, is that it makes his reward somewhat less dependent on the elusive personal good will of superior executives toward him, than would otherwise be the case.

Several factors are apparent, which make cash profit sharing a weak stimulus to efficiency, in the ordinary worker. First, the profit share is remote during most of the year, and uncertain in amount. It is distinctly a bird in the bush. Second, if all the common workers did their level best to increase profits, and they obtained the whole of the increase, which might reasonably be attributed to their efforts, the share of each probably would not be a very handsome addition to wages, since only a part of the total costs of the business are in any degree within their control. Many overhead costs, and the buying and selling negotiations which are so important to profit making, are quite beyond them. And finally, since the individual can have no assurance that all or even most profit sharers are doing their best, many will refrain from extra exertions whose fruits must be shared with a multitude of strangers. The combined result of these factors is that the average annual distributions in cash profit sharing schemes have been rather small—some 5% or 6% of the sharers' annual wages, or possibly the equivalent of two or three weeks' pay. Professor Bowie remarks, à propos of all-cash profit sharing,

To the worker an extra £5 may mean a good deal. There is, of course, no danger of his refusing it and it is doubtless welcome. But it achieves nothing. Unless the reward is of such a nature and size as to knit up the worker's mind and effort with the business as a whole it serves no useful purpose. The fact that this small dole is proportionate to profit is of no positive value whatever, though there is evidence to show that it may have a negative value in that if the dole is reduced or disappears altogether the worker has much to say in the way of criticism of those responsible for profits.<sup>17</sup>

The last sentence in this quotation brings us to the question of *morale*. To some extent a more friendly disposition of the workmen is desired by the employer because it makes his situation more pleasant for him, apart from problems of labor disputes and inefficiency; and certainly a leading objective of all the schemes considered in these two chapters is to cultivate a more cooperative attitude in the men. It is questionable whether mere cash profit sharing yields satisfactory returns in this re-

<sup>17</sup> *Op. cit.*, p. 93.

spect, particularly after its novelty has worn off. Critical workers and union leaders are generally apt to look the gift horses of employers' "welfare" measures in the mouth. When inquiry was made in 1925 about the American Federation of Labor's attitude, its president replied:

Labor does not approve of profit sharing as used by certain industrial concerns. The American Federation of Labor takes the stand that every employer who is able to pay more in wages than he has been giving should increase them so that the workman will receive every week that which he would under the profit sharing plan at the end of the year.

Profit sharing is used for the purpose of discouraging organization of the workers. For instance, in a large plant where the employees are unorganized and receive less wages than in union plants of the same kind the employer sometimes doles out what he calls a share in the profits. He thinks that by doing so the employees will refrain from organizing.<sup>18</sup>

Observe that this statement does not quite flatly oppose any and every sort of profit sharing; it rather seizes the stick to whack anti-unionist employers. Some of the American, and most of the British, profit sharing employers maintain friendly relations with trade unions. Union leaders, however, are seldom if ever enthusiastic about profit sharing, even in union shops; perhaps mainly because they apprehend that it may achieve in some degree the employer's goal of increased community of interest between himself and his own workmen. This result might weaken the loyalty of such workers to their trade unions, which in the end would injure such workmen by weakening their bargaining power—in the view of the union advocates, at least. Hence we find Mr. Green saying, in the second sentence quoted above, "every employer"—presumably including those who make terms with unions—should pay higher wages rather than share profits.

Professor Bowie and many others have also made the paradoxical point that, although all-cash profit sharing dividends are nearly always too small and remote to affect the worker's morale favorably, yet after he has come to expect them as a right and become accustomed to spending them in advance, he is

<sup>18</sup>James, Burritt, Dennison, Gay and Kendall, *op. cit.*, p. 189.



likely to be angry and censorious when a bad business year arrives and there are no profits to share. Bowie held that the Ford "profit sharing" bonus inaugurated in 1914 "avoids every one of the faults inherent in most cash profit sharing schemes. The bonus is not small; it is not remote, being paid weekly; it does not fluctuate, and as it is not in direct proportion to profits made, the extent of these profits is never called in question."<sup>19</sup>

2. We should not base our conclusion about cash profit sharing for ordinary employees entirely upon its direct effects on efficiency and morale, nor on the reflection that it is hard luck for a man who works extra hard and then finds that there are no profits to divide. We should also raise the question, if it would not be still harder luck for our workman to lose his job, for slack service or high wages would tend to force his employer to shut up the shop. Some form of the profit sharing principle might contribute toward *continuity of employment*, by adjusting labor incomes to the employer's ability to pay, in a less spasmodic manner than is afforded by the mechanism of standard wage rates and layoffs when the employer cannot pay them. This argument need not be stretched into a recommendation that profit sharing be used as a subterfuge to cut wage rates; but it shows that the employee may not reasonably expect that his total

<sup>19</sup>*Op. cit.*, p. 98. See also the critical study of Ford "profit sharing" by S. M. Levin, in the *Personnel Journal*, Vol. 6, Aug. and Oct. 1927, from which the following particulars were extracted. The famous five-dollar minimum daily "wage" of 1914, which was indeed a high minimum for the time, consisted, for the lowest category of worker, of some \$2.34 in wage proper, and \$2.66 in "profit share," which was contingent only in a remote and indirect sense, since the total of \$5.00 a day was disbursed in cash at every pay period. In order to qualify for the "profit share" the worker had to satisfy the company's Sociological Department that his private life was acceptable—that he was taking care of dependents, paying his bills, saving money, etc. Originally the "profit" share varied inversely with the wage proper: "The profit was simply added to the regular wage so that a 26 cent [per hour] man would get \$2.34 in wages and \$2.66 in profit, totaling \$5.00. A 38 cent man on a similar basis would get \$3.42 in wages and \$2.58 in profits, and a 43 cent worker \$3.97 in wages and \$2.03 in profits. The great mass of workers, between 85% and 90%, belonged to the \$5.00 class."—Levin, *op. cit.*, p. 81. By 1919 the minimum daily total of "profit" and "wage" was raised to \$6.00, and the "profit" element was made 15 cents an hour for all such "profit sharers." The years 1920 to 1922 saw experiments with bonuses based in part upon length of service, and the beginning of the present thrift plan, whereby in prosperous years the employee-depositor obtains a high yield on his deposits.

annual earnings shall always be proportionate to his efforts and abilities. His prosperity, and in greater degree his employer's, are bound to be affected by many factors, like outside business conditions, which are beyond their control; and the more promptly the employee shares in the financial results of these chance influences, the more secure is his job likely to be.

Consideration of this luck element in profit and loss also suggests a reply which meets in part, if not wholly, the charge that profit sharing is dishonest because the employee is expected to work harder and thus create more profits, yet he is to get only *part* of such extra profits. Whenever profits are higher than the standard figure, it is pretty certain that the excess is not due *solely* to extra effort by employees. It is due in part to luck, in which the employer may claim a share, to offset his bad luck in the poor years when he pays standard wages and has less than standard profit for himself.<sup>20</sup>

This possibility, that some forms of profit sharing may contribute toward stability of employment, was suggested to me by Professor Bowie's article, "Wage Adjustment in the Coal Industry [of Great Britain]."<sup>21</sup> British coal miners' wages, over some decades, had been in some regions and periods adjusted by "sliding scales" based upon the selling price of coal, which arrangement tended in some degree to keep money wages in line with both the cost of living and the ability of the industry to pay. In 1921 a revised sliding scale was applied, which made the wages vary, above a guaranteed minimum, not simply with the price of coal, but with the average profit margin in the district. Each operator's receipts and costs were audited by neutral accountants, and apparently the "proceeds" in effect were pooled within the district, or were so reckoned for purposes of this wage scheme. To be paid out of such proceeds was a dividend of 17% to the operators, calculated not on the controversial base of invested capital, but on the amount of standard wages

<sup>20</sup> The Baker workmen (see note given on page 344) appear to have experienced greater stability of employment than is usual in their industry, by reason of their high efficiency and willingness to accept wage cuts in severe depressions.

<sup>21</sup> *Economic Journal*, Vol. 37 (Sept. 1927), pp. 384-393. Compare Appendix I of his book, cited above.

paid during the period. After paying standard wages, 17% on them as standard "profit", and other costs; any surplus "proceeds" were shared, 83% to labor, 17% to capital. Bowie remarks that some naïve persons had supposed that the miners would work harder by reason of the proceeds-sharing incentive; but of course the connection between any individual's effort and his share in the proceeds of his district was too remote: output per miner was little affected. Professor Bowie thought he could demonstrate statistically, however, that somewhat steadier employment in the mines had resulted from this scheme of wage adjustment. It was not many years before the plan became practically inoperative, by reason of protracted labor disputes and increases in the standard wage beyond the point where any dividends on wages would be possible.

## CHAPTER 17

### COPARTNERSHIP; SHARING PROFITS WITH EXECUTIVES

**Profit and Management Sharing Through Employees' Stock Ownership.**—We have just seen why the sharing of net profits with rank and file workers in cash alone has not in the long run yielded results which are very widely satisfactory. Let us now consider the comparative effects of employee participation in management, through shareholding. Such shareholding may come about as pure purchase by the employee or as outright gift from the employer, but ordinarily it occurs through some combination of these principles. I shall discuss two leading varieties, which we may call contributory and profit sharing copartnership. In the first case the employee is induced to invest his own savings in stock of the company which employs him, usually by some subsidy from the employer conditioned on an investment by the employee. In the second case, no subsidy is offered for cash contributions from the worker, but wage-earners with some minimum length of service receive predetermined shares of net profits,—not in cash but in stock which cannot immediately be sold. The stock purchase plans of the U. S. Steel Corporation and American Telephone and Telegraph Company illustrate the first; the "Partnership Stock" of the Dennison Manufacturing Company illustrates the second.<sup>1</sup>

The first of these types, employee stock holdings subsidized by employers, had earlier beginnings but enjoyed its great vogue in America in the decade 1919-29. Various factors contributed

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<sup>1</sup> Procter and Gamble's scheme is a mixture of these two principles. The company subsidizes the employee's purchase and holding of stock, by special dividends which vary more closely with the employee's length of service than with the annual net profit of the company. Profit sharing employees in this concern automatically secure certain prerogatives, such as work stability and vacations with pay.

to the movement, including something of the same sentiment in other employers which we have noticed in Mr. Ford's "profit sharing" bonuses to those of his men who convinced him that they were living honorably and thriftily. Most of the stock purchase plans attempted to kill two birds with one stone: (1) to stimulate the employee's thrift and build up his savings; also, (2) by drawing his investment into securities of his employer, to get some of the "partnership spirit" into his work. By 1929 this movement had swept some hundreds of thousands of employees into purchase, or contracts to purchase, stock valued at that time at more than one billion dollars.<sup>2</sup> Many observers, including Professor Bowie as he wrote in the early '20's, saw in this trend great promise for improved industrial relations; though there were not wanting critics who showed that it tended to put all the worker's eggs into one basket, and that he could not effectively, like Mr. Carnegie, "watch that basket." In a large corporation a dispersed ownership in little dribblets of stock enables the active management to control policies through actual proprietorship in a rather small minority of the shares.

Warnings were occasionally sounded as to the speculative dangers of some of these schemes, to the finances and morale of employees:

For instance, a prominent company, organized in New York to meet a war-time need, in the days of its prosperity sold common stock to sub-executives and the managerial staff on a partial payment plan at a price very substantially below the market price of the stock at the time. Unforeseen, adversity came upon the company so quickly that, before more than one or two installments had been paid by the employee-subscribers, the stock was selling not only for less than the subscription price, but for less than the employees had actually paid thus far. Yet they were still liable for their remaining installments. The condition was further aggravated by the necessity of cutting down the size of the organization, which involved the discharge of employees who were subscribers for the stock.

<sup>2</sup>E. Davis, *Employee Stock Ownership and the Depression*, Foreword and Bibliography (Princeton University, Industrial Relations Section, 1933). Some statistical data, showing that employee ownership in American corporations in 1922 amounted to many millions, are given in Chapter VII of the Federal Trade Commission's report on *National Wealth and Income*. This last, and many other reports, however, do not make clear how the employee-stockholders are classified as to incomes and jobs—they might, for example, be mainly executives and other higher-salaried people.

From the corporation's standpoint these employees still owed it money; from the employees' standpoint, they had lost their jobs at a time when it was hard to find new ones, and they had already paid for the stock more than it was then worth, besides being faced with their agreements to continue to pay installments.<sup>3</sup>

Managers of the older plans, like that of U. S. Steel, which by 1922 had weathered several depressions, also observed that employees found it irksome to be obliged (by conditions attached to the employers' subsidies) to hold on to their stocks, both when stock prices were high and when they were rapidly tumbling.

Employers have used several means to reduce these hazards, in their employee-stock-purchase plans. They have offered preferred stock instead of common, or with common; and many have guaranteed the employee against loss of his own contributions by agreeing to repurchase his stock at the price he paid. Or, a scheme which looks on the surface like employee-stock-purchase, in that the employer puts a premium on the employee's deposits in the company's thrift department, proves to be more like an investment trust—investing the combined funds in a variety of stocks and bonds, for the sake of maximum security. Such plans are or were operated by the International Harvester and General Electric companies. Naturally this reaching for security is somewhat at variance with the quest for fuller participation by the employee in the fortunes of his own company.

**Effects of Depression.**—After 1926 these stock schemes had to go through a boom and depression of unusual magnitude; so that surveyors of the scene in 1933 found little but discontent among both managers and men. Miss Davis's study of July 1st market quotations of 35 stocks sold to employees (18 preferred, 17 common) shows that, with July 1, 1926, as 100, these common shares rose to a median index of nearly 160 on July 1, 1929, and sank to about 12 on July 1, 1932. The preferred issues rose only about 10% from 1926, in the boom years, and held their ground well into 1931; but by July, 1932, they also were at a median price less than 40% of the 1926 base. Employee-participants in great numbers had been obliged to raise what cash

<sup>3</sup>James, Burritt, Dennison, Gay and Kendall, *op. cit.*, pp. 69, 70 (1926).

they could from savings, for current living expenses, by reason of the disastrous spread of unemployment and short time. Various companies enabled their workers to get out as many dollars as they had put in, and not a few gave the working "partners" still more favorable settlements. But legal responsibility for such indemnification was rather uncommon; not all managements felt moral responsibility to undertake it; and of course the same hard times which made the employees' needs for cash so urgent made some employers quite unable to protect their employee-stockholders. Consequently, of the 50 plans intensively studied by Miss Davis, 31 had been terminated or suspended by 1933. This experience illustrates the saying "History teaches us how little history teaches us." As recently as 1921, several companies had seen a similar debacle of employee ownership of their common stock; and various publications dealing with such plans gave warning of the dangers. Yet only a few years later more common than preferred shares were being sold to employees. Mr. Rosenwald, who had chivalrously buttressed his company's finances with his personal fortune in 1921, partly because employees had been induced by a profit sharing plan to contribute toward purchase of the corporation's common stock since 1916,<sup>4</sup> once more came to the rescue of employees whose company stock was about to be sold by brokers, when the "crash" occurred in the stock market in 1929.

**Security vs. Participation in Control**—From the standpoint of security of the employee's savings, and its bearing on his welfare and his attitude toward his employer when depression comes, any investment mediated by his employer is likely to be an egg in the same basket with his job. Also, as with any other investor, the greater the safety of his principal, the more modest seems the return he can secure upon it, in years of prosperity. Should we conclude, then, that the employee's worst investment is his employer's common stock, and his best investment something entirely outside his employer's direction, e.g., a savings bank or government bonds or durable tangible property? Some

<sup>4</sup>James, Burritt, Dennison, Gay, and Kendall, *op. cit.*, pp. 215 ff.

such conclusion is indeed dictated by the safety and diversification test alone; and if the employer is mainly concerned with encouraging saving among his people, he will do best to confine himself to giving investment counsel. In any case, the employer's bonus to employee investors has an undesirable element of "giving to him who hath"—i.e., to him whose family needs are lightest.

After the employee has been provided with some reasonable protection against the more probable income hazards, nevertheless, there is much to be said in favor of encouraging him to share some of the financial speculation inherent in the enterprise where he works, for the sake of the incentive which it will afford him to serve the enterprise effectively, for the insight it will give him into the risks and rewards of the other capitalists, and for the greater share in control of company policies which employee stock ownership may in the course of time develop.<sup>5</sup> We should recognize that, if every one tried to play as safe as possible with his savings until *all* his hazards were soundly underwritten, no small proprietors would ever venture into self-employment, and the industrial world would show a still closer approach to a caste society than it does at present. The employee who contributes toward payment for his stock is pretty sure to prize it more highly than if it is entirely a paternalist gift, and otherwise he is likely to be a more desirable partner in the former case. Also, as we shall see in a moment, there are not lacking examples of aggregates of employee capital in very large businesses, which, if voted *en bloc*, would add significantly to the economic power of the worker-owners.

It is impossible as yet, however, to evaluate the relative importance of all these conflicting tendencies in employee stock ownership. The most obvious lesson is that it had a mushroom growth in the '20's, like many other fads. Companies made a fetish of large percentages of employees participating, so that many workers were swept in who had more pressing needs for

<sup>5</sup> Compare the effective arguments along these lines by J. A. Bowie, *Sharing Profits with Employees*, especially Ch. 19 and Appendix II. He would probably add many qualifications now, in the light of the intervening decade's events; though British stocks did not undergo the extreme fluctuations in value which characterized American shares.



their savings; the get-rich-quick spirit which is so near the surface of us all prompted sale to employees of the booming common stocks; and like all other losing investments these schemes are now exposed to the castigations of critics, who neglect to mention how many investments considered gilt-edged when made (e.g., street railway bonds and real estate mortgages), may depreciate startlingly in a few years of adverse economic conditions.

**Copartnership Through Profit Sharing.**—In effect we have just dealt with profit sharing and copartnership, for ordinary workers, separately. Let us now look at some special characteristics which emerge when the two ingredients are fused—when the principal or sole means by which employees acquire stock in their concern is through profit shares. Usually such stock is not immediately salable by the recipient. In this case the cash savings of the workers are not affected (unless they accept lower wages by reason of the profit sharing plan); they speculate only with whatever extra effort they put into their work. How does this variation affect the employee's efficiency, security, and status?

The incentive to production supplied by such stock dividends, said Mr. Dennison, is even weaker (during most of the year) than is the prospect of a cash profit share. The prospective share of profits, to be paid mainly in stock, is "a much weaker spur than the cash, so weak that in the early years—at least two or three—we need expect no visible results to exist, perhaps none at all." But accumulation of such stock tends to give the worker increasing protection against old age and other needs; and the employee-stockholder may come increasingly to feel a proprietary interest in his company. Also his cash dividends from stock tend to increase year by year; the company need not be extraordinarily profitable to yield him cash dividends in his twentieth year of participation equal to half his average annual wage during that period.<sup>6</sup>

<sup>6</sup>"For instance, under the Taylor scheme, a man who had been in the employment of the company for twenty years and whose wage had averaged 50s. a week during that time, received during 1922 in addition, as labor bonus in the form of shares and as dividend, some 41s. a week extra to wages."—*Ibid.*, p. 150.

Copartnership derived from profit sharing distributions of stock, however, contains most of the weaknesses which we have noticed in contributory stock ownership by employees, and some special drawbacks of its own. The desire of many employees to draw all their benefits in cash need not be considered a serious disqualification, if we could convince ourselves that their interests are best served by accumulating most of their profit in the form of shares. But, if we place our main emphasis on maximum participation in management, then we shall be dissatisfied with schemes which either confer voting stock alike on the fit and unfit, as their share in profits, or which disburse these profit participations in the form of non-voting stock. If, on the other hand, we are most concerned to build up cumulative reserves for the employee's financial security, we shall be dissatisfied with stock dividends, on the ground that such stock is apt to be a "frozen asset" when he most needs protection. At such a time the employee does not have a grievance against a pure stock bonus plan so acute as against a contributory stock ownership plan which seems to have swept away much of his own savings; but in either case the protection offered him against hours of dire need is inadequate. The company's finances, moreover, are subjected to the same sort of strain in a depression, as is imposed by a contributory stock scheme for employees: the company may be obliged to find cash to take up the stock of employees who have to leave its service on account of the depression.

**Reconciliation.**—It is scarcely necessary to choose flatly between these two objectives; various compromises have been offered, and tried with some success. To secure participation in interest and management by the more thrifty and ambitious employees, the employer may offer a contributory scheme, in which he subsidizes employee purchases of stock which carries voting power. But the current disasters suggest that some much more reliable minimum provision for the employee's protection should come ahead of such stock ownership. This last proposition means that an employer who has the "welfare" of his employees at heart (partly because he knows that worries over their private troubles make all, at times, poor producers)

should seriously consider building reserves to provide benefits additional to whatever minima the state may require, for unemployment and disability; also retirement annuities. Such reserves should be in trusts, insurance companies, or other legal devices which would secure maximum safety and regularity of income, independently of the solvency of any particular firm; moreover, the annual equity or premium should be non-transferable, not to be seized for his debts, and should purchase, as far as it will, protection for the employee regardless of how long he remains in the firm's employ. As fast as practicable the purchasing power of deferred benefits should be made more stable, perhaps by national measures of price-level control, or perhaps by the spread of contracts for all types of future payments in numbers of dollars varying inversely with the buying power of the dollar.<sup>7</sup>

Deposits like this to the employee's credit would have little or no effect on his attitude and efficiency during the first few years; in this respect they are like profit shares paid in non-transferable stock. But as the years pass, he would have increasing opportunities to notice that high profits gave him and his fellows increasing security against the hazards which likewise increase with his advancing years, and this realization would tend to affect his morale favorably. It seems quite undesirable, however, to set the scale of deposits so high, in relation to each income class, that the employees who manage to save most, out of current incomes, would have no scope for free

<sup>7</sup> An example of profit sharing subsidy of a provident fund for employees is supplied by Mavor & Coulson, whose labor experiences I often refer to herein.

In 1928 the firm began to accumulate, from a "fixed but undisclosed percentage of profits," a fund for employees' benefit which is to provide a more secure foundation for pensions than the current revenues out of which they had been paid. It will be a contributory scheme, supplementing the Government's old age pension. Some particulars are given in the firm's *Apprentices' Magazine*, Summer number, 1935. Mr. Mavor wrote that this "Employees' Benefit Fund has quite importantly increased the good will and interest of our people in general. It certainly induces the effort on the part of the employees, and does not cause erratic fluctuations in income."

The section on Provident Funds, pp. 187-190 of *Bowie's Sharing Profits with Employees*, comments adversely on schemes of this general type.

It should be recalled that the Maison Leclaire's scheme makes the Mutual Benefit Society the principal stockholder and profit sharer, and that this feature has been retained throughout the long lifetime of the plan. (See page 370.)

investment. For them, purchases of voting stock could be subsidized with good conscience by the employer; and a copartnership committee of employee-representatives could vote the employee stock as a block and thus reinforce the bargaining power which they would have otherwise.<sup>8</sup>

**Managerial Profit Sharing.**—Special schemes of profit sharing and stock ownership for chief executives and other managerial functionaries exhibit many points of contrast, as compared with corresponding plans for the more ordinary wage and

<sup>8</sup> Some of the possibilities of bloc voting of employees' stock were illustrated by the Philadelphia Rapid Transit Company's Cooperative Wage Dividend Fund, initiated in 1922. The company advertised in the newspapers, in that year,

"P. R. T. employees stand almost alone in having saved from their increased wages during the war. Their cooperative saving fund . . . now contains more than \$1,700,000, safely invested in government and other standard securities . . ."

"P. R. T. employees, by super-cooperation, are effecting economies unapproached elsewhere, and are now receiving recognition therefore in the form of a cooperative wage dividend equalling 10% of the payroll . . . [which] has, by individual signature of practically every employee, been turned over to trustees, who have already so impressed themselves upon capital as to borrow \$1,000,000, to be repaid when the men receive their cooperative wage dividend. The trustees of the men have, with this money, financed the purchase of 50,000 shares of P. R. T. stock at an average of \$30 per share . . ." Within a few years, according to later press reports, the "Mitten Management" was able with this help from employees to secure working control of the corporation. "By the end of 1930, employee investment in the fund amounted to \$17,000,000. [Total par value of common stock in 1922 was \$30,000,000; market value considerably less.] The fund was invested first in stock of the P. R. T. Company, but was later transferred largely to stock of the Mitten Bank Securities Corporation. As the result of litigation involving the company, the controlling interest in common stock previously held by the Mitten Bank Securities Corporation and including the employees' fund, has been placed in the hands of a five-year voting trust made up of three trustees appointed by the court. Employee deposits in the wage fund were discontinued in May, 1932."—E. Davis, *op. cit.*, p. 26.

I have not attempted to work up further the history of this remarkable case; but it is clear enough, first, that the chief executives of any concern have a power over employee-stockholders, through control of their jobs, which such executives do not have over other small stockholders; and second, that the leverage which employees may exercise through stock ownership *in addition to* the threat to quit or strike is at present more potential than real. As law and custom develop, they may (perhaps) secure increasingly effective organization in both capacities.

In the profit sharing copartnership plan of J. T. and J. Taylor, Ltd. (some 2,000 employees, half female), the workers acquired more than half ownership of the capital. Their stock is non-voting, but a copartnership committee represents their interests in management. See Bowie, *op. cit.*, Chapter 12 and *passim*.

salary earners. Whereas the latter devices grow out of humanitarian interest, search for industrial peace, and so on, the former develop more directly out of businesslike procedures, still commonplace in legal and investment banking firms, whereby older proprietors take younger men into partnership; and out of arrangements whereby inactive owners allow the chief executives annual bonuses contingent on the net profits earned. During the past decade and more, there has been a tendency to reach downward and bring more of the higher-salaried people into the fold of managerial profit sharing schemes; and before the depression of 1929 these schemes for principal employees seemed distinctly more successful than those for wage-earners.<sup>9</sup> Their history remains to be rewritten in the light of the post-1929 depression; but we can infer some of the more obvious results of this extreme trial. Let us briefly compare these limited schemes with those we studied above, again in respect to effects on the employee's efficiency and morale, also effects on the stability of his employment. First we must deal with profit sharing as such; then presently with managerial copartnership.

As a stimulus to efficiency, net profit sharing is held to be specially suitable for employees (a) whose individual accomplishments are most difficult to measure, especially their cooperativeness; (b) who have greatest opportunities to influence profits; (c) who can scrutinize the work of other profit sharers, so that members of the group mutually stimulate each other; (d) whose personal finances can best stand feasts and famines in income; and (e) who can work for distant profits and not be too much upset when the year shows loss instead of profit. These criteria do not apply in equal degree to the same persons, but in general they account for the persistence and growth of profit sharing, and bonuses out of profits, for limited groups of higher-salaried people. Indirect laborers, for example, are not so likely to be included, though their accomplishment also is difficult to measure; for all the other tests rule them out. Outside salesmen, on the other hand, often are included, if their

<sup>9</sup> See, for example, the previously cited work of James, Burritt, and others; C. C. Balderston, *Managerial Profit Sharing* (Wiley, 1928); and accounts of individual plans, in publications of the American Management Association.

efforts may affect net profits in an important degree. The importance of the mutual surveillance factor is indicated by Mr. Dennison's remark, "Our plan, I am sure, has a [strong] effect upon our principal executives, more by virtue of the possible criticism of their fellow-executives than by virtue of the cash obtained at the end of any given period."<sup>10</sup>

More direct indexes of the individual's productivity than that which is afforded by net profit are often preferable, however, for these people as well as for wage-earners. Hence, we have a great deal more use of the "gain sharing" or "unit profit sharing" principle than of over-all net profit sharing. The salesman, for example, may be rewarded on some basis intermediate between crude measures such as time worked or dollars' worth of goods sold, and the very indirect and partial measure which is afforded by the net profit of his firm. Thus he will have some reason to feel that, if he does *his* part well, he need not suffer unduly if incapacity in other men, or mere bad luck, brings loss to the company. Various managerial profit sharing schemes, too, distribute their funds to eligibles, not in any predetermined proportion to salaries, but partly in accord with executive judgments as to individual deserts. It is the few chief executives who are most commonly given bonuses based on *net* profits, since in their case net profit most nearly measures the success of their efforts. Within limits, however, it is a strength of profit sharing, not a weakness, that it does not attempt to pay each person according to his exact deserts. After provisions have been made for assessing the individual's performance as well as the technical and economic circumstances permit, there may well remain a place for sharing net profit, both as a bid for self-sinking cooperative teamwork, and as a means of participation in the establishment's good or bad luck which is practically beyond any one's control.

**How Large Should the Executive's Bonus Be?**—Another circumstance which makes profit sharing peculiarly suitable to the minority of principal employees is the feasibility of making such a man's bonus large, in relation to his salary. This would

<sup>10</sup> American Management Association, Annual Convention Series, No. 71, p. 6 (1928).

be true merely because executives are few in number, by comparison with wage and lower-salaried earners; moreover the former have much the greater opportunities to influence profits; and since there are less definite market rates of salary for such men than for workers in the lower ranks, it is often possible that the executive will be content with a lower salary, with a chance for bonus, than he would be without such a chance. Mr. Denison and his co-authors in their two books on profit sharing have emphasized the proposition that, while some high-grade men are anxious for maximum stability and assurance of income, and hence work best on straight salaries, other people of equal capacity are of the "adventurer" rather than the "settler" type. These "adventurers" are in their element with incomes which may be very large or very small, depending on their efforts and their luck. It is said that some houses are able to satisfy both classes by hiring some salesmen on straight salary, some on commission and bonuses.<sup>11</sup>

**Government Regulation of Salaries and Bonuses?**—The profit bonuses obtained by executives of big corporations during the war years and the 1920's were sometimes stupendous in amount; and not seldom added to salaries by no means meagre. Were these huge incomes fairly earned? Various stockholder groups went into court to attack such schemes, even before 1929; demanding that they be abrogated and that the executives be required to make restitution. In 1933 President Roosevelt's administration undertook a campaign against extremely high salaries and bonuses, hinting that it was even going after the great wages of cinema stars. An article in the *New York Times* gave a résumé of current common knowledge about these incomes.<sup>12</sup>

In the early days of the Steel Trust the country gasped at the salary of \$100,000 paid to Elbert H. Gary and at the bonuses that brought his

<sup>11</sup> Bonuses to chief executives, based on profits, have been common and well-known in Europe for some decades,—they are denoted by the French term  *tantième*. See F. W. Taussig and W. S. Barker, "American Corporations and their Executives," *Quar. Jour. Econ.*, Vol. 40 (1925), pp. 1-51; and James, Burritt, *et al.*, *op. cit.*, Ch. 8.

<sup>12</sup> By L. H. Robbins, October 29, 1933. Compare article on "U. S. Corporate Management," *Fortune*, Vol. 7 (June 1933) pp. 47 ff.

compensation close to \$500,000 a year. Amid the discussion John D. Rockefeller declared Judge Gary's services worth \$1,000,000 a year and expressed willingness to pay him that sum if he should ever wish to join Standard Oil . . .

Judge Gary's compensation seems only moderately large now, for numerous men have passed him in annual pay. Eugene R. Grace, head of Bethlehem Steel, got a bonus of \$1,623,753 in 1929 and a salary of \$12,000 besides. His compensation in five years totalled \$5,497,684. The company has since modified the system whereby fifteen high men shared in bonuses amounting in a good year to about \$5,000,000. . . .

And there is George W. Hill, president of the American Tobacco Company, whose salary and commissions have at times exceeded a million a year and might in 1930 have reached \$2,200,000 if a stockholder had not brought court action . . . In the end Mr. Hill declined the allotment [of bonus stock].

By 1934 and 1935 a great deal of information about these payments to corporate executives had been made public through agencies of the Federal Government. Upon instructions from Congress, the Federal Trade Commission made a special inquiry on the subject; and later, information about the stock holdings and remuneration of the chief executives, filed with the Securities and Exchange Commission, was made a condition of listing stocks on the principal American exchanges. These reports show that the head officials of large corporations have quite commonly been paid in part by bonuses, even in depression years; and that in 1932 at least 22 executives were paid more than \$100,000 for their personal services, in each case by one corporation. It appeared that by 1932 Mr. Grace's salary from Bethlehem Steel had been raised from its 1929 level of \$12,000 to \$180,000 (and his bonus-basis reduced); also that in 1932 Mr. Schwab received a straight salary of \$250,000 as chairman of the board of this corporation. In that deep depression year apparently no motion picture executive earned, by both salary and bonus, quite as much as the \$300,000 annual stipend of Greta Garbo, but at least one producer's salary (the late Mr. Thalberg's) was still a little over the \$200,000 level.<sup>13</sup>

<sup>13</sup> See *Time, the Weekly Newsmagazine*, March 12, 1934, p. 62, for the foregoing and other particulars; also Federal Trade Commission's release of February 26, 1934. The Treasury announced, presumably on the basis of income tax returns, that in 1934 some 8,000 corporations had paid 18,000 salaries above \$15,000.



Most of these schemes were no doubt instituted while the companies were decidedly going concerns. When an enterprise is in financial difficulties, a new executive with reputation for high ability may exercise his bargaining power in ways which the ordinary shareholder is well content to approve—at the time. Thus a man who had gained business fame in the management of that highly-advertised drug, Listerine, became president of the Gillette Safety Razor Company about 1930 with no salary at all, but with the promise that if earnings were restored to five dollars a share he should receive a bonus of 20,000 shares; if to six dollars, another 20,000 shares. And in 1932, when another executive re-entered the National Cash Register Company, his principal remuneration was an option open to him for five years on a block of stock bought for the purpose by the company.<sup>14</sup>

It seems to me unlikely that many high executive incomes will be found actually illegal; but considerable numbers would doubtless shrivel a bit under the light of publicity, even in prosperous times. The secrecy in which such arrangements have been shrouded in the past, plus the incapacity of masses of stockholders to control corporation directors, have enabled some executives in effect to vote each other salaries and bonuses in a manner which responsible business opinion considers immoral. It is freely charged, for example, that directors, who are not paid bonuses by their corporations; surreptitiously share in the bonuses which they vote to their active officers. J. B. Eastman, Federal Coordinator of Railroads, expressed this point well, when he used the railroads' need for government support to reduce their executive salaries (which in some instances reached \$120,000 a year) to a mere \$60,000 a year maximum:

My belief is that a danger now exists in the fixing of high salaries for executives in private business which did not once exist, and which grows out of the fact that great corporations with widely held stock are controlled not really by the legal owners of their properties but rather by boards of directors who tend to become self-perpetuating and who may have a comparatively small stake in the industry. Nor do I

<sup>14</sup> *Ibid.*, Dec. 5, 1932.

know of any reason to believe that the competency of executives can be safely judged by the salaries they receive.<sup>15</sup>

Charles E. Mitchell's argument that executives in financial corporations should have chances for large bonuses, in order that such corporations may compete effectively with partnerships, has considerable force; but the partnership, being much more closely owned, does not present the problem of fairness to minority stockholders as sharply as does the large corporation. And this problem is still less involved in the salaries of the movie stars.

It seems probable that, even if safeguards against improper insider-control of corporations could be set up, and if publicity were required for all such arrangements, the force of competition would tend to give the most-sought-after business executives earnings little less than they have been receiving. The startling growth in top salaries in recent times is mainly due, I think, to the growth of facilities by which one man's work may in effect be sold to more and more customers. Earnings in bonuses contingent on profits will surely often be preferred by the majority of stockholders to the flat salaries which the men they want can obtain elsewhere. Owners have a way of prodding their high-salaried employees to produce more and more dividends; and a contingent bonus remuneration often saves an executive from dismissal in bad times. Thus profit sharing may function, with greater effect than with manual workers, to protect salaried men from unemployment.

It is true, I think, as Mr. Eastman intimated, that executives are not paid very exactly in proportion to their real abilities and productiveness. A similar observation might be made with reference to surgeons and authors and teachers and government servants. In general, however, the competitive demands which force up the income of an outstanding executive are considerably based on his real or apparent capacity to produce profits for stockholders, though there is a terrific rate of labor turnover among the higher-salaried classes in business, as dynasties and cliques succeed one another within almost any corporation.

<sup>15</sup> Quoted by Robbins, in the *New York Times* article above cited.

Should Government try to fix maximum earnings (salary plus bonus), through all industries, and not merely on the railways? Or should it sharply tax the higher brackets of such incomes? Or would either of these policies discourage the creative elements in a manner disastrous to the Nation? Any one may slacken his efforts in response to *new* measures which he thinks unfair to him; and if pecuniary emulation is denied us we doubtless need other prizes to compete for, such as are found in the services of arms, arts and sciences, and the church. But, given some such personal distinctions and rather modest maximum incomes, it is quite possible that our best men would still strive to do their best. In fact, there may well be for each person at a given time an optimum range of earnings, below which *or above which* he will be inadequately stimulated. "If a skilled workman worked hard and enthusiastically all the year and got ten dollars' worth of non-convertible stock at the end, he would be incited to put a bomb under the plant—not to work harder next year," said Mr. Dennison; who also remarked, concerning another extreme, "I know of a case where a distribution to executives was so heavy in extraordinarily good times that it is actually true that several of the very important executives could not be found at their places of business for months afterwards—because they were playing the ticker and could make more money in playing with this large investment than by sticking close to business."<sup>18</sup> Even a very modest profit bonus arrangement has some tendency to cause unsettlement, gossip and speculation among prospective recipients.

We should not forget, however, that incomes have other very important social functions beside furnishing sustenance and motivation for the workers. One of these other functions is guiding each worker to the post where he is most needed,—according to the criterion of pecuniary demand. Needless to say, this criterion is very fallible and needs to be supplemented

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<sup>18</sup> A. M. A. Convention Series No. 71, pp. 7, 10. In the General Motors executive profit sharing, "Under the 'Managers' Securities Plan', which was inaugurated in 1923 and was terminated in 1930 . . . 4,509,060 shares of General Motors stock were acquired by eighty executives. At one time this stock had a market value of more than \$400,000,000 and all the executives were millionaires."—*New York Times*, Feb. 7, 1932.

in various ways; but if Government could make effective a low maximum service income, the political and ethical and aesthetic factors by themselves might effect a more wasteful allocation of human talent than if they were buttressed by the pecuniary indicator in some such manner as with us now. Remember also that these salaries and bonuses, however large, are still "earned" incomes in the sense that they stop (or are reduced to a lower pension basis) when the recipient's work comes to a halt. For this reason there is always much point to the theory and practice of taxing "earned" (i.e., labor) incomes less heavily than "unearned" (i.e., property) incomes of like size.

**Managerial Copartnership.**—Ownership of stock in the company for which one works, like profit sharing, calls for differing judgment, according as it is considered for principal employees or for the rank and file. In practice we find managerial profit sharing and managerial copartnership rather closely associated. Let us briefly consider some differences which tend to make the dangers less, for the higher-salaried; some dangers which remain even for them; and the special type of profit sharing copartnership which is designed to secure continuity of management.

What are the circumstances which make copartnership still a rather dubious experiment for common workers? They include: (1) the common worker's ignorance of corporation finance and his inability to understand the necessity of fluctuations in profit; (2) his low appreciation of outright paternal gifts; (3) the probability that shares of profits paid only in untransferable stock would force partnership upon many employees who are unsuited for it; and (4) contributory copartnership, though it acts as a useful sieve to admit only the more thrifty and ambitious workers, presents a dilemma between the objective of safety and liquidity of the employee's savings and the objective of a voice in management through partnership.

It is readily apparent that these problems present less formidable difficulties for managerial, sales, and specialist employees than for the mass of manual and office workers, principally because the former are more prosperous. Hence they are better

acquainted with business principles and are better fitted to act as intelligent stockholders. Since their personal finances are not so close to the subsistence level as those of the wage-earners, they can better afford the speculative risks inherent in stock ownership. In general, their jobs are more secure, so there is less need for liquidity of their investments; and if unemployment comes, their resources other than this stock are more adequate. On the average these principal employees are more suitable candidates for copartnership of both the contributory and the purely profit sharing types.

Consider now some of the dangers which such stock participation presents to the two classes of employees in common. First there is the danger that unsuitable partners will be attached to the firm automatically, by the rather common scheme of sharing profit only in stock which cannot be sold until the recipient has left the firm. It is a gift horse, to be sure, and it has some cumulative effect on the worker's economic security and interest in the firm's costs; still, the voluntary and contributory employee-partners may be a more effectively selected crew. Second, there are numerous exceptions to the generalizations laid down about personal finances in the two classes; in particular there are principal employees who find it so hard to live within their incomes that both contributions for purchase of stock and non-existent dividends and unsalable stock, in hard times, are great burdens. To them may be joined, when depression comes, many more thrifty higher employees, who will blame the management for their loss of even paper profits. Finally, the bugaboo of both eggs in one basket becomes intolerable to those high-grade men who are thrown out of their jobs in a severe depression, at which time their stock in the employing company is a very frail support. The minimum of protection which such men should have, when they purchase their employer's stock on partial payments, is an iron-clad contract which releases them from further payments if and when the company dispenses with their services.

If, therefore, we should interrogate many of those concerned with managerial copartnership schemes, whether contributory or not, during the gloom of a bad depression, we should hear little but tales of woe. The further the scheme reaches down

toward the rank and file, perhaps, the more serious and more prolonged the reaction. It is not likely that the most able and adventurous of executives will be deterred, however, by such burning of the fingers, from entering another stock participation scheme where prices and prospects seem attractive.

**Co-optation in Management.**—Perhaps the most ambitious type of copartnership scheme is that which provides that active control of the business shall remain in the hands of “working partners,” so long as they can meet their fixed charges. Virtually all copartnership schemes in which large numbers of common workers participate, set limits on acquisition of voting stock by these humbler employees. Such provisions are strongly favored by Professor Bowie, who says “While we may question the capacity of the officers of the industrial ship, there can be no doubt of the unfitness of the crew”; and even Sidney Hillman, president of the “radical” Amalgamated Clothing Workers union, remarked:

I question what might happen when great numbers, inexperienced in management, proceeded to assume the functions of management. Suppose they all assign their proxies following a campaign more or less like our political campaigns, in which we all know that all issues but the essential ones are discussed. It may very well happen that, under such circumstances, management will suddenly be turned over to a group of people who have neither the knowledge nor the experience to run institutions with resources of over a billion dollars.<sup>17</sup>

**Maison Leclair.**—Such co-optation was part of the scheme of Leclair, who provided that working employees should have full control of the business so long as they could make it pay. He did not, however, by any means propose that his workmen should manage their concern in any ultra-democratic, debating-society manner.<sup>18</sup> The two managing partners come into control indirectly, *via* a self-perpetuating inner circle of employees

<sup>17</sup> James, Burritt *et al.*, *op. cit.*, p. 98. Notice the limitations in Mr. Hillman's statement—*sudden* acquisition of power, over a *very large* corporation, by a mass of *unorganized* stockholders.

<sup>18</sup> The following account is based on James, Burritt *et al.*, *op. cit.*, Ch. 16, as of the year 1925, and Aneurin Williams, *Copartnership and Profit Sharing*, Ch. 2 (London, 1913).

called the *noyau* or "nucleus," about 140 in number (the total number of employees in 1925 was 1,141). Whenever one of the managing partners dies, retires, or is recalled, the *noyau* elects his successor, who must buy out his predecessor's share as fast as he is able. After payment of 5% interest on capital, the remaining profits are distributed as follows: 15% to the two managing partners; 35% to the mutual benefit society (this society exists for all employees of five years' service or more, and it is the principal owner of the capital in the business); and 50% in cash to all employees in proportion to their wages and salaries. This last "dividend to labor" has been substantial,—10% to 25% of wages.

This co-optation of management in the Maison Leclair e endured with but few changes in detail, from the form finally given it by Leclair e in 1869 (after his retirement from active management) down to recent years if not to the present day. A very impressive monument to its founder. Closer inspection naturally would disclose weaknesses. In 1911-12 there were reported to be a total of 1,277 employees;<sup>19</sup> in 1925 a lesser number, 1,141. In both these years the *noyau* contained approximately 140 men; in 1842 there were 44 "specially selected officers and principal employees," and presumably some hundreds of lesser workers. This absence of growth is not necessarily a sign of weakness; but at least it raises the question whether a scheme like Leclair e's would be effective in a much larger concern.<sup>20</sup>

**Leeds and Northrup.**—The principle of co-optative management has been applied to a few other establishments in more recent times, notably in the Dennison Manufacturing Company (1911) and in Leeds and Northrup (some time before 1920). The latter company had about 600 employees in the middle 1920's; Dennison's had over 4,000. Mr. Leeds' profit sharing and copartnership plans apply only to principal employees, who

<sup>19</sup> A. Williams, *op. cit.*, p. 39.

<sup>20</sup> On a still smaller scale (perhaps 100 stable employees), Mr. Wm. P. Haggood and associates have worked out an ultra-democratic industrial partnership in the Columbia Conserve Co., Indianapolis. A recent account of its difficulties is given in C. C. Balderston, *Executive Guidance of Industrial Relations* (University of Pennsylvania, 1935).

are selected by co-optation. The profit sharing group elects to its membership any employee who is thought likely to earn the share he would receive; and it may demote members who are thought not to be paying their way.<sup>21</sup> Profit sharers are classified into groups, for division of the fund according to their assumed opportunity to influence profits; in general the higher-salaried executives secure higher percentages of their salaries as profit shares. These bonuses are paid in cash or at the option of the management, in stock. Voting common stock is always owned by active executives, who alone may become directors of the corporation; this stock must be exchanged for non-voting shares when the holder becomes inactive. The privilege of buying such voting stock is extended to executives and other principal and long-service employees by a process of co-optation: "At any time that there is to be a new issue, the trustees, who are the qualified representatives of the holders of employees' shares, decide to what individuals new stock may be issued and how much shall be issued to each, it being the intention that this most qualified group shall select those who are most likely to contribute to the future welfare of the undertaking. . . . *The employees' shares are sold, not given, to those to whom they are assigned.* Their value is ascertained by a fixed method, depending on the earnings of the business for a number of years preceding the time of sale."<sup>22</sup>

**Dennison Manufacturing Company.**—Mr. Dennison's plan also connects managerial partnership and managerial profit sharing intimately, and a profit sharing plan for the more routine employees was requested and worked out by their works council in 1919. When the managerial partnership scheme was adopted in 1911, the existing owners were bought out with non-voting 8% cumulative preferred stock, totalling four and a half million dollars.<sup>23</sup> Control remains in the Managerial Industrial Part-

<sup>21</sup> *Ibid.*, pp. 141 ff.; see also in C. C. Balderston, *Managerial Profit Sharing* (1928).

<sup>22</sup> M. E. Leeds, quoted in Balderston, *Managerial Profit Sharing*, p. 62. (Italics in original.)

<sup>23</sup> See the two books on profit sharing, in which Mr. Dennison collaborated with R. E. Heilman and G. James; also Mr. Dennison's American Management Association pamphlet, Annual Convention Series, No. 71.



nership common stock, so long as this 8% dividend is not in default. The said M. I. P. common stock was issued to a co-optating group of executives and other "principal" employees, who numbered in 1928 about 350—some 7% of all on the payroll. The crucial question of who should be admitted into this group was the subject of many heart-burnings, and of scientific job analysis by expert consultants from outside the firm.

Until 1919, after payment of the preferred dividend and provision for reserves, the directors declared a fluctuating cash dividend on outstanding M. I. P. stock and issued new M. I. P. stock for the remainder of the year's profit, to each member in the group in proportion to his salary. Since voting stock may be held only by active "partners," a second preferred stock was provided in 1911 or soon thereafter, to be issued in exchange for any M. I. P. stock which had to be canceled because the holder became inactive. In 1919 a fourth stock was provided for the non-managerial profit sharers, called "Employees' Industrial Partnership" stock. It has no vote, and obtains cash dividends which fluctuate with earnings, as determined by the directors. By 1928 an employee profit sharer must have five years' service, which included about half the non-managerial workers. The profit fund which had previously been distributed in M. I. P. stock, was now split so that two-thirds went to the managerial group and one-third to the junior (wage-earner and lower-salaried) profit sharers—to each of the latter in proportion to his length of service. When a holder of employee partnership stock left the company's payroll, his partnership stock, with its fluctuating dividend, was retired; and he received instead a fixed-dividend, transferable preferred stock. Mr. Dennison stated in 1928 that the managerial employees were paid "market" salaries, and that their share of profits ordinarily amounted to 20% to 35% of such salaries.

These principles of co-optation in management have not had a sufficiently long and broad application to business corporations so that we can say with much assurance or accuracy what effects may be attributed to them. They do embody many of the economic characteristics of the old-fashioned legal partnership, which still holds the center of the investment banking stage—

in J. P. Morgan's and other firms; in fact, the Leeds plan, at least, appears to have been consciously modeled on such partnerships. The arrangements of Messrs. Dennison and Leeds are intended to safeguard their concerns from voting control by absentee owners, and they will accomplish this end unless and until the managing "partners" lose control through failure to earn fixed charges. The managerial group have incentives toward efficient teamwork that are more comparable with those of literal partners than is the case with ordinary stockholders and boards of directors.<sup>24</sup> These incentives, however, obviously do not assure any management of perpetual ability to meet its engagements; many other factors are involved, such as types of demand for products, and relations between "equity" ownership and interest, rents and taxes. The numerous creative business men, who take just pride in the institutions they have helped to build up, must be frequently shocked at what the third or even second generations in other families do to their businesses when they inherit them. If these inapt heirs merely destroyed some speculative values and changed the financial affiliations, it would not be much cause for concern; but unfortunately any injury to the prosperity of a business house is likely to affect adversely the employees who have faithfully served it, not to mention its clientele; here is a consequence of upheavals in management which Leclair and Leeds and Dennison wished to forestall. Their methods, we have seen, differ in many particulars, though all employ the general principles of profit sharing and co-optation. Quite possibly further studies of unincorporated partnerships and the innumerable schemes of stock options and bonuses for executives would facilitate the construction of various alternative schemes for securing active management against absentee and mainly speculative control.

#### How May Co-optative Management be Made More Secure?

—Many of the problems boil down to the quest of criteria for persons who are to exercise managerial control, and for criteria,

<sup>24</sup> In Leeds and Northrup, "None of the employees sufficiently high in rank to become holders of employee [managerial] shares have voluntarily left the concern either to join competitive firms or to set up concerns of their own."—Balderston, *Executive Guidance*, p. 142.

moreover, which will in the long run be more satisfactory than those hitherto produced by corporation finance. One requirement which appears commonly in such schemes as were cited above, is that management sharers must have been in the firm's employ for some minimum period like five years. Another is a minimum salary of say two or three thousand dollars. These tests doubtless will usually tend to select capable and steady people of managerial calibre, but some flexibility is needed. A rigid "probationary" period of several years may deprive the management of needed benefits from "new blood"; and among the higher-paid employees there may be some classes, for instance salesmen or specialists of various sorts, who are so isolated from many operations and problems of the business that they are not apt to have proper background for general managerial thinking. A set of objective criteria for membership is useful toward checking the power of cliques; but the governing group should be expected occasionally to make exceptions to such objective criteria in co-opting new members.

It is very important to keep in mind here the distinct objectives of (1) furnishing an optimum incentive to effort, and (2) providing for continuance of stable and intelligent control of the enterprise. A "probationary" period so long as five years, for instance, may fail to give the most effective stimulation to extremely able employees during their first few years of service, though at the same time it may be a very good sieve for selecting the persons entitled to vote for directors. Mr. Leeds' scheme apparently has the great merit of assuring that these two functions will not become confused in too many minds, by providing that people may be co-opted into the bonus or profit sharing circle, without thereby necessarily giving them the opportunity to buy voting stock. To determine admission into a co-optative group which shares profit by way of cash or non-voting securities, it may well be sufficient that the other members are satisfied that the new man will be stimulated to earn at least his salary and bonus; but an individual's eligibility for purchase or bonus of management-sharing stock should depend on a somewhat different set of qualifications. Management sharers might, for example, be drawn mainly or solely from persons rec-

ognized as responsible largely for development of (and progress within) their respective functions of the business.

In order to give co-optative management the best possible chance of long survival, it is desirable to provide as far as may be against very severe depressions, by keeping down charges which might unduly reduce the incentives of the managerial employees. They might be able, for example, after a few years of deficits, to earn more than enough to pay fixed charges, including cumulative preferred dividends to people who had supplied capital; but if they were also burdened with vast arrears of cumulative preferred dividends on old profit sharing stock, their prospects of ever earning any dividends for themselves would be very discouraging. The non-managerial profit sharers might better be given common or non-cumulative preferred stock, in such limited quantities that the corporate surplus would permit the steady dividends which most of such holders would need, except in extraordinarily hard times; and after a severe depression, the company's recovery would be easier with this sort of capital structure than if the active "partners" were confronted by a great encumbrance of unpaid cumulative preferred dividends.

**The Gist of It.**—When one makes more than the briefest study of the history and theory of profit sharing and related practices, he is astonished at the complexity of the problems. Variables like the purposes sought, small and large concerns, types of employees and employers, cash and stock, systematic and arbitrary, formal and informal, need to be discriminated and followed through their numerous permutations. Almost all the innumerable sorts of contingent wages and equities in ownership would appear in a really complete picture.

The broad purpose, to be sure, is simple enough, and it gives a real unity to all this maze of particulars: it is to create more of a "partnership" bond between employer and workers, for mutual benefit. The schemes we have studied which aim in this general direction, however, may be interpreted with varying emphasis, so that contradictory attitudes are reached. Trade union leaders, for example, can easily show that many profit sharing

schemes invite the workman to barter his birthright, of freedom to organize and strike, for a small and uncertain addition to his wage. Other observers argue plausibly that cash profit sharing has little, if any, effect on the employee's efficiency, because the profit share is meagre and remote and only infinitesimally affected by his own efforts. Still others demonstrate that ownership of stock in the concern which employs him is a very poor investment for any one. In short, our net judgment is determined, first, by what proportion of the factors really involved we perceive; and second, what weights we assign to each. Each establishment is an individual problem in both these ways; yet I shall attempt a few generalizations about some types of situation.

With respect to the outstanding problem of effect on productive efficiency, profit sharing schemes share many of the properties of the group wage plans which were discussed in Chapter 14 above. Neither is a satisfactory substitute for good supervision and such measurements of individual performance as are economically feasible. Both seem to operate best in small groups, where cooperation among individuals is needed, where its effects show up in output, and where the alert and ambitious members have a real chance to detect and discipline the lazy or non-cooperative workers. The group reward which Mr. Towne called Gain Sharing, in which the contingent wage to the group members, and/or to its supervisor, is based not on either mere quantity of output or on net profit of the business as a whole, but upon all direct and indirect costs which are considerably under the group's immediate control, is found in many connections and is often called "unit profit sharing" in large corporations. It is a very promising mode of quasi-partnership, especially in any but the smallest enterprises. In the latter establishments the sharing of net profits with all stable employees has opportunities, similar to those of gain sharing and other group bonuses in big plants, to stimulate the worker's efficiency.

Unit or general profit sharing seems rather commonly to promote efficiency when applied in special plans for executives and other "key-men." Not only because they constitute a relatively small group within which "public opinion" may be a real spur, but because (1) cooperation among members is specially

important, (2) objective measures of individual efficiency are more scanty than in the case of more routine workers, and (3) the higher-grade workers have more opportunity to influence departmental or enterprise net profits.

These remarks on efficiency pretty well cover the least vague aspects of the worker's "morale." If the worker thinks his employer offers him unusually good opportunities to reap where he sows, he has some predisposition toward cooperativeness. But, however admirable be the broad principle of partnership, there are sure to remain many controversial issues, particularly the base wage rate. The far-sighted employer will hardly play into the hands of "outside agitators" by putting any provisions into profit or gain sharing plans which may be plausibly construed as infringing his men's liberty to go on strike whenever they become sufficiently dissatisfied with his wage scales or other arrangements.

The fact that net profit is dependent on many factors far beyond the worker's control is a handicap to net profit sharing in its rôle of stimulus to labor efficiency, but it also gives rise to another useful rôle for such sharing. I refer now to the function of minimizing unemployment and short time. Net profit may disappear, despite the employees' best efforts; but these best efforts are likely to enable the employer to keep operating longer and with fuller force than he could without them. This is an aspect of profit sharing which seems not to be noticed by many students of the subject; and manual workers doubtless especially need to have it called to their attention.

The foregoing arguments apply in similar directions to any *de facto* "industrial partnership," whatever be the proportions of cash or stock or subsidies on stock purchase used for distribution of the fruits of cooperation. But of course there are all manner of distinctive and vexing problems presented by schemes of copartnership and profit sharing through employees' stock ownership. Let us not too hastily condemn the whole idea of such ownership because of the disasters following 1929: all manner of institutions, such as real estate mortgages, seem almost equally "discredited" at such a time, which does indeed furnish "acid tests" that should lead to better safeguards in the future.

All should recognize that manual workers at best are exposed to severe and cruel fluctuations of wage income, through irregular employment; and that the lower the *average* income, the greater are the evil results of *fluctuations* in that income upon the family budget. A mere cash profit sharing scheme for such workers accentuates the "feast or famine" element in their lives; and during the feast periods the surplus income is likely to be unwisely spent or invested, if left entirely to the employee's discretion.

If all the main objectives are kept firmly in mind (improving the average amount of the worker's income by raising his productivity and investing his savings; stabilizing this income by more regular employment, as well as by suitable investment and insurance; and enabling him to earn still other desirable features of a financial partnership status)—then experimentation with numerous variations and combinations among the means we have surveyed is likely to improve labor relations, even in their more socialistic settings.

## CHAPTER 18

### INDIVIDUALIST CULTIVATION OF EMPLOYEES' SUGGESTIONS<sup>1</sup>

#### The Denny Awards Scheme.—

To the Workmen of Leven Ship Yard, Dumbarton [Scotland]:

We have noticed during the past two years many improvements in methods of work and appliances introduced by you into this Yard. We very readily recognize the advantage accruing to our business through these efforts of your skill, and we are desirous that they should not pass unrewarded. We have, therefore, decided that the authors of such improvements . . . shall have a claim upon the Firm for reward; and, to enable these claims to be readily and easily adjusted, we have appointed a Committee of Awards . . . We are confident the names of the gentlemen comprising the Awards Committee will recommend themselves to you as guarantees that thorough fairness and competent intelligence will guide their proceedings and decisions. . . .

This announcement was issued by William Denny in 1880. The earliest suggestion system of which I have found record, it survived in the Denny works until 1931, when its operations were suspended during an extreme depression in shipbuilding.

The original rules provided that

1. Any workman in our employ, exclusive of head foremen, officials of this Committee, and heads of Departments, may claim an award from the Committee on the following grounds:

- (a) That he has either invented or introduced a new machine or hand tool into the Yard . . .
- (b) Improved any existing machine . . .
- (c) Applied any existing machine . . . to a new class of work . . .
- (d) Discovered or introduced any new method of carrying on or arranging work . . .

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<sup>1</sup>Parts of this chapter were published in my article, "Suggestion Systems," *Mechanical Engineering*, Vol. 56, pp. 671-675 (Nov. 1934).



(e) Or, generally, that he has made any change by which the work of the Yard is rendered either superior in quality or more economical of cost. [Later, prevention of accidents and material waste were specified here.]

2. In the case of a workman who is unable to test the merits of his supposed invention or improvement, either through inability on his own part to make the necessary experiments or to pay for the same, the Firm, on the recommendation of the Committee, may agree to bear the whole or part of the necessary expense, and if the invention should afterwards prove a practical success an award shall be granted accordingly. . . .

8. If any claimant desires such help, the Secretary will put his claim into proper form and write it out for him. . . .

The normal awards were to vary between a minimum of £2 and a maximum of £15, but "Should a claim, in the opinion of the Committee, not be of sufficient merit to entitle them to make the minimum award of £2, but which may be of some value, the Committee have the power to grant an allowance less than £2 to encourage claimant to try again. . . . These allowances to be called 'encouragement premiums'."<sup>2</sup> When any workman had received five regular awards, he was paid a premium equal to the sum of all his awards, and similarly for succeeding sets of five, except that for the second and later sets he also got an accelerating bonus,—£5 for the second five, £10 for the third, and so on. Later, annual bonuses were given for largest and next largest earnings in awards.

To a remarkable extent these essentials of the first system characterize most suggestion schemes in use today. At least two other progressive manufacturers introduced similar plans a little later,—Yale & Towne in the '80's, and John H. Patterson at the National Cash Register Company in 1894. The latter of these systems still survives. Mr. Patterson characteristically provided a series of semi-annual "Suggestion Contests" for lump-sum prizes.

**Mavor and Coulson's Suggestion Scheme.**—In recent years a neighbor of the Dennys, Mr. Sam Mavor, whose firm is mentioned at various other points in this book, has become a leading

<sup>2</sup>Quotations are from typed copies kindly supplied me by officials in the present Denny firm.

exponent of both practice and theory of suggestion schemes. He read one of his several papers on the subject at the Glasgow meetings of the British Association (1928). Here it is appropriate to quote some of the general remarks he has addressed to his employees :

By this means [submitting suggestions] a worker may express his individuality, and have the satisfaction of seeing his own ideas put into practice, and that with immediate and substantial advantage to himself and to the Firm, and less directly to the industry in which he is engaged, and to the community. . . .

The invitation for Suggestions is not an admission by the Management that they do not know their own business, or that they are unable to initiate improvements. On the contrary, the major improvements projected by the Management are often in advance of the time and means required to put them in practice. The Management provides the Works organization, but it does not have a monopoly of brains and technical skill; intelligent workmen in their individual and intimate contact with details have innumerable opportunities of devising means for facilitating machining, fitting, or assembly of parts in their progress through the various operations, and for economizing in time and material. . . .

That initiative in communicating ideas is not more general among workmen may be partly due to shyness or reticence, but it is probably chiefly due to past lack of encouragement and suitable acknowledgment. We are most anxious that all here should contribute the work of their heads as well as that of their hands, and we want to remove every barrier that has prevented the free communication of ideas, . . . A Suggestion Scheme gives every one opportunity to bring his talents out into the open, and to demonstrate his claim to merit wage-advances and to promotion.<sup>8</sup>

The wide variety of such suggestions, in both subject-matter and value, is illustrated by the following example from the Eastman Kodak Company's experience—its suggestion plan was initiated in 1898:

One suggestion was that stuffed owls be put in the ivy covering many of the buildings to keep the sparrows out; another, that an outside hatch be made to facilitate getting heavy grinding wheels into and out of a basement; a third, that refrigeration be discontinued as unnec-

<sup>8</sup> *M. & C. Apprentices' Magazine*, Christmas number 1927, p. 142.

essary in the conditioning of some of the products. The first suggestion was rejected; the second was awarded \$25; and the third received an award of \$1500.\*

**Relations with Other Labor Management Devices; Types of Suggestion Plans.**—In a moment we shall pursue a little further the history and significance of schemes like those just cited, but now let us indicate the scope of the following discussion more precisely.

First, notice that we are usually concerned, in this chapter and the one which follows, with positive and constructive ideas of workers about products and methods in the establishments where they work; and that in general these are distinct from their ideas concerning the controversial collective issues of wages, hours, working conditions, and rights of organization, on the one hand, and adverse criticism of matters like tools, foremen, and fellow-workers on the other. Yet these three classes of ideas in practice cannot be sharply differentiated; and there is obviously some point to the remark in the National Cash Register Company's poster: "Complaints are also desired. A complaint that leads to an improvement receives the same credit as an adopted suggestion." Many suggestion plans, however, are restricted to a certain range of ideas, such as safety measures or waste reduction; not all are wide-open as to subject matter.

Besides this question of eligibility of subject, there is the problem of eligibility of persons. In general we are here concerned with the ideas of the "rank and file" or common workers in shop or office or salesroom, who are neither supervisors nor salaried specialists. Obviously the supervisors and others of similar status have always been paid largely for brain work. But here again the distinction is only relative, for the same intolerance of unsolicited advice from inferiors, which is often called "foreman-resistance" to ideas from the common workers, tends somewhat to prevent officials at each level from receiving the best thought of their own inferiors. Hence, many suggestion plans make foremen and other officials eligible for

\* V. M. Palmer, "The Operation of a Suggestion System," *Mechanical Engineering*, Vol. 56, pp. 731-735, Dec. 1934.

special recognition with reference to proposals on matters outside their normal responsibilities; and some give bonuses to foremen on the suggestion-rewards of their men.

**Methods.**—We may also classify the principal methods of utilizing this potential fund of ideas. The traditional ways, of course, are informal; and many authorities tell us that if a plant has competent supervisors it does not need a suggestion plan. Another possibility is that the labor organizations, whether trade unions or “company unions,” will attempt to stimulate and mobilize the constructive ideas of the workers, as well as to protect them in their rights. We shall see that many starts have been made in this direction. These joint council or collectivist plans, together with the individualist reward systems, we may comprehensively call *formal plans for eliciting, appraising, and utilizing employees' suggestions*. An individualist scheme provides an appraisal committee, containing responsible representatives of the management—also, perhaps, representatives of the common workers—which committee receives the ideas, either directly from the suggester or through some intermediary other than his immediate supervisor, in order to minimize the “resistance” which his own supervisor may offer to his suggestion. The name of the suggester is likely to be withheld from the department head affected, during the investigation; and in some systems the suggester remains anonymous until he chooses to claim his reward or explanation, by means of the numbered stub which he tore off the blank when he submitted his suggestion upon it.

Within the realm of formal suggestion plans, in this wider sense, we may readily distinguish some other subsidiary categories. A convenient main separation was indicated above, namely (a) Individualist—systems which appeal chiefly to the individual self-interest of the potential suggesters, and (b) Collectivist—those which appeal more to his interest in his worker-group, trade union or other. In general the individualist plans lean most heavily on pecuniary incentives, and the collectivist schemes rely more on non-pecuniary motivation, yet there is considerable overlapping. In not a few establishments all manner

of material and honorary appeals are made in both individualist and collectivist fashion at once.

**Objectives.**—The objectives sought through any suggestion scheme should also be more explicitly enumerated before we proceed further. There are two general sorts, which I have called “technical” and “morale” benefits. (1) The technical worth of a suggestion is identical, no matter who makes it,—employee, boss, customer, or complete outsider. Under special conditions the idea may be patentable and thus become a piece of property of the inventor. (2) The “morale” effects of the whole suggestion process, on the other hand, are peculiar to the suggestions of *employees* of the establishment to which the suggestion refers. These “morale” benefits, in turn, are of three main sorts, namely: (a) provision of better ventilation of criticisms and grievances; (b) assistance in identification of employees who are capable of holding better jobs; and (c) increase in the knowledge and interest of the suggester in his work. Any method—informal or formal—of dealing with suggestion problems has characteristic costs and disadvantages. Naturally, no employer wants his worker’s headwork to cause neglect of his ordinary handwork or other routines; nor does he altogether approve if he thinks the suggestion plan has tended to make the employees even more unjustly critical of the management than they were before; and it is understandable that many supervisors emphasize the military virtue in subordinates of complete dependence upon methods prescribed by superior authority.

The present chapter emphasizes statistical views of suggestion problems and methods, with special reference to individualist types of suggestion schemes. In the following chapter, I shall offer a few comparisons between these and the more collectivist plans of employee-management cooperation.

What is the general history of the individualist plans? What conditions seem to have influenced the volume or quantity of suggestions offered through them? And the quality of these ideas—can we estimate their direct or “technical” benefits? How great may be the total net benefits to all parties, when account is taken of the difficulties of appraising and sharing such

gains? These four questions we shall consider in turn, in the remainder of the present chapter.

**1. General History.**—The examples set by Messrs. Denny, Towne, and Patterson have been followed by some hundreds of companies, and the suggestion scheme "movement" has had a gradual growth from the early '80's to the present day. It has almost escaped the attention of statisticians, however, so that our wholesale knowledge about it is very limited. The Cadbury, Rowntree, Dennison, Bird & Son, Westinghouse, and Automatic Electric concerns, among others, had established suggestion reward plans by 1914, in which year a library periodical index began to use the heading "Suggestion Boxes." Congress had already authorized payments of this sort, at least in the ordinance and post office departments. In the middle 1920's several surveys of company practices in industrial relations showed that at least two to three hundred American concerns were using some sort of suggestion plan. Most of them were manufacturers, but merchants, railways and public utilities, financial and insurance institutions, oil refiners, mail order houses were also included—a considerable range of industries. Abroad, such schemes have become especially common on railways (in Germany, France, and Switzerland, for example); and, as will be noticed in Chapter 19, Soviet Russia's industries have featured formal plans for encouragement of workmen's ideas.

Some significant changes have occurred in emphasis since the earliest plans were launched. In the '80's references were generally made to "inventions" of workmen, and provisions were common, as at Denny's, for possible patents. Later, as we have seen, safety and anti-waste became stressed, and "suggestions" replaced "inventions" as the general term. From the outset Mr. Denny asked for improvements relating to quality; but it remained for more modern schemes (and, perhaps, more suitable industries) to appeal for ideas as to what new products and types of service might be offered, and where new customers could be found. The recent anti-waste campaign of American management engineering societies seems to have stimulated the organization of suggestion plans.

To some extent suggestion boxes have been regarded in America as rivals to, and perhaps forestallers of, any sort of employee organization. In 1924-26 two canvasses of 1,000-1,500 companies showed that, while over 200 firms reported the use of suggestion systems and over 300 had employee representation plans, less than 75 were using both.<sup>5</sup> I shall argue in Chapter 19, however, that these are properly complementary rather than competing devices. In other lands, such as England, the suggestion scheme is frequently auxiliary to both trade union and works council structures in the same plant.

**Suggestions in Absence of Plan.**—So much for general history; let us now consider some chief phases of that history in greater detail.

I begin with a query, based on the notion of "control group" in scientific investigations. What is the suggestion situation likely to be in the absence of a formal plan—other things equal? The foregoing discussion of notions which lead to the adoption of formal systems shows that many managers who have had experience with informal methods have thought it needful to take more systematic steps toward meeting thinking employees half-way. But in order to form a sound judgment on what results may be attributed to suggestion schemes as such, we need much more information than is yet available, on corresponding phenomena in plants which are similar except that they do not use formal methods of dealing with employees' ideas. A sample of what might be found, by suitable field work, is supplied by

<sup>5</sup>Data privately supplied by National Industrial Conference Board and Industrial Relations Section, Princeton University. More particulars are given in my pamphlet and article cited below. A later survey by Mathewson [*Personnel Journal*, Vol. 10 (1931), pp. 225-31], of 195 large concerns, indicated that suggestion plans had been coming into use more rapidly than works councils; 54% of these companies were using the former, as compared with only 19% using employee representation. By 1933, of course, our Government's NRA and other labor policies lead to greatly increased labor organization, in and out of "company unions." In 1935 the National Industrial Conference Board obtained reports from 2,452 companies, employing 4.5 million workers; the results appear in its Study No. 221, *What Employers are Doing for Employees*. Five hundred sixty-six (23.1%) of these companies, accounting for 44.7% of the employees, reported that they were using suggestion systems. Seven hundred fifty-one (30.6%) of the companies, with 57.7 of the workers, reported employee representation plans in use.

the following excerpts from a report secured for me by a member of the higher management in a railway equipment plant, employing about 1,000 people, which has no formal system :

The lowest number of suggestions per worker is found in the foundry. . . . In departments where skilled workers are employed there are considerably more [e.g.] in the tool room. . . . Many of the workmen's good ideas never come to the attention of the foremen except in the excellence of the work. . . . Another such line is maintenance. A great variety of jobs done by men working independently tends to have men make suggestions to themselves. . . .

One of the workmen who welded rings . . . conceived a device to hold the parts in place and revolve them slowly as the work was being done. The man was allowed to develop the device himself and eventually it was successful. . . . However, the workman was a welder, not a machinist, and he wasted a good deal of time and money in building the machine. . . . The foreman ventured the opinion that it was all right for employees to make suggestions, but, if any of the ideas showed promise, the development of them should be put in competent hands.

The attitude of the workers towards suggestions and foreman resistance varies greatly. Some feel that constructive criticisms are not welcome and that they are to do their jobs well and nothing else. Others believe that the foreman is interested in the efficiency of his shop and his workmen and looks with favor upon any proposed improvements. . . .

None of the foremen looks with favor upon the establishment of a formal reward system . . . it probably would be more trouble than use. They believe that suggestions are the effect rather than the cause of employee efficiency and initiative and that if a worker is satisfied with conditions and pay, he will do as good a job as he can for his employer.

Here are further indications that, in any organization, some supervisors tend to repress the constructive thought of their underlings. Whether suitable selection and training of foremen and other executives might solve most or all of the problems connected with workers' suggestions, is a problem which will be discussed toward the end of this chapter.

**2. Influences on Volume of Suggestions.**—In the individual reward schemes which have operated for ten years or more, what volumes of ideas have been secured, under what conditions?

Since 1926 I have had contact, mainly by correspondence, with persons acquainted at first hand with the operations of



perhaps 60 to 100 of these systems, and I have collected comparative statistical data for one or more years, from 29 companies. The accompanying table exhibits samples of this statistical information, other details of which have been published elsewhere.<sup>6</sup> The data are not thoroughly comparable, even from year to year within the same establishment, for instance "accepted," "awarded," "adopted" do not have the same significance in different places and times; also it may occasionally happen that an employee makes an invention or other improvement which he is able to exploit outside the suggestion system, and thereby earn even more than is shown as the maximum payment for his establishment, in my table.

Interpreting these figures in the light of such other information as is available, in which types of situation are the largest numbers of suggestions per potential suggester secured? Column 5 indicates the great variations which may be found between still lower figures than the 15 to 20 *per thousand* employees in our life insurance company (Establishment No. 26) and the average of five to six suggestions *per single employee* in Mavor and Coulson's, at Glasgow (No. 27). Probably the outstanding cause of these differences is variation among the managerial personnel immediately in charge of operation of the systems. The investigator or secretary who deals personally with the suggesters, assisting them to elaborate and express their ideas, and explaining to the authors why certain suggestions were rejected, is truly a "key-man" in the success or failure of the plan. A stable and compact suggestion committee is also needed. And, of course, these officials must have prestige and financial resources, which will be supplied only by a higher management which is genuinely enthusiastic over its suggestion

<sup>6</sup> See my *Suggestions from Employees*, Michigan Business Studies, Vol. I, No. 3 (Ann Arbor, 1927); "Suggestions from Workers: Schemes and Problems," *Quar. J. of Econ.*, Vol. 56, pp. 617-43 (Aug. 1932); "Suggestion System Operations, 1926-31," *Personnel Journal*, Vol. 12, pp. 16-22 (June 1933); P. L. Stanchfield and Z. C. Dickinson, "Suggestion Systems in 1932 and 1933," *ibid.*, Vol. 13, pp. 197-203 (Dec. 1934). Citations to other literature on suggestion schemes are given in these papers, though I have not compiled, nor seen reference to, any exhaustive bibliography of the subject. See also J. Rossman, "Stimulating Employees to Invent," *Industrial and Engineering Chemistry*, Vol. 27, pp. 1380, 1510 (Nov. and Dec., 1935), which summarizes replies received from 233 large companies.

## COMPARATIVE DATA ON SUGGESTIONS IN 11 ESTABLISHMENTS

(1) Estab. No.	(2) Industry, location	(3) Size <sup>1</sup>	(4) Period	(Annual basis)				(7) Average payment per awarded suggestion <sup>2</sup>	(8) Lowest and highest awards	(9) Number of suggestions per suggestionster	Women			
				(4a) No. of employees, as per cent of no in 1929	(4b) Total man-hours worked, as per cent of 1929	(5) No. of suggestions per 1000 employees	(6) Per cent awarded <sup>3</sup>				(10) Per cent of total employees	(11) Per cent of total suggestions	(12) Per cent of total awards	(13) Employee representation
2	Rubber manufacturing, Mid-West	Large	1926-29	..	..	170	24	10.61	5- 800	17	..	..	No	
			1930	..	..	197	24	15.00	5- 500	17	..	..	..	
			1931	..	..	63	75 <sup>4</sup>	250	26	8.40	5- 100	17	..	Yes
			1932	..	..	57	..	200	23	8.60	..	..	..	..
			1933	..	..	61	..	181	23	13.85	..	..	..	..
5-a	Electrical manufacturing, East <sup>4</sup>	Large	1926-29	..	..	294	33	15.81	5-1200	1.6	15	6	4	Yes
			1930	..	..	384	34	14.45	5-1000	..	..	..	..	..
			1931	..	..	299	34	12.25	5- 350	1.8	13	7	4.3	Yes
			1932	..	..	29	308	35	9.15	..	..	..	..	..
			1933	..	..	29	130	29	9.20	..	..	..	..	..
5-b	Electrical manufacturing, East <sup>4</sup>	Medium	1926-29	..	..	219	31	10.09	5- 150	1.7	40	26	18	Yes
			1930	..	..	392	29	9.70	5- 150	..	..	..	..	..
			1931	..	..	334	24	10.90	5- 100	1.5	42	25	15	Yes
			1932	..	..	43	..	35	6.30	..	..	..	..	..
			1933	..	..	48	..	28	5.90	..	..	..	..	..
6	Electrical manufacturing, Mid-West	Medium	1926-29	..	..	1518	45	No cash	No cash	4.8	32	9	12	Yes
			1930	..	..	1818	45	No cash	No cash	5	..	..	..	..
			1931 discontinued	..	..	..	..	..	..	..	..	..	..	..
8	Paper manufacturing, East	Medium	1926-29	..	..	1145	28	4.28	2- 500	..	48	11	11	Yes
			1930	..	..	533 <sup>4</sup>	15	6.67	5- 100	..	..	..	..	..
			1931	..	..	410	19	7.72	5- 100	1.8	48	9	2.8	Yes
			1932	..	..	138	19	5.60	..	..	..	..	..	..
			1933	..	..	50	16	5.41	..	..	..	..	..	..
18-a	Chemical, East <sup>4</sup>	Medium	1927-29	..	..	540	23	11.00	2-1165	2.8	32	6.9	5.1	Yes
			1930	..	..	844	20	13.97	2-1000	3.2	37	7.9	6.7	Yes
			1931	..	..	481	29	8.79	2- 138	2.7	31	4	9	No
			1932	..	..	493	25	10.83	..	..	..	..	..	..
			1933	..	..	420	25	10.24	..	..	..	..	..	..

18-b	Chemical, East <sup>4</sup>	Large	1927-29	...	219	38	6.39	1- 200	...	24	...	2.4	No	
			1930	...	388	31	5.81	1-1000	...	20	...	4.4	No	
			1931	...	517	27	7.37	1-1000	...	21	...	3	No	
			1932	...	211	32	4.61	.....	...	..	...	..	..	..
			1933	...	252	34	4.65	.....	...	..	...	..	..	..
19	Public utility, Mid-West	Medium	1926-29	...	306	27	7.50 <sup>5</sup>	0.50- 850	...	17	...	..	Yes	
			1930	91	200	27	8.75	0.50- 305	...	..	...	..	Yes	
			1931	..	200	25	5.30	5- 10	...	..	...	..	Yes	
			1932	78	185	7	6.00	.....	...	..	...	..	..	..
			1933	82	275	7	7.25	.....	...	..	...	..	..	..
25	Department store, East	Large	1927-29	...	70	17	4.50	2- 25	...	60	...	..	No	
			1930	104	85	13	4.60	2- 25	...	..	...	..	..	..
			1931	124	37	23	4.09	2- 25	...	60	...	..	..	..
			1932	119	60	20	3.46	.....	...	..	...	..	..	..
			1933	121	75	16	3.52	.....	...	..	...	..	..	..
26	Life insurance, East	Large	1929	...	20	34	9.00	.....	...	77	...	..	No	
			1930	...	19	37	8.13	.....	...	78	...	..	..	..
			1932	...	15	50	7.71	.....	...	..	...	..	..	..
			1933	...	16	42	7.31	.....	...	..	...	..	..	..
			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	Machinery manufacturing, British	Small	1926-29	...	2884	40	3.50	0.60- 49	8	Small	...	..	Yes	
			1930	...	5613	37	2.55	0.60- 15	..	Small	...	..	Yes	
			1931	...	5430	35	2.13	0.60- 49	...	..	...	..	Yes	
			1932	83	78	6460	35	2.02 <sup>6</sup>	.....	...	..	...	..	..
			1933	93	91	5850	32	2.16	.....	...	..	...	..	..

<sup>1</sup> "Large" = 5000 or more employees, "medium" = 1000 to 5000; "small" = under 1000.

<sup>2</sup> Or "accepted" i.e., given some sort of cash or honorary award. In some cases a suggestion receives an award without being actually put into operation.

<sup>3</sup> Total payments during year (including regular, special, and supplementary prizes) divided by number of suggestions awarded during the year.

<sup>4</sup> 5-a and 5-b are two plants of a single corporation, likewise 18-a and 18-b.

<sup>5</sup> Standard of acceptance raised, April 1, 1929.

<sup>6</sup> This index is calculated with the average number of persons on the payroll in 1929 used as base. In earlier reports, the per cent of the number in the preceding year was given.

<sup>7</sup> Averages for 1926-1930, inclusive, obtained by adding total of cash awards and potential value of "merit-mark" awards, and dividing by total number of suggestions given either type of award. For years after 1930, only cash awards are averaged.

<sup>8</sup> British payments converted into dollars at the rate of 25 cents to the shilling.

scheme. These financial resources are required principally for the payment of rewards; various phases of which we shall discuss in a moment. Expenditures are needed, too, for equipment such as suggestion boxes, forms, and drafting assistance, for the convenience of suggesters; and for bulletins, payroll slips, and other devices of publicity which bring to the workers a succession of novel and interesting reminders of the suggestion scheme. Posting a type of problem that is of special interest to the management may give a helpful lead to suggesters.

The importance of these matters may be illustrated from the experience of Mavor and Coulson. They initiated their suggestion system in 1917, from which time up to 1926 it produced only about 50 suggestions a year—an average rate of perhaps 1/10 of a suggestion per worker. Then the numbers climbed very rapidly (though the average payment per adopted suggestion declined somewhat), as more intensive propaganda was employed, until in 1928 over 2,500 suggestions were lodged—equivalent to 5.7 suggestions per person employed by the firm. Since 1928 even better records have been hung up, with one striking exception: in 1929 there was a slump to 1,500 suggestions, coincidentally with the unsuccessful trial of a new investigator of suggestions.

**Payment.**—To what extent does the volume of suggestions respond to the policy of payment? Columns 5, 6, 7, and 8, reflect the payment policy within each concern, from various angles, and give us some useful clues. If the management desires to encourage suggesters by giving awards for all proposals which show any keenness of mind, then many workers learn that the hurdle is not too high for them, and a large volume may be secured (Column 5), of which say 40% or more may win payments (Column 6). The average payment per "awarded" suggestion, however (Column 7), in this case must be low; and the minimum payment (Column 8) will also be low. The maximum total reward paid for any one suggestion (Column 8) makes fine material for headlines; it appeals to the lottery-customer who lives in every one of us. Only large plants, however, in which small unit savings may be utilized through many

repetitions, are apt to pay \$1,000 or more as a single suggestion prize; and even in them the argument has great force, that prizes should be proportioned in part to the ingenuity and care and effort displayed by the suggestion, rather than strictly according to the rate of production of the part affected.

**Non-Pecuniary Incentives.**—Several plants have experimented with individualistic appeals other than direct cash rewards. One such incentive is notation of each suggestion and its estimated value on the suggester's employment record, where it is supposed to be a factor in determining his steadiness of employment and advancement. Establishment 6, manufacturing electrical equipment, with two or three thousand employees in the '20's, obtained very striking results for many years without paying cash rewards. They did, however, distribute annually "token" presents of jewelry and other merchandise, the value of each present being roughly proportioned to the total value of the recipient's suggestions during the year; and they featured the idea of notations on suggesters' service records.

Another powerful type of motivation, which may be employed with or without cash rewards to individuals, is supplied by favorable publicity, through the plant paper and otherwise, for the makers of the best suggestions. Many people who are otherwise politically conservative—directors of research organizations, for example,—as well as many enthusiasts over "solidarity of labor," deprecate any such "invidious distinctions" among individuals; but the Bolshevists in Russia have also used honorary individual citations as rewards and incentives on a very large scale—for constructive suggestions from common workers, as well as for all manner of other supposedly meritorious acts.

**Influence of Sex and Occupation.**—Does our table indicate other causes or effects, related to the mere number of suggestions? If this table were extended to include all similar data which I have collected and published, we should see some further reason to suspect that manufacturing and public utility employments are more fertile fields for suggestion schemes than are stores and offices. In fact, some of my factory correspondents

have observed that white-collar employees contribute "less than their share" of suggestions (except in special circumstances, such as the unusual encouragements given the office boys in Establishment 27). Columns 10, 11 and 12 show a very marked difference between the sexes as to both quantity and quality of suggestions. The percentage of suggestions submitted by women is invariably much lower than the percentage of women among all employees, and in most cases a smaller per cent of the suggestions from women win prizes than is the case among the suggestions from men. Perhaps women do as well as men within the same categories of age, length of service, occupation, and so on; but only fragmentary analyses of these latter factors have yet been made. It may be that the woman's feeling that she may be rescued from her job at any moment by marriage, and/or that a real career in business is denied to her, however capable she may be, by the prejudices of executives against women, handicap her as a suggester, to an important extent.

Some hints on the influence of age and occupation are afforded by the accompanying table, constructed from data supplied by Mavor and Coulson. Special efforts are made in this plant to secure suggestions from the boys, who (perhaps more than others) obtain some payments for ideas which are not adopted. The pattern shop was in a persistent slump during the next four years, after getting one and one-half to two suggestions adopted per man in 1928 and 1929.

**Recidivism.**—Another statistical aspect of quantity of suggestions is recidivism—the tendency of some individuals to make more than one suggestion. A complete tabulation in each plant would show how many persons turned in just one idea during a given year, how many offered two, and so on; and further, a cumulative count may be offered on the basis of how many suggestions the individual has made during all the years he has worked under the scheme. Column 9 of the table on page 390 gives an index of this factor where it was obtainable—the "average number of suggestions per suggester." A more readily intelligible index, perhaps, would be the percentage which

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SELECTED DEPARTMENTAL RECORDS, AT MAJOR AND COULSON'S <sup>7</sup>

Department	Number of Suggestions per Employee						Suggesters as % of all employees, 1933
	Received			Adopted			
	1931	1932	1933	1931	1932	1933	
"A" Department (Fitting).....	14.8	8.5	7.4	7.5	4.8	4.1	100
Office boys.....	14.5	18.6	33.0	4.0	4.8	6.5	100
Pattern shop (combined with joiners after 1931).....	1.0	0.8	0.9	0.4	0.4	0.3	33
Toolroom.....	6.6	8.2	5.5	2.0	2.3	1.0	41
"A" Laborers.....	2.0	3.2	0.7	0.6	1.0	0.2	48
Foundry.....	0.7	0.4	0.3	0.4	0.3	0.1	27
Smithy.....	1.5	1.9	1.1	0.3	0.5	0.4	44
Maintenance men.....	3.8	7.8	4.8	1.4	2.3	1.6	67
Test bed.....	0.8	10.6	48.0	0.4	3.0	15.0	100

the number of individual suggesters forms, during the year, of the average number of employees eligible to offer suggestions. (See last column of the accompanying departmental table.) The per cent of all employees who are suggesters may be approximated by dividing the index of Column 5 by the corresponding index in Column 9. Establishment 6, for example, in 1930 received 1818 suggestions per thousand employees, and the ratio of total number of suggestions, to number of workers who made one or more suggestions each, is shown in Column 9 as five. Dividing 1818 by 5, we find that 364 persons per thousand employees made suggestions, signifying that 36.4% of the workers that year were suggesters—if there were no labor turnover. Major and Coulson secured, in 1928, one or more suggestions each from about 70% of its employees—who were mostly men and boys; more recently between 50% and 60% of all employees have participated each year. In the other plants for

<sup>7</sup> Corresponding data for these departments, except Test Bed, for 1928, 1929, and 1930 were given in my article in the *Quar. J. of Econ.*, Aug., 1932, p. 628. The numbers of suggestions per employee from Test Bed Department were, respectively, 3.0, 1.6, and 2.7 for 1928-30; and the numbers adopted were 1.8, 0.7, 1.3. The Test Bed's record, therefore, for the four years 1928-31 was mediocre; after which it became quite exceptionally good.

which I have indexes of recidivism not more than 20% of the employees have been authors of one or more suggestions each during any year; and usually the figure would be nearer 10% to 15%. I shall argue presently that the largest single objective of a suggestion scheme should be the promotion of skill and interest in work. From this standpoint the outstanding purpose is to get as many workers as possible into habits of constructive thought; and toward this end one suggestion each from ten people may be of much greater import than ten suggestions from one person. Such an argument is at least sufficiently plausible so that each suggestion secretary should study his achievement, year by year, in terms of numbers of separate suggesters "patronizing" the system, as well as in terms of the number and technical value of suggestions.

**Depression.**—Various other influences might be studied statistically,—for example, relations between mental test scores and quantity and quality of suggestions. I shall allude here to only one among these remaining factors, namely, the effect of business depression. I have not tried to collect and analyze data with reference to earlier periods of severe unemployment, but the figures supplied me from 22 plants of 19 companies enable me to make some preliminary generalizations on the history of suggestions during the dark years 1930-33, compared with earlier and better times in the same firms. Samples of these statistics are given in the table shown on page 390.<sup>8</sup> The indices in Columns 4a and 4b, referring respectively to average number of employees on the payroll and total man-hours worked, for each year, indicate the severity of the depression in those plants where such information is available. All told, I have published comparative statistics from 29 companies which were operating suggestion schemes in 1926—all these systems were established at least two years prior to 1926.

The outstanding depression phenomena in these systems were a surprisingly low mortality among the schemes, a rather marked rise in volume of suggestions per eligible employee, in 1930, fol-

<sup>8</sup>The complete data are given, with some sub-calculations and fuller discussion, in the article cited, by Stanchfield and Dickinson.



lowed by declines through 1931-33; and lesser declines in the average payment per adopted suggestion during the latter three years. No other evidence is at hand to show any significant change in the average quality of the ideas submitted during this depression period.

The mortality and morbidity figures among these systems, 1926 to 1934 are not complete; but a few items will show the general outlines of the case. Nineteen of the 29 companies supplied statistics of their employees' suggestion systems during 1932 and 1933. Another reported, in 1934, active operations up to date; but it did not furnish quantitative information.<sup>9</sup> Few of us, perhaps, would have been optimistic enough to guess (in 1932 and '33) that out of 29 companies operating suggestion schemes in 1926, 20 would operate these systems almost uninterruptedly<sup>10</sup> until the time of reporting in 1934. The odd thing is, not that the systems of nine of the firms had been discontinued, suspended, or become "dormant," but that five of these nine *became inoperative between 1926 and 1929!* No simple formula accounts for the lapses, several of which occurred in systems which had never operated vigorously. Occasionally one plant or branch of a big concern discontinues its suggestion system, while other plants of that company inaugurate or continue their own schemes. The only two "non-financial incentive" systems which had previously furnished me data (Nos. 6 and 29) were not among the quantitative reporters in 1934; for one was formally suspended in 1931 and the other had become little used by 1932. Two or three of the nine inoperative plans have been so much alive in the past that it seems likely they will be revived, if the managements survive into better times.<sup>11</sup>

<sup>9</sup> No. A-17, in my 1926 table. See Michigan Business Studies, Vol. I, No. 3, p. 59.

<sup>10</sup> Establishment No. 12, whose system operated throughout 1933, suspended its suggestion plan for some months, then revived it, during 1930.

<sup>11</sup> The National Industrial Conference Board's survey of 1935, cited on page 387 *supra*, elicited 159 replies that the company had discontinued a suggestion plan (p. 12). I have made several case studies of schemes that failed, aside from those referred to in the text above. Two opposite errors seem to be common causes—underpayment and overpayment. The former tends toward dissatisfaction on the part of the employees, the latter on the part of the management.

In the concerns which reported for these last years, no significant decline occurred in percentage of suggestions adopted during 1930-33; and the decreases in average money-payments per adopted suggestion, through 1933, were generally quite moderate,—hence the purchasing power of the average award tended to rise. If we had data from more plants, we might be able to show statistically the relation between volume of suggestions per eligible worker and the degree of unemployment and short time in his plant. It is a common and probably sound opinion that the gloomy outlook which wholesale and continued unemployment produces is, in itself, a damper of no mean importance upon suggestions—though obviously improvements that cut costs and thus help to get new business are then needed more than ever by the managements, and payments are more needed by the workers.

**3. Quality; Technical Value of Suggestions.**—The foregoing discussion related most explicitly to quantity. What now may be said of the quality of the common worker's ideas? In this connection "quality" means "technical value," the direct business advantages derivable from the proposals *per se*. We shall investigate this sort of quality first; then at a later stage take up the indirect advantages, which I have designated "morale and educational values," of employees' suggestions. The records of which the above tables are samples show that generally from 20% to 30% of all suggestions formally submitted are given some sort of award, most of these being actually adopted; and that, although the maximum rewards sometimes exceed \$1,000, the average payment is usually under \$10. But we should not be content with these simple indicators of technical value; we must seek further details as to how the schemes which now reach suggestion boxes are appraised and rewarded, and we must speculate on the values of the ideas, if any, which have not come to the boxes as yet. These matters may be viewed from many angles: the standpoints herein adopted are (a) classification of suggestions by subject-matter, (b) problems of measuring the direct business value of each idea; and (c) problems of fixing amount of payment.

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(a) CLASSIFICATION OF SUBJECT MATTER.—Some presumptions as to the technical values in question are supplied by the classifications according to subjects which many firms make up annually; and very likely much more could be learned from them, if the nomenclature and classification procedure were made more nearly uniform through cooperative action. The accompanying table is a specimen of the existing data of this kind; it shows the percentage distribution, by certain subject-classes, of all suggestions submitted in 1933 in Plant 4a, a large establishment manufacturing a great variety of electrical equipment. About the only generalization I have been able to derive from such summaries is that proposals that are primarily di-

PERCENTAGES OF SUGGESTIONS IN SPECIFIED CLASSES  
Plant 4a, 1933

Names of Class	Per Cent
Apparatus and products.....	36.1
Tools, jigs, fixtures and dies.....	45.9
Property and equipment.....	5.5
Forms, orders, stock, production, information drawings.....	1.3
Guards, safety, welfare, education.....	4.5
Shop methods, means of manufacture.....	3.8
Finishes, salvage, testing, miscellaneous.....	2.9
Total .....	100.0

rected toward comfort and convenience of employees, or to relieve grievances, and even schemes for promoting health and safety, usually play rather minor rôles. The suggestion plan itself is the object of such tinkering; 3% of the numerous projects submitted at Mavor and Coulsons' in one year fell into this class. Of special interest would be the percentage aimed at new types of business for the firm—new products or customers, or even merely slight adaptations from those now in hand. Classification of the *adopted* suggestions would doubtless show significant variations from that of *submitted* suggestions, in any one plant and year.

(b) MEASURING "TECHNICAL" VALUE.—Such summaries give us a bit of a start on the fundamental problem of measuring

the direct business or "technical" value of a suggestion, which problem is of great importance, as we shall see, even in collectivist schemes which do not pay individual cash rewards. There is considerable variation among the subject-classes, of course, in the resistance of such value to measurement. New products and customers, improvements in quality or finish of old products,—such innovations must often be tried out for months or years before the extent of their advantage to the employer can be confidently estimated. Added convenience and safety to employees are worth something, but the gain is likely to be intangible. Even when the difference in material and labor and overhead cost are clearly demonstrable, between the method the suggester found and the one he proposed, it is questionable how many repetitions of this saving are economically imputable to him.

As Mr. Mavor put it, in a private letter,

. . . when a new job is put into a machine-shop, for example, the number of parts prospectively required may be unknown, or may at first appear to be small; and in such a case the method of production is not so closely studied [by officials] as would be a part of which a large number were required. A suggestion might result in substantial economy in respect of the method first adopted, but there is the certainty that if the numbers required warranted it, the planning staff would concentrate on reduction of cost, and the more economic method proposed by a suggester, or its equivalent, would quite certainly be applied by the staff.

The vast majority of "adopted" suggestions are paid the minimum award, say one to five dollars.<sup>12</sup> In such cases the officials evidently think that refined cost studies would not be warranted. All told, it is doubtful if more than 10% of all adopted suggestions can be appraised objectively (economically speaking), even in large mass-production plants which are bristling with

<sup>12</sup> See the table on p. 37 of my *Suggestions from Employees*, Michigan Business Studies, Vol. I, No. 3, for data from ten companies, showing that 90% of the awards fell at or under five dollars. Mavor and Coulson publish a classified table annually. In 1933, e.g., 29.5% of their payments were at the minimum figure of 2s. 6d. (about 65 cents, reckoning the pound sterling at \$5); 36% at the next step, 5s., and 23.3% at 10s. Thus nearly 90% of the suggestions adopted by this firm in 1933 won payments not exceeding 10s.

engineers and accountants.<sup>18</sup> In organizations where standard practices and costs are not carefully studied, the case is correspondingly worse; they will lack cost data on both the old and the new ways. All these difficulties are baffling enough to the conscientious Suggestion Committee, who also face the added problem of suggesters' suspicion that their brain-children are being systematically undervalued and exploited.

These problems have obviously not prevented the continued operation of many suggestion schemes, though they have been rocks on which numerous brave ships have foundered. If the profit attributable to the suggestion cannot be determined down to the last cent, in a manner satisfactory to all parties, at least agreement can generally be reached as to whether the first year's saving is nearer to \$10, \$50, and so on. Most suggestion committees establish, say, half a dozen broad classes of merit, into which they classify suggestions without attempting to determine exactly how high or low they rank within their respective classes. Of assistance, too, are reviews of adopted suggestions, resulting in supplementary rewards for any which have proved more remunerative than was anticipated at the time of adoption. A frequent result of such retrospects, however, is indicated by this announcement in Establishment 27, where detailed cost studies are commonplace, at the close of 1933:

All suggestions adopted during the year have been reviewed, and much to our regret no suggestion has proved in practice to be more useful than was estimated when the original payment was made.

One suggestion secretary, with long and large-scale experience, tells me he thinks the aggregate of over-valuations would exceed the sum of under-valuations.

Further sidelights on the order of magnitude of the "technical" values of employees' suggestions are afforded by com-

<sup>18</sup> No. 4a in the table on page 390 *supra* is such a plant. A number of minimum awards (at \$2.50 each) were given recently for suggestions that such-and-such existing jigs and fixtures be adapted to thus-and-so newly-designed operations. "Better workmanship, and may prevent making a duplicate tool" runs the standard verdict of the Committee in this series. Changes in office routine and forms, more exact specifications in drawings, simplifications of style numbers and standard parts—all these are adjudged worth adopting, but ascertainment of the amount of the saving is thought impracticable.

paring the reward payments with the wage bills, and by the numbers of patents developing out of the suggestions of ordinary workers. For each of the concerns in my tables we may readily compute the total annual payments in suggestion rewards, per thousand employees on the payroll. In Establishment 2, for example, during 1926-29 an average of about \$433 per thousand employees was so paid out (Column 5  $\times$  Column 6  $\times$  Column 7). This is about 43 cents a man a year. In some other establishments the figure is larger, and in many it is smaller; moreover it is usually supposed that the direct business value of the suggestions is ten times or more the rewards; nevertheless it is clear that the workers are producing a great deal more with hands than with heads. I have also made some inquiry as to patents emerging from suggestion boxes and from union-management cooperation: they appear to be very few indeed.<sup>14</sup> There is no positive evidence, therefore, from a great variety of long-tried schemes, that the mass of workers respond to such stimuli as we have been discussing in this chapter, with any significant number of revolutionary technological or business-methods improvements.

(c) DETERMINING REWARDS FOR MAJOR SUGGESTIONS.—

In view of the difficulties cited above, would it not be best to make all appraisals only in retrospect—to wait on experience with each adopted suggestion? This query brings us to some further problems of payment for ideas. A deferred appraisal policy would not satisfy most suggesters, to whom a bird in the hand is worth several in the bush. Prompt preliminary appraisal is practically necessary; and also prompt payment of most of the ultimate reward. This means that some suggesters are bound to be over-paid, from the standpoint of technical values of their ideas; and here is a reason or excuse for some underpayment for the exceptionally profitable suggestions.

In a predominantly individualistic system the reward policy has two major phases, according as it is major or minor adopted suggestions with which we are dealing. As we have seen, the

<sup>14</sup> These points are discussed a little further in my article in *Quar. J. of Econ.*, Vol. 46, pp. 638-639.

great bulk of awards in the schemes for which we have data are under \$10; and we may infer that many or most of the smallest payments are regarded by the managements as "welfare" expenditures rather than as purchases of inventions. We shall consider the welfare aspect further in a moment. The few higher awards have much more of the inventor-royalty aspect, and it is these with which we are just now concerned.

Naturally the first query is, what is the probable *net* saving accomplished by the suggestion? From the gross benefit must be deducted, to begin with, the expenses required for installation of the new design or method, which alone often prohibit the adoption of very promising ideas. And then some part of the company's expenditures for wages, equipment, and supplies, in the operation of the suggestion scheme itself, should be recovered before the good suggestions may be said to earn net savings. How much of this latter general expense should be allocated to a particular adopted suggestion, however, is a puzzle.

Yet this last problem of allocation is involved in the apparently simple query, what fraction of the net saving should be paid to the suggester as his reward?—as well as other rather baffling considerations. Few of us, I take it, have much patience with thoroughgoing paternalist notions of keeping maximum rewards small, on the ground that bagatelles will satisfy mere working people, who would be demoralized by the receipt of any real money. One method of dealing with the issue of payment, (and with the related difficulties of measuring the saving attributable to a given suggestion), is the prize contest principle, popularized by Mr. Patterson in the National Cash Register Company. When a fixed series of prizes is offered, such as \$100 for best, \$50 each for the two next best suggestions submitted during a given period, then the judges have only to determine the order of merit of the few best ideas—they are not assigned the more difficult task of appraising the absolute value of each project. Some such schemes have been very effective in securing quantities of suggestions; and for all I know to the contrary the quality of these projects may average as high as the ideas secured by other plans. But obviously the principle

of paying for each suggestion what it is individually worth makes a forcible appeal; and so most suggestion plans purport to follow this latter policy, perhaps in combination with some special contests for fixed prizes. Prize contests, of course, are effective means for calling attention to the suggestion scheme.

Supposing that a routine is established for making estimates of the probable savings, a further step which naturally occurs to many engineers is to plot a curve, showing relation of reward to saving, and thus to make the amount of reward automatically follow from the estimated saving. Many schemes purport to pay a reward equal to 10% of the estimated saving, whatever that may be; and in some mass-production plants, smaller percentages are paid on large than on small savings. This latter idea was taken over by some of the earlier suggestion plans in Soviet Russia—rather oddly, it may seem to those who reject it as an obviously unfair exploitation of labor. Paying diminishing fractions of increasing savings, however, is a principle which has a more solid foundation in equity than is apparent at first glance; for the improvements which run into big money are apt to be small unit savings, perhaps discovered and reported with little or no effort or ingenuity on the part of the suggester, which happen to apply to articles which are turned out by the hundred-thousand. Many conscientious managers feel strongly that rewards should be proportioned, in part, to the effort and mental quality displayed by the suggester. On the other hand, it may be urged that rewards at a uniform percentage of expected savings have two important recommendations: (1) large rewards give publicity to the suggestion scheme, of unrivalled effectiveness, and (2) payment according to profit results tends to make suggesters try for improvements of maximum profitability.

REWARDS FOR MINOR SUGGESTIONS.—As was intimated above, the query What fraction of the saving is proper for the reward? is entangled with the problem, What are the proper charges to be deducted from the gross saving in order to arrive at the net saving of the individual suggestion? I assume that the 10% figure, which is a common basis of American awards,



usually means 10% of the estimated first year's gross gain, minus only the "out of pocket cost" of installing whatever new apparatus is required for putting that particular suggestion into effect. The suggestion secretary adds up all such gains, deducts the 10% paid to the suggesters, and the remaining 90% seems to be a margin of tens or hundreds of thousands of dollars, against which the salaries of the secretary and his assistants are rather trifling expenses. The suggestion system appears handsomely profitable to the company. This sort of showing, I imagine, may induce a certain tolerance in the various auditors who scrutinize the computations of the gains, so that these estimates of total savings may frequently be optimistic, though there is considerable variation among companies in standards for checking such claims. If account were carefully taken of all the costs of operating the suggestion system, including bits of "company time" of committee members, suggesters, supervisors and experts who have to be consulted, as well as the payments made for the mass of minor suggestions, it seems possible that the suggesters as a group get 90% or more, rather than 10%, of the net total technical gains accomplished by adopted suggestions.

Makers of the best suggestions, however, may say that the whole cost of the system should not be assessed against the gains produced by their own, clearly profitable, ideas; that the investigations and payments relative to the 99% of poorer proposals is educational or welfare or back-slapping work, which should be separately financed if carried on at all. This argument is readily carried to a ridiculous extreme; yet it applies with greater force to low-standard systems, which try to induce the maximum participation by employees, than to high-standard systems, which try to encourage the submission of a smaller volume of more promising ideas.

#### 4. **Morale and Educational Effects: Total Net Benefits.—**

What may be said in behalf of a policy of low minimum standard of rewards? This query is bound up with a larger one, namely, what are the natures and magnitudes of the indirect effects of suggestion schemes—the "non-technical" or morale

and educational results? We may analyze some apparent types of gains and costs within this latter field, but of course it is even more difficult to measure these benefits than the direct business values. The principal functions which suggestion systems may perform, apart from the production of profitable new ideas, were outlined earlier in this chapter as (a) ventilating dissatisfactions, (b) discovering bright workers for promotion, and (c) increasing knowledge and interest in work. The intangible costs include the envious and disappointed and resentful attitudes of suggesters whose ideas have been rejected, dissatisfaction of some prize-winners with the amounts of their prizes,—in short, every detail of the plan and its operation is susceptible to unfriendly interpretation and propaganda. In some cases aspiration to a suggestion prize may distract a worker from attention to the job he is capable of doing, and absorb him in some project whose impracticality he is unable to recognize.

The grievance ventilation function is historically important in suggestion schemes, for they have often had to serve as the only sorts of employee representation in their plants. And the distinction between mere complaints and positively constructive suggestions is not clean-cut; their problems overlap considerably, in every establishment. With reference to the placement function, the employee's total record as to quantity and quality of suggestions surely is worth considering, along with other particulars, when there is a possibility of changing his rate or job or laying off or rehiring; yet obviously a cash reward for his suggestion is often (perhaps nearly always) more suitable than an increase in his rate of pay,—if *each* good suggestion is to be immediately rewarded at all. An alert suggestion secretary or investigator not infrequently is able to assist in improved placement of suggesters; by transfer if not by rate increase or promotion.<sup>15</sup>

Our third non-technical type of benefit,—increasing knowledge and interest in work—appears to be of great potential importance, especially if the suggestion department is either part of the personnel division or works closely in touch with educa-

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<sup>15</sup> See V. M. Palmer, *op. cit.*, p. 735.

tional and placement officials. A background of industrial psychology will very usefully supplement these people's practical skill in dealing with the innumerable interests and capacities that are present in every working force, and which may be revealed in the suggestion-processes. They can tolerate and moderate the few cranks, discover and utilize the few geniuses, and above all they can assist the mass of authors of amateurish suggestions to learn more about the subject-matters with which their suggestions deal. As part of the plant's education and training, a 50-cent or one-dollar reward for a suggestion which evidences some study on the suggester's part may be widely approved on the same grounds as bonuses for steady attendance of classes; whereas if we call that 50 cents one of the rewards for *adopted suggestions* it cheapens the system of prizes for really novel and profitable suggestions. The good chance of getting a small bonus, and the slight chance of winning a real prize, are potent instruments in the hands of such educators as I am supposing to be assisting the operation of the suggestion scheme; and these premiums, along with various arts of publicity, may enable them to get practically the whole working force to submit to their tuition by becoming suggesters. And surely many, if not all, of these suggester-tutees may be made more informed, more skilled, more productive and more happy workers,—especially if serious attempts are made to find the job which the worker will most nearly enjoy.

The current statistics of suggestions, especially as compared with past periods in the same company, are indexes of certain aspects of morale of the employees, especially, of course, as it relates directly to suggestion policies and methods. In the Eastman Kodak Company, for example, the suggester is given the option of signing his name to his proposal, or merely tearing off the stub whose number identifies him as the author of the suggestion.

The percentage of signed and unsigned suggestions is a rough indication of the employees' confidence in the suggestion system. 81% of the suggestions received in 1933 were signed, and 88% of those adopted were signed. Of the unsigned ones, a high percentage are of a trivial nature.<sup>16</sup>

<sup>16</sup> *Ibid.*, p. 732.

It must be expected that the suggestion boxes of even the best-managed organization will occasionally attract some bitter or humorously-intended communications.

**Better Supervision as Suggestion System.**—If there is any importance in the educational aspect stressed in the foregoing section, what are its implications with reference to the foreman's functions? Many able managers hold that, if the foremen and other supervisors are doing their jobs well, there is no real occasion for a suggestion scheme—in fact, that such a scheme is a vain effort to dodge the management's responsibility for good supervision. The emphasis which all accounts of suggestion plans inevitably place on "foreman-resistance" gives much color to this criticism; and no doubt ability to utilize the mental capacities of each of his men is a vital point of good foremanship. I agree, in part, with these critics. The foreman scarcely needs a fund of money rewards with which to bribe his men to think; he usually has at his command abundant incentives wherewith to invite their intelligent cooperation; and a program for improved supervision should frequently or always take precedence over the development of a formal suggestion plan. I think the latter is best regarded as a sort of functional foremanship. Like other specialized functions, such as hiring and rate-setting, it cannot be well carried on without the cooperation of the line supervisors; and most of them can be made to realize that their total jobs become more manageable when special services and routines are developed to assist them. Incidentally suggestion routine, like employment routine, tends to check abuses by some foremen of their authority; and a cash prize often seems the best reward for the suggester, who may not for a long while be eligible for a better job with a higher wage-rate. The suggestion secretary of General Electric Company has said that the best suggestions are received from departments whose leaders are considered the best all-around foremen.

Finally, one of the stronger arguments for a suggestion reward scheme may be derived from the common testimony about workers who have discovered ways of cutting the time required

for operations on which they work. This matter was developed in Chapter 8 above.

**Suggestions in a Small Concern.**—In a small organization, where the top boss may be personally acquainted with all the workpeople, is there a place for a formal suggestion scheme? The National Industrial Conference Board's inquiries indicated that such schemes, like employee representation plans, are relatively much more common in plants of over 200 employees than in smaller establishments; but this finding does not give much presumption, if any, that formal methods are not needed by the small fry—it may be that better management methods usually are introduced more rapidly into larger than into smaller plants. Examples may readily be found of failures to secure satisfactory results from suggestion schemes, in small as in large concerns; but data are lacking for determining whether the ratio of failures to successes varies according to the size of the firm.

A correspondent who has thrown some light on these problems, as they appear in a group of less than 100 people (in a rather peculiar industry), is Mr. Durant Rose, vice president and general manager of the Armored Service Corporation of Brooklyn, which operates a fleet of armored trucks, transporting payroll cash and other valuables.<sup>17</sup> The men engaged in this industry are necessarily subjected to elaborate routines (including a good deal of pistol practice) and quasi-military discipline; hence we might say offhand that here is a soil unfavorable for the systematic cultivation of employees' suggestions. And, in fact, so long as the opportunity to earn suggestion bonuses was conveyed to the men chiefly through typed bulletins, the suggestion harvest was rather poor.<sup>18</sup> But when meetings, confer-

<sup>17</sup> Mr. Rose has contributed articles on some of his company's personnel policies to the Metropolitan Life Insurance Company's *Executives Service Bulletin*, March 1933 and Dec. 1934. In the same *Bulletin*, for July 1934, appears an article by Davis Merwin, reporting gratifying results from a suggestion system in another organization, of less than 100 people—*The Daily Pantagraph*, of Bloomington, Illinois. In the latter case, a suggestion led to a succession of very productive prize competitions among employees for "tips" on where additional advertisements might be secured. The interest aroused by these campaigns seems to have reacted favorably on the more general employees' suggestion program.

<sup>18</sup> In this concern, the suggestion system is part of a larger merit-demerit scheme, outlined on page 113.

ences, and other promotional measures were applied, much better results were secured.

The credit points earned by suggestions, in this system, are accumulated until 100 are canceled, at the employer's option, either by a \$5 cash bonus or by a rise in the employee's salary. In the year May 1934 to May 1935, a total of 206 suggestions were made—equivalent to more than two per eligible employee; of which 121, or 59%, were adopted in original or modified form; and the credits, averaging 12.6 per adopted suggestion, were canceled by increases in hourly wage rates. Fifty-five of these 206 proposals were attempts to earn bonus points which are objectively based on minutes saved by a change of routing of a truck. In this group 43, or 78%, were successful; for routing is a subject-matter with which the truck crews are intimately familiar. They score less hits in their shots designed to improve other phases of the business. Mr. Rose has made a similar comparison between the suggestions of more experienced men, of higher rank and pay, as compared with those of newer and lower-paid employees:

Although the highest ranking man may be superior in intelligence and avoids making useless suggestions about the work with which he is familiar, it is offset by his greater inclination to make suggestions on problems of which he has very little knowledge. For example, a low ranking man does not make a suggestion about sales policies, whereas a high ranking man feels he knows enough about our business to make suggestions on that subject. Yet . . . he frequently has no more knowledge of the factors controlling our sales policies than a total stranger.

In response to my request for a comparison of the total suggestion-situations "before" and "after" the adoption of a formal suggestion plan, Mr. Rose submitted the following analysis:

The volume of *useful* suggestions did radically increase after the institution of the formal credit scheme. In the earlier period, to be sure, many suggestions were discussed informally in a half-baked fashion with various supervisors and executives, but this type of suggestion seldom went any further, for one of three reasons:

- (a) Ineffective presentation;
- (b) Inability of person hearing suggestion to visualize its practicability;
- (c) Jealousy of person receiving suggestion.

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Under our present system, the first defect is minimized by requiring the suggestion to be put in written form. The second defect is minimized because the written suggestion must be read by three persons, viz., (a) the head of the department that would be affected, (b) the personnel manager, (c) myself. Each of these three persons, in self-defense, has to exert his best efforts in analyzing the suggestion and making constructive criticism. The third defect is practically entirely eliminated for the same reasons that apply to the second.

The general conferences about the suggestion program had revealed fear of "foreman-resistance" among some of the potential suggesters. The formal scheme assured them and their foremen that constructive ideas would be given careful consideration by the higher management, without producing all the disciplinary difficulties which follow when common workers go around their immediate supervisors in order to unburden themselves verbally to the higher chiefs.

Can a small concern operate a suggestion system successfully without a suggestion secretary? Obviously a full-time official will not be required until the annual volume of suggestions runs into thousands. Meanwhile part-time services will suffice, including the watchful eyes of the executives who are most interested in the success of the scheme. In the long run, however, the plan's success, whatever the size of the organization, will be based upon considerable centralization of responsibility on some one or very few persons. They must keep alert for novel devices to recall the attention and interest of the workers to the scheme's possibilities, and see that the management deals promptly and informedly with the dissatisfactions which any plan must frequently encounter.

## CHAPTER 19

### COLLECTIVIST SUGGESTION METHODS

Appeals to *group* loyalty of employees for collaboration with management, in improvement of products and methods, have a somewhat shorter history than the more individualist schemes cited above, yet to many observers the former appear much more profoundly significant. Let us briefly survey three principal types of collectivist approaches to employees' constructive suggestions,—namely, (1) that of Soviet Russia, (2) the works council or employee representation movement, and (3) union-management cooperation. We shall thus obtain a rough notion as to how their methods and accomplishments compare with those of the individualistic plans which were discussed above.

1. **In Soviet Russia.**—The managers and propagandists in Soviet Russia urge their workers toward greater efficiency by all manner of group or public spirit appeals; from this standpoint theirs is the climax of our three cases. But I have to deal with it concisely, because of the limited data available to me. The Bolshevist schemes which bear most explicitly on employees' inventions and suggestions seem to have emerged during the latter 1920's, out of the many convulsions of theories, practices, and policies, relative to "workers' control" in the enterprises where they worked. By 1930 rather highly centralized management had triumphed, but experimentation was in progress on means of securing, utilizing, appraising and rewarding suggestions from wage-earners. The individual authors of adopted suggestions were rewarded, apparently, by various combinations of promotion, honorary decorations, and cash bonuses.<sup>1</sup> It is said that the idea of "socialist competitions," which have had

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<sup>1</sup> See, for example, article by W. N. Polakov, in *Harper's Magazine*, December, 1931, p. 44; also *Das Arbeitererfindungswesen in der U. S. S. R.*, Vol. I, No. 10, pp. 32-36, 1931. (In New York Public Library.)



a prominent place in Soviet methods, was proposed originally by a factory worker, who received a suggestion award for the idea. Stress has been laid on group, as well as individual, rewards. The *Moscow Daily News* of November 5, 1932, said

A further important activity of the trade unions in industry is the organization of production conferences, and the encouragement of workers' inventions. . . .

For instance, in 57 trusts controlled by the Supreme Economic Council, in 1931, workers' proposals in the first quarter saved three million rubles, in the second quarter six million, and in the third quarter 11 million.

During 1931, no less than 1.5 million inventions and improvements were handed in by the workers, and the first All-Union Congress of Worker-Inventors, organized with the aid of the trade unions, pledged itself to save one billion rubles . . .

Late in 1933 the same paper reported, concerning workers in a sewing factory, that since 1930 their inventions had produced economies of 190,000 rubles.

As rewards for these devices, premiums totaling [some 25,000 rubles] . . . were paid. . . . Half of the savings from these economies goes to the inventors' society of the factory, while the other half is applied directly to the reduction of costs.

The society publishes a pamphlet which gives hints on possible inventions, and many would-be inventors spend their spare time in the factory's machine shop endeavoring to develop these suggestions, . . .

Emphasis on workers' suggestions continued to characterize Government and Party policy through 1935.

Thirty Central Administrations [apparently "trusts," or groupings of factories, steel mills, mines, etc.] under the People's Commissariat for Heavy Industry received 278,045 workers' proposals in the nature of inventions, technical improvements and rationalization measures. Of these 123,422 were accepted, 98,765 were operated and the sum saved on the working of 54,011 of these, for which financial results were calculated, amounted to 174,911,000 rubles.

Similar ratios are cited for "light industries," in which 7,000 audited proposals were said to have saved 24 millions of rubles.<sup>2</sup> I have not seen any specific statement as to the basis of pecuniary reward, if any, which accrues to the individual suggester in

<sup>2</sup> *Monthly Review*, issued by the USSR Trade Delegation, p. 356 (London, June 1936).

these cases; but the Party's stress on individual piece work is so strong that it seems probable the "premiums" mentioned above are cash rewards to the individual, based upon the appraised value of his proposal. No attempt should be made to discover a trend in the annual figures given in the foregoing quotations; for the establishments, workers, and rubles were not directly comparable.

THE "STAKHANOFF MOVEMENT" is cited by some Soviet sympathizers as proof that the masses of people have great creative talents, which by proper organization and other conditions have unlimited possibilities for raising the efficiency of management and labor. Alexei Stakhanoff is a coal miner, of little or no formal education, who became at least the symbol of a new wave of scientific management enthusiasm in Soviet speeches and press. It is claimed that he converted the squad of men who worked near him to the idea of division and specialization of their labor. He was a good driller, it seems; and when he induced the others to take care of the loading and timbering, so that he could keep the drill busy throughout the shift, the output of the whole group was greatly increased and costs, including capital and maintenance with reference to drills, greatly decreased. That was about the first of September, 1935. By early December of the same year the American press began to report the doings of the "Stakhanovites," including a few other heroes and heroines who shared the official spotlight with Stakhanoff,—these others, it was said, had been inspired to show what could be done in other industries. For instance,

On September 19, Alexander Busygin, a forge worker in the Gorki automobile plant, produced 1,050 crankshafts in a seven-hour shift, exceeding the norm by 375 crankshafts. About the same time a locomotive engineer, Peter Krivonos, increased the speed of a freight locomotive from the norm of 30 kilometers to 53 kilometers an hour. Two sisters, Dusya and Maria Vinogradova, weavers in a textile mill in Vichuga, became famous by operating 144 looms each instead of from 16 looms to 26 looms operated previously.<sup>8</sup>

<sup>8</sup> V. Trivanovitch, "The Stakhanov Movement in Soviet Russia," Nat'l Ind. Conf. Bd. *Service Letter*, Vol. 9, pp. 9-12 (Feb. 29, 1936), citing the official Moscow daily paper *Izvestia*, Nov. 15, 1935. "Norm" means production-time standard, on which the piece rate is based. It is also vital, of course, for five-year planning.

Other accounts, emanating from similar sources, are reminiscent of earlier journalism about workers' inventions; bureaucrats, unenlightened leaders, counter-revolutionaries were sabotaging the movement, being brought to bar, being roundly punished and presently reformed. Stakhanovites are called super-*udarniks*, or shock-brigaders; or, if one pleases, super-*subbotniks*—the latter term having been used for workers who devoted their rest-day to socially-needed work, such as excavation for the Moscow subway.

By all accounts, Soviet workers who produce more, nearly always earn higher wages—frequently even progressive piece rates. At the outset, too, "Sarkisoff, executive chief of the Donetz<sup>4</sup> Communist party organization, made an important announcement: 'The Stakhanoff system must be adopted throughout the Donetz region, and executives and engineers who attempt to hinder it will be dismissed. Above all, there must be no change in the rates of payment. If miners earn 2,000 or 3,000 rubles a month or more than that, let them enjoy the prosperity that is a reward for the mastery of technique that Stalin said should be the goal of Soviet industry today.'"<sup>5</sup> In December, however, Premier Molotov and the inner circle of the Communist Party were observing: "The Stakhanovites have shown in actual practice that the previously established technical norms and projected capacities, as well as the norms of output, are now in many cases no longer suitable, because they are antiquated and are distinctly underestimated. . . . It is the task to abandon the idea of not making full use of technique, which is inevitable in capitalist society, where the worker works not for himself, not for the collective, but for the capitalist, . . . to keep pace with the Stakhanoff movement, to lead it and help it create a new productivity of labor, higher as compared with that under capitalism."<sup>6</sup>

<sup>4</sup> The region where Stakhanoff worked.

<sup>5</sup> *Soviet Russia Today*, p. 19 (New York, Nov. 1935).

<sup>6</sup> *Mo. Rev.*, USSR Trade Delegation, p. 11 (London, Jan. 1936). For a rather comprehensive, statistical, soberly-sympathetic account, see H. Moore, "Stakhanovism Explained," *Personnel Journal*, Vol. 14, pp. 357-364 (April 1936). Compare also Chapter 8 above.

Thus, though it is quite possible that the chief Bolsheviks were astonished to hear of Stakhanoff's original achievement, they were at least extremely prompt to use it as a relatively novel variation on their familiar theme—given out by Lenin even in the days of the Revolution—we must use many Taylor management methods, including piece work; these methods do indeed unduly “speed up” the worker under capitalism and hence are then rightly met by restriction of output, but all that is changed when we have no capitalists to work for; speeding ourselves up would be an absurdity; our methods of increasing the output “norm” somewhat more than the wage are not at all like capitalist rate-cutting, and so on.

We seem to have wandered far from collectivist and non-pecuniary incentives; and we might wander still further by noticing how the choicest honorary decorations awarded by the Soviet Government for conspicuous social service are buttressed by material perquisites; for example:

“The Red Banner of Toil” entitles the owner to a free pass on Moscow trams, a pass to travel twice a year to any point in the USSR, and a pension of thirty rubles a month. Also it brings the regular pension nearer by adding so many years to the service record. “Heroes of Labor” also receive an additional pension.<sup>7</sup>

Such motivation does seem distressingly *bourgeois* to many Communists, and by mid-1931 an agitation for pooling and equalization of incomes among wage-earners and collective farmers had attained such proportions that Stalin felt obliged to condemn it in the strongest terms.<sup>8</sup> This hitherto-dominant tendency, in the Soviet Union, toward individual material rewards more or less proportioned to individual productivity does indeed make it difficult to learn how effective are the collective and spiritual appeals which are simultaneously employed on an unprecedented scale; yet it seems probable that the latter propaganda has a good deal of the intended effect. Among the many strong human motives which it stimulates is our appetite for novelty—the current slogans always refer to great and new discoveries.

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<sup>7</sup> H. F. Ward, *In Place of Profit*, p. 81 (1933).

<sup>8</sup> At the Conference of Leaders of Industry, June 23, 1931.

2. **Efficiency Proposals in "Company Unions."**—Managers have sought to obtain constructive ideas from employees through works councils or employee representation schemes, during several decades. In the United States, as was remarked in Chapter 18, both works councils and suggestion plans have had a rather anti-trade union flavor. The employer adopted them in the hope that he and his workers would thereby obtain most of the advantages which trade unions could offer, without the latter's particular vices. Also, it may be that the boss who pins his faith on his suggestion scheme alone is probably unable to imagine a workman doing any constructive thinking unless he is directly paid for it. Obviously a suggestion plan offers no collective bargaining.

The "company union" type of employee representation, on the other hand, is primarily directed at collective bargaining—at least its main concern is with the common subjects of industrial disputes, such as general and relative positions of wages and hours, comforts and conveniences, hiring and firing, and application of shop regulations. These representation plans, however, frequently encourage joint discussion of proposals from either side aimed at increased economy, efficiency, new or improved products, and so on. Sub-committees on such subjects are often set up. Two rather comprehensive studies of the proceedings of works councils in a number of companies, made more than ten years ago, found constructive projects of this sort, from employee-representatives, quantitatively important; though they usually accounted for less than half of all transactions of the councils.<sup>9</sup> Naturally it is no part of a works council plan, as such, to pay council members bonuses according to the value of the ideas they contribute. Many firms, however, operate both a works council and a suggestion reward scheme; and in such cases undoubtedly there are many opportunities for employee-representatives to present projects for improving products and methods, which, by reason of multiple authorship or otherwise, are unsuitable for the individualist reward scheme.

<sup>9</sup> See National Industrial Conference Board, Research Report No. 50, *Experience with Works Councils in the United States* (1922), pp. 40 ff.; E. R. Burton, *Employee Representation* (1925), p. 249.

**Limited Scope Plans.**—Managements sometimes concentrate the field for employees' constructive suggestions, whether these are to be made through a council or a reward scheme, either formally or informally. Joint committees have been set up, for example, whose scope was restricted to safety campaigns; the same is true of some suggestion reward schemes. A plausible argument may be advanced, however, for the opposite emphasis. A correspondent of mine propounded this opposite argument in 1934:

We welcome suggestions from employees in regard to any and all policies and procedures in the field of industrial relations, i.e., pay, hours, supervision, etc. We receive some, but frankly do not encourage, suggestions from rank and file employees in regard to operation—machinery, materials, production methods, etc. . . .

The pressure for development of industrial relations standard instructions, in more than half of the cases, comes from rank and file employees, through their elected councilmen. Management usually prepares the original draft, which is carefully combed by council committees and the council, and frequently is completely revised. It is almost belittling to the employees and elected councilmen to speak of these contributions merely as suggestions. The council is truly legislative.

Operating supervisors do and should consider operating improvements, but even in their case, it is perhaps better for an operator to spend his time operating. A large staff is maintained for research and development. The half-baked technician and the operator with the patent bug are nuisances.

To sum up: We maintain that cooperative legislative action in industrial relations policies and practices is desirable, but that encouragement for rank and file employees to putter around in the invention of generally useless gadgets is not desirable. So much for our prejudices.

Since this communication was written, the joint council of the company in question has adopted a procedure for consideration of suggestions from individual workers, which procedure does not provide for either cash rewards or steady propaganda about the suggestion scheme. The resulting stream of ideas has rather agreeably surprised this management, however; for the hourly employee, if encouraged to do so, can sometimes bring to light opportunities for savings which have escaped the attention of the very best of executives and technical staffs. On the principle of putting first things first, however, there is certainly a

great deal to be said in favor of giving several types of program precedence over the development of a suggestion scheme. A more fundamental objective, for example, is the improvement of supervision of all grades, for a suggestion plan alone is a relatively crude method of dealing with the tactlessness and arrogance of foremen which makes them unable to encourage whatever really good ideas their workers can produce. Another is the development of joint councils for discussion of those controversial issues which are of most immediate interest to the workmen. When the progressive development of policies such as these is assured, it is time enough for attention to the educational and immediate economic benefits inherent in employees' suggestions toward more efficient operating and general business practices.

**3. Union-Management Cooperation.**—A third set of collectivist appeals for constructive ideas are those in which trade unions take an active part. "Union-management cooperation" is an elastic term, frequently applied merely to arbitration machinery; but I shall confine attention to cooperation within the realm of ideas and practices which traditionally has been the monopoly of management. Rather promising deeds as well as words, of this general sort, have come from a number of unions within the last decade; from organizations of textile workers, street railway men, coal miners, potters, glass workers, clothing workers, for example.<sup>10</sup> The most persevering and important work of the sort, however, apparently has been done by unions of railway shop employees, to which experimentation we must now give some attention.<sup>11</sup>

Union-management cooperation was launched in certain shops of the Baltimore & Ohio Railroad in 1923, and it has spread, apparently with but few setbacks, through all departments and geographical divisions of that carrier. Three other American railways (Canadian National, Chicago & North-western, and Chicago, Milwaukee & St. Paul) have also utilized

<sup>10</sup> See Nyman, *op. cit.* and discussed in Chapter 8.

<sup>11</sup> See the admirable study by Louis A. Wood, *Union-Management Cooperation on the Railroads* (New Haven, 1931). Its final chapter gives brief accounts of collaborative ventures of a number of unions outside the railway industry.

very similar plans, in cooperation with the same unions and their technical adviser, Mr. Otto S. Beyer. The cooperative meetings, composed of representatives of management and of unions designated for the purpose (relative to a given area and department of the railway), assemble on predetermined schedules, say biweekly. The meetings have little or no collective bargaining significance; the collective agreements on such matters as wages, and the adjustment of grievances arising under such agreements, are attended to by other union-management parleys; and so the cooperative sessions are free to concentrate on problems of economy and efficiency. No attempt is made, in the shop councils, to identify the individual author or authors of a given suggestion, but statistics are kept on the number of proposals submitted, in each period, (a) by employees' representatives, and (b) by management representatives; and these are classified by subject-matter and as adopted, rejected, or pending.

These statistical summaries show remarkably large numbers of propositions coming from the employee-representatives, of which a very high proportion are declared adopted. The figures are perhaps higher in the Baltimore & Ohio shops than elsewhere; in these shops over 90% of the proposals come from the men's side and in the four years 1924-28, at all its repair points (apparently in the "Motive Power Department" alone), this road received 21,582 suggestions, of which 85% were adopted. In July 1929, these shops were employing some 17,500 men, of whom an important fraction were not union members.<sup>12</sup> Somewhat tentative experiments with union-management cooperative committees have been made in the transportation and maintenance of way departments of the Baltimore & Ohio and the Canadian National systems respectively; and through various campaigns the help of all employees and interested trade unions has been sought in securing increased traffic.

What light do these railway experiments throw on problems of employees' suggestions? To study any one of them thoroughly is not merely an achievement but a career; but here are a

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<sup>12</sup> See Wood, *op. cit.*, pp. 103, 112, 223.



few of the impressions which I have gathered as to their significance.

Notice first what special conditions may be afforded by trade unions if they become interested in cooperative improvement of operating efficiency. The American unions which have adopted this much of scientific management are usually opposed to individualist piece work and bonus wage plans, and this position engenders hostility to cash rewards for individual suggestions. Their cooperative schemes emphasize labor solidarity and collectivism in the preparation of constructive proposals, and in sharing the gains which flow from their adoption. British unions, on the other hand, seem not opposed so strongly to the principles of piece work and individual rewards to suggesters. In all the five British companies, for example, which have supplied me with suggestion scheme data, various trade unions are "recognized," and these unions also play some part in the works councils. In most or all of these cases the unions are preoccupied with their old bargaining and mutual welfare functions. On the largest British railway system, however, in recent years the trade unions have carried out an efficiency program rather similar to the Baltimore & Ohio scheme cited above; and at the same time this British carrier has operated an individual cash reward suggestion plan.<sup>18</sup>

**Attempts to Measure Gains from Cooperation.**—We should also keep an eye on the attempts made, in connection with union-management cooperative schemes, to estimate with increasing precision the extent of the gains achieved thereby. Their collectivist attitude makes them much more interested in the aggregate of such gains than in the worth of particular suggestions, though they do tackle the latter problem as a means toward solution of the former. Professor Wood, who attended meetings and studied records of a number of these committees, in three chapters on the suggestions relating to equipment, new construction, shop methods, materials, and working conditions, gives a wealth of examples, including many improvements which can be pretty definitely evaluated. He argues, however, that

<sup>18</sup> See Wood, *op. cit.*, pp. 294 ff.—references to London, Midland & Scottish system, under chairmanship of Sir Josiah Stamp.

measurement of *all* the gains, including the strengthening of morale, by integration or summation of values of separate suggestions is quite hopeless. He does not attach great importance, either, to the records of numbers of proposals submitted and adopted, partly because his remark "undoubtedly a proportion of suggestions regarding shortages [of materials] is drummed up to make a showing" seems to apply in some measure also to other types of proposals in these committees.<sup>14</sup> More promising, apparently, are the wholesale or statistical tests which the railway people have applied, in their efforts to approximate the net worth of the cooperative program. Such calculations are of interest to us, not only for judging their own achievements, but also for hints toward development of similar tests of accomplishments of industrial relations experiments elsewhere.

These over-all statistical measures include operating and financial ratios, involving two sorts of comparison, (a) before and during the cooperative era, in the same organization, and (b) between companies, during the same years, which are similar except that some use the cooperative plan while others do not. The latter type of comparison is especially important in the railway industry, because of standardized accounting and statistics, supervised by the Government on all roads. The former type of calculation (year to year comparisons within a given concern) is of more general applicability among all industries.

A few examples will indicate some methods of applying such tests to railway data. Certain categories of operating expenses may serve as indices, perhaps in comparison with operating revenues; this sort of gain sharing has been used for bonuses to transportation employees on the Southern Railway, and year by year reduction of the operating ratio was cited as a result of cooperation by employees of the Pittsburgh street railways. The steam road shopmen have also utilized Interstate Commerce Commission statistics of equipment failures, and defects revealed by government inspections, to indicate the fruits of cooperation. From 1925 to 1930, for instance, all Class I carriers reduced the percentage of defects revealed by locomotive inspections, from 46 to 16; the Baltimore & Ohio from 52 to 8, and

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<sup>14</sup> *Op. cit.*, pp. 165, 137.

the Chicago & Northwestern (another locus of union-management cooperation) from 32 to 8.<sup>15</sup>

Somewhat similar comparisons have indicated that the numbers of minor labor disputes and grievances have been markedly reduced, and the employment of participating workers made appreciably more stable, by the cooperative plan.<sup>16</sup> Steadier work has been, in fact, the most explicit goal of the cooperative plan from the beginning; it has been the chief material reward of the cooperating workmen, by reason of both the difficulties of measuring the full fruits of cooperation, and the severe economic depression in their industry. Much discussion has occurred, however, and some experimentation, with reference to other rewards, such as premium wage rates, lump-sum "honorary," vacations with pay, and higher rates for overtime.

It would doubtless be instructive and significant to compare individualist and collectivist plans, in an effort to discover what conditions tend best to stimulate constructive thought, as nearly as is practicable among all employees. In the preceding chapter I ventured the surmise that the instruction of individual suggesters by company officials, as to why some features of their suggestions are good and some not so good, may be the most valuable feature of an individualist cash reward scheme. Some managers of these systems, we noticed, keep count of the number of separate suggesters in each year. The collectivist cooperative arrangements, on the other hand, are very unlikely to show statistically how many of what sort of individual workers made constructive suggestions; and it is not clear whether they offer as much encouragement to the great mass of employees to work up valuable suggestions as do the individual reward plans. The employees' committeemen, to be sure, usually have meetings with constituents or fellow-union-members, at which any worker may volunteer suggestions; and the desire to help the worker-organization doubtless stimulates many members more strongly than would the prospect of a cash prize. But an individual reward, or individual citation, plan may operate along-

<sup>15</sup> Wood, *op. cit.*, pp. 189, 190.

<sup>16</sup> *Ibid.*, Chs. 13, 15.

side or within an active employee-organization, and may offer help and instruction to members and non-members alike.

**Summary.**—Encouragement of constructive suggestions from wage-earners and lower-salaried employees regarding improvement of equipment, methods, products, and sales prospects, is emerging as a phase of labor management, relatively distinct from such phases as foremanship and collective bargaining. A suggestion or cooperation scheme, of course, will not go far toward bolstering up a weak management; such cooperation rather is a special field for the exercise of good management.

The objectives rationally sought through suggestion programs include improved efficiency and earning power of both employer and suggesters; discovery of valuable ideas and discovery of persons able to produce good ideas; increase of interest and competence of worker-suggesters with respect to their work. Means used for these purposes include various individualist and collectivist arrangements, utilizing both immediate and remote rewards. A suggestion bonus is a more logical means of rewarding an individual who discloses a quicker way of doing a job than maintaining task-times for all workers on the same job.

The outsider who attempts to judge the comparative effects of these various methods is obliged to rely heavily on the unsatisfactory indexes of mere numbers of suggestions submitted and adopted; but some further indications of quality have also been cited. Individual cash reward schemes usually contemplate the payment to the suggester, at the time his idea is adopted, of about ten per cent of the sum which it is estimated his idea will save, in the first year. Plants which secure the larger numbers of suggestions, in proportion to numbers of employees, in general pay the lower average rewards. Other factors which influence the number and quality of suggestions are the volume of output of the article whose cost is affected; the skill and experience of the suggester; and above all the skill of the official who deals with the suggesters. It appears that women workers (mostly shop employees, in these records) turn in fewer and poorer suggestions, in proportion to their numbers, than men;

but comparisons have not been made between men and women known to be of equal average skill and experience.

Rather few ideas of large business worth are put forward in these suggestion and cooperation schemes. Still fewer patents emerge from them. The intrinsic values of the best suggestions, however, doubtless go far toward carrying the cost of administration—if indeed they do not exceed it by a comfortable margin; and a well-run suggestion plan may also yield returns, in the way of discovering talent worthy of promotion and in nurturing each suggester's trade skill, however little it be, which are of great importance.

When we add to these latter benefits the satisfactions which suggesters derive from knowing that the foreman is not the sole judge of the utility of a suggestion, and especially from seeing some of their projects actually adopted, we can appreciate that the question of existence or amount of cash payment is not so crucial as at first blush it appears.

There is considerable evidence, in fact, that an impressive volume of suggestions can be motivated by deferred and even group rewards, as in the railway shop union scheme. In these plans the difficult problems of evaluation of individual ideas are to some extent avoided. The individualist plans, however, have in their immediate cash rewards a stronger stimulus; and thus far they have probably given the maximum encouragement and assistance to the individual suggester.

## CHAPTER 20

### INTEREST IN WORK; MONOTONY; NON-PECUNIARY INCENTIVES

Up to this point we have been concerned mainly with material incentives, which may be called objects of extrinsic or ulterior interest. Yet we have also recognized, in Chapter 1 and elsewhere, the existence of sources of work-interest which are relatively independent of material gain. A job may be, to some extent, an end in itself; not merely a means toward an interesting reward. The sportsman, for example, is motivated mainly by an activity such as hunting or fishing; and the delights of consuming his catch, or of making some one else happy with it, are likely to be quite secondary. His professional guide, on the other hand, will hardly consider that he has "a swell job" unless the pay and other emoluments are unusually satisfactory. In the present chapter we are to inquire a little further about the interplay of material and immaterial, extrinsic and intrinsic, factors in the interest, incentive, and efficiency of the worker. Let us first notice briefly a few problems of scientific method that are encountered in researches on these matters; then attempt a summary catalog of principal interest factors.<sup>1</sup>

**Definition and Measurement.**—Before we inquire further into the means by which workers become more or less interested in their jobs, it is well to be more explicit as to what we mean by interest, qualitatively and quantitatively. Consider first the subjective view, which a person may apply to his own mental experiences—and may thereby infer how another person probably "feels" under similar circumstances. One earmark of interest is *attention*. An object of intrinsic positive interest (this

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<sup>1</sup> Some parts of this chapter are used in my paper, "Interest in Work: Some Research Methods and Results," in *Economics, Sociology and the Modern World* (Harvard University Press, 1935).

"object" may be itself an activity, such as walking or singing) is one to which we respond wholeheartedly; we resist "taking our mind off it"; whereas an object or task which is dull or distasteful to us (i.e., is negatively interesting) is one from which our attention readily wanders, which we easily forget, and to which our mind must be frequently recalled. Such recall may be accomplished by extrinsic incentives of reward or punishment, which amount to reminders as to how the dull object is a stepping-stone toward some end which is actively and spontaneously desired.

Another earmark of interest, on the subjective side, is the *sense of time*. While engaged in a dull task we tend to watch the clock and to think we have worked longer than we actually have. Industrial researchers are beginning to use this time-sense as a test to identify the spells when a given worker is bored.<sup>3</sup> And of course the chief meaning of positive "interest," like "pleasure" which is virtually its synonym, is that we *want to continue and recur* to the activity or sensation which is interesting, whereas we want to *get away from and avoid* repulsive stimuli and behavior. The bodily reactions and accompanying states of consciousness which are most vigorous, and are furthest removed from lukewarmness or coolness or indifference, we call emotional. It is likely that all such states of feeling are conscious correlates of instinctive reactions of seeking or avoiding.

In the following pages I shall speak of the workers' "interest," "efficiency," "motivation," and "incentive" somewhat loosely—too loosely, perhaps. Motive and incentive and efficiency all suggest, I take it, the over-all objective view; the combination of stimuli or conditions which drive the subject into the overt action with which we are mainly concerned. Uncritically we say that the highly productive worker "shows interest in his work"; but of course he may hate it, and be positively and primarily and pleasurably interested only in what he can do with

<sup>3</sup> Notice, however, that a spell may seem to pass quickly when a worker is not bored yet is not really interested in his work-operations either. If the operative's motions are sufficiently automatic and other conditions are favorable to pleasant day-dreaming, time passes quickly because attention is involuntarily absorbed—in the dreams.

his pay. In that case his attention to, and interest in, his work is a laborious, voluntary, secondary sort. His attention to his pleasurable activities, on the contrary, is primary and involuntary, and his interest in them likewise. In general I shall use "interest" in the popular sense, to denote direct, involuntary and pleasurable interest; and "efficiency" to denote the accomplishment which is the immediate objective of the employer.<sup>3</sup>

**Objective Aspects of Interest-Factors.**—Experimental studies of human efficiency in work, until lately, have relied largely on objective indices, such as records of output, accidents, labor turnover, absences, or requests for transfer. And it is a fact that objective data like these are capable of indefinitely supplementing the worker's account of his own feelings, in much the same way that laboratory findings are capable of extending medical science far beyond what could be learned merely by questioning the patients about their symptoms. Introspective reports of our subjective mental states are at best somewhat vague, blurred, and hazy. Yet we shall see that many valuable studies are going forward in industrial psychology on correlations between the outward conditions and the inner lives of the workers.<sup>4</sup>

Objective data may be defined with increasing precision in each of two categories emphasized by psychologists: the situations or stimuli, and the responses or reactions of the subject. Progress in measurement within each of these groups tends to take us a little further through the maze of complex causation of the worker's attitudes, welfare, and efficiency. I have already

<sup>3</sup> Compare discussions of relations among these terms by Kornhauser and Fryer, in *Personnel Service Bulletin* (issued by Personnel Research Federation, New York), e.g., Vol. IX, Nos. 2 and 6 (Jan., Sept. 1933).

<sup>4</sup> "Where there's a will, there's a way"; and we may learn to infer the state of the will from the "ways" which the subject exhibits. An example of this sort of attitude index is afforded by the time lost by a worker, either through pauses and errands or by staying away from work altogether. British investigators found lost time of both sorts to be the greatest in operations most disliked by the operatives.—Indust. Health Res. Bd., ("I.H.R.B."), Report No. 69, pp. 25-34 (1934). Rate of improvement in proficiency was also positively correlated with liking of the operation. Other particulars of this I.H.R.B. research (by Wyatt and others) are given elsewhere in this book, especially in Chapters 2 and 15.



cited his output record as a partial measurement of the employee's response.

**Monotony, Short-Cycle Tasks, Boredom.**—Observe now that the problems of “monotony” in work could not be well understood so long as the investigator's attention was too exclusively centered upon evidences of presence or absence of the subjective experience of boredom in the worker. In order to find what degrees of which factors tend to produce how much boredom, in which persons, we must develop more exact and quantitative specifications.

One factor which may be isolated is the length of an objectively identifiable work cycle, which may average under one second, even when allowance is made for rest pauses.<sup>5</sup> A leading difference between repetitive and varied work, of course, is not in the length of the elemental times but in the number and variety of patterns which the worker composes out of his tiny elements in the course of a day. A creative author, for example, may strike typewriter keys, while composing a literary or scientific masterpiece, in about the same frequencies as does a routine typist while addressing envelopes from a mailing list. Less ambitious comparisons than this were made, by the British Industrial Fatigue (Health) Research Board, between (a) days spent continuously at *one* short-cycle task, like soap-wrapping, and (b) days containing variety among *two or more* short-cycle tasks, like wrapping and packing. This investigation indicated, for the work and operatives studied, that

(1) Uniformity in the method of procedure is generally less productive and is conducive to greater irregularities in the rate of working than are varied forms of work.

(2) The highest output is obtained when the form of activity is changed after 1½ or 2 hours of unvaried work.

(3) Many changes are detrimental to output because of their interference with the swing of work.<sup>6</sup>

Field studies of work psychology have been rather preoccupied with these light repetitive operations, which are commonly

<sup>5</sup> See I.H.R.B., Report No. 26, p. 2 (1924). Compare Chapter 8 above, on the time study aspects of work cycles.

<sup>6</sup> Report No. 52, p. 25 (1928).

carried on by girl operatives. Some authorities have deplored this preoccupation; yet short-cycle jobs do offer some especially favorable conditions for pioneering research on "the human factor in industry." Such work provides, within a few months or years, enough records of output for significant statistical manipulation. The repetitive job is to the science of work what the fruitfly *drosophila* is to the science of heredity: the unit cycle of each is short, hence a single researcher can study many such cycles. Many of the characteristics of such work and workers, however, are not in the same degree present in other jobs; hence we should be cautious in generalizing from these researches.

**Subjective Indicators; Correlations of Interest and Efficiency.**—Now is anything like measurement possible in the subjective realm of the worker's feelings and emotions? Can we systematize evidence from that quarter, on the conditions of "joy in work"? To a much greater extent than is commonly realized, the industrial psychologist (like the modern physician) may study his patient's relative happiness or euphoria by purely objective or behaviorist methods; yet such researches are much facilitated by organized and periodic introspective reports. Thorndike had the subjects of his experiments in mental fatigue make such records every 20 minutes, on a scale of 10. The zero-point was "the greatest discomfort or distaste or aversion the subject had ever experienced for mental work in his life; 5, his average enjoyment of mental work during the year or so past; and 10, the greatest interest, zeal or satisfaction he had ever experienced in mental work or play."<sup>7</sup> Other investigators have devised alternative codes for similar purposes. Since introspection at best is an inexact process, however, a good deal may be said in favor of more informal interviews with workers.<sup>8</sup>

<sup>7</sup>E. L. Thorndike, "The Curve of Work and the Curve of Satisfyingness," *Journal of Applied Psychology*, Vol. I (1917), pp. 265-67. Compare A. T. Poffenberger, *Applied Psychology*, pp. 134-35 (1927).

<sup>8</sup>Some further data, relevant to these matters, are given in the discussion of occupational interest analysis, in the latter part of Chapter 2 above. These techniques often instruct each subject to mark his inclination or disinclination toward the work of each of a considerable number of vocations. Nearly all these occupations, of course, he marks on the basis of superficial knowledge. This method has been used thus far chiefly in research on vocational aptitudes of young people; but it has also been employed in connection with

I have intimated that the output record is an index of interest as well as of efficiency in work; but this view may be challenged. Are most of us so lazy that we are inevitably discontented while we are doing real work? Do we try constantly to ease the discomfort by shirking, when the boss's back is turned? Plausible indeed is Thomas Carlyle's dictum, "No faithful workman finds his task a pastime." Scientific studies are as yet too fragmentary to underwrite any large generalizations on these points; they are still clarifying the problems. Thorndike's curve-of-satisfaction technique, for example, gave increased precision to the economist's notion that, within any working day, after some optimum point, discomfort increases with continuation of work; and it also demonstrated in quasi-quantitative fashion the lack of a short-run correlation between enjoyment and output. Some other studies have also shown that those workers who are, in general, most contented with their jobs are not necessarily the most productive members of their establishments;<sup>9</sup> but on the other hand, when we compare *a given worker's outputs*, under varying conditions, the weight of evidence seems to favor the view that, in the long run and within limits, most people tend to be most productive when they are most nearly happy in their respective tasks.<sup>10</sup>

One difficulty in reducing this problem to a quantitative basis is that the worker may be happier in one occupation than another; and we cannot directly compare his output in one (typing, for example) with his output in the other (e.g., acting as a sales-

problems of specific factors of interest within a given job, such as are considered in the present chapter. See the numerous references to Strong interest-scores in R. Hoppock, *Job Satisfaction* (Harper, 1935).

<sup>9</sup> See for example, A. W. Kornhauser and A. Sharp, "Employee Attitudes," *Personnel Journal*, Vol. 10 (April 1932), pp. 393-404; and I.H.R.B., Report No. 56 (1929), p. 32.

<sup>10</sup> See, e.g., E. Mayo, "Revery and Industrial Fatigue," *J. of Personnel Res.*, Vol. 3 (Dec. 1924), pp. 273-281, and others of Mayo's writings; R. B. Hersey, *Workers' Emotions in Shop and Home* (1932), especially Part III. The British Fatigue Board found that its subjects produced somewhat less during spells in which they felt bored than in other spells; except that when the girls talked freely among themselves as they worked, they obtained relief from boredom at the expense of some loss in output.—Report No. 56, pp. 9, 22-29. The relay assemblers in the Western Electric research at Hawthorne (see Chapter 15 above) were more productive in the test room, where free conversation was one of their privileges, than when working in their regular department.

person). In short, the widespread conviction that "welfare work" for employees pays the employer by increasing the comfort and thereby the efficiency of his workers seems to be solidly grounded—within limits and in the long run.

Of course the humanitarian person wishes to increase "joy in work" at almost any cost, and this wish is apt to be father to his thought that it pays employers to promote such joy. It may well be true of many or most people that they would be happiest if not obliged to work at all; yet if they must work, they will be most effective in those jobs which are most nearly enjoyable. Often, unfortunately, the work we most enjoy is not the one in which we are best paid—perhaps because we have taste for an occupation that is over-supplied. Our practical problem is to find the most satisfactory balance among the various attractions and repellents connected with all occupations potentially open to us.

**Outline of Interest and Efficiency Factors.**—From the foregoing review of some problems of methodology, I now proceed to the second and principal task of this chapter, which is to summarize in more concrete terms the conditions affecting "joy in work," or "job satisfaction." After considerable experimentation I have concluded that the conventional categories of wages, hours, working conditions, and voice in management are scientifically valuable rubrics here, as far as they go; and that three other heads (the worker's personal traits, social reactions, and skill) account for the principal supplementary factors, somewhat as follows.

#### SOME DETERMINANTS OF THE WORKER'S INTEREST

- A. Personal traits, home life, and the varying state of his health
- B. Factors in his job
  - 1. Real wages, as relatively direct penalties and rewards
    - a. Fines and physical or criminal punishments ("Beat or treat nexus")<sup>11</sup>
    - b. Long run "real income" of self and dependents, including consideration of

<sup>11</sup> See Florence's names for Wagner's work motives, Ch. I above.

- (1) Promotion and apprenticeship prospects
- (2) Relative security offered by job against unemployment, old age indigence, and other hazards to income
2. Social reactions; less direct rewards and penalties, mediated via
  - a. Neighbors and community at large
    - (1) Altruistic concern for user of his product
    - (2) Distinction or disgrace
      - (a) Formally or informally conferred on individual or his team
      - (b) Social status automatically conferred via one's job, i.e., his employer, his occupation, his income
    - (3) Envy, sympathy, etc., toward other sharers in product and honors, such as "capitalists"
  - b. Fellow workers
  - c. Bosses
3. Other features in the workshop
  - a. Participation in management; suggestions
  - b. Working conditions—creature comforts, discomforts, hazards
  - c. Hours—strenuousness of exertion, tempo or pace; total hours and their distribution; fatigue
  - d. Skill
    - (1) Repetition and variety of tasks
    - (2) Development of systems of knowledge and sensory and motor capacities

These categories, of course, are not entirely independent of each other nor completely comprehensive. Many other outlines may be devised, to emphasize additional factors and aspects; for example, the similarities among people as compared with individual differences, pecuniary and non-pecuniary, selfish and unselfish, "professional" versus commercial motivation. Illustrations of other conditions or combinations which may well be emphasized, and which are not all clearly implicit in the outline above, are supplied by Hersey's excellent list of earmarks of "a

congenial job."<sup>12</sup> The work is most likely to be inherently enjoyable, Hersey holds (referring especially to railway shopmen), when it presents occasional challenges to the worker as to his ability, yet does not haunt him with a terrifying sense of incompetence liable to exposure; when the criteria of successful performance, set by his bosses, seem fair; when the product is evidently useful, and is esteemed by other people; when there is some variety of movement and thought; and when there is a sense of cooperative achievement in an important task, such as clearing up a wreck.

Discussion of the foregoing outline may well begin with a few general remarks on the way in which extrinsic and intrinsic motives (whether defined objectively or subjectively) intertwine to make up a person's total attitude toward his job at a given moment.<sup>13</sup> No one will doubt that any worker at a given time may find some or all of the operations and experiences which are inherent in his work attractive; some or all repulsive—at least during some part of some work spells. These might be called interest factors intrinsic to that job and man at that time. In addition, there are many extrinsic or ulterior factors which may play some part in the worker's comfort and motivation, by the design of his employer or otherwise—for example, wages, punishments, attractive or repulsive working conditions. The pill of intrinsic ingredients in the work may be bitter, and it may be sugar-coated by extrinsic attractions like welfare work; or the revolting innermost pill may bear a further bitter coating—wormwood upon gall—if some of the extrinsic factors are also repulsive, as when one dislikes not only the routine of his job but also his bosses and fellows.<sup>14</sup> Many factors in any position, how-

<sup>12</sup> *Op. cit.*, pp. 374-75.

<sup>13</sup> Many ambiguities are concealed in the word "job"; it may refer to a general occupation, such as carpenter; or to a position, such as carpenter hired by Contractor Smith; or again to the activities of a given period—e.g., Carpenter Jones liked the operations which he carried out for Contractor Smith last Friday. See Chapter 11 on page 190. Such components as these we are attempting to analyze in this chapter. Cp. Hoppock, *op. cit.*, p. 7.

<sup>14</sup> Compare P. Sargant Florence's treatment of "The Stimulus to Labor," in his *Logic of Industrial Organisation*, Ch. 5 (1933). He points out that positive stimuli to labor efficiency include, first, inducements and conditions which tend to attach the worker to a given occupation and shop; then "in-

ever, can be varied artificially; and so I think the distinction between intrinsic and extrinsic job factors is a less serviceable tool of analysis than the contrast between attractions and repellents. The worker's attitude may be made more favorable toward his work and employer as a whole, by increasing the attractions, or by diminishing the repulsions, or by both means. His net attitude at any instant is in some sense an algebraic sum,—whose factors, however, are far from stable and constant. As Wyatt put it,

The output obtained in this experiment, as in all forms of industrial work, was the resultant of positive and negative incentives to activity. Obviously output will be increased whenever the former are strengthened or the latter reduced in intensity. It is advisable, however, to direct attention in the first place to the possible existence of negative factors which are impeding production. Their detection and removal will have the same effect as the introduction of a stronger positive incentive such as an increased rate of payment. It is clearly uneconomical to increase wages in order to obtain a higher output while the results are being neutralized by disregarded obstacles to production. Only a thoughtless driver would waste fuel in attempting to drive a car without first taking off the brakes.<sup>15</sup>

Most of the factors in my outline, it will be noticed, may vary between extremes of attraction and repulsion in their average effect upon a given type of worker.

### A. Personal Traits, Home, Health

**Home Life; Individual Differences.**—Space is lacking for more than a few comments on each of the various components listed above. The first heading ("Personal traits, home life," etc.), calls attention to the rôle of the worker's personal history in determining his satisfaction with his job. Within this group various sub-categories might be elaborated. The pleasant and unpleasant thoughts of the worker, and the ups and downs in his efficiency, which are due primarily to joys and worries in his

—  
 "ducives" and "conducives" which tend to make him efficient within that shop. The search for optimum conditions in any case, soon leads to matters beyond the worker's control, as well as to many whose significance to him he does not realize.

<sup>15</sup> I. H. R. B., Rept. No. 69, p. 53.

private life, might be considered irrelevant to our topic Interest in Work; yet they are factors in his feelings and productivity which are of large importance to the manager as well as the "labor uplifter." Hence we have a growing literature on these types of influence.<sup>16</sup> Of course, the employer faces a nice problem as he tries to determine in what ways, if any, he may influence or utilize the private life of his employees to their mutual advantage. The Ford Motor Company's experiences in 1914-18 are in point. Yet the danger line is not everywhere the same. In Soviet Russia, for example, the workman's private life is much more closely bound up with his occupational status than is the case in "capitalist" urban populations.

Among the worker's antecedents which determine the direction and extent to which his interest will be affected by a given objective work-factor are his relative aptitudes. Here we are once more on the threshold of a vast science of individual differences in taste and capacity, which variations were discussed, from somewhat different points of view, in Chapters 2 and 8 above. One laboratory study, for example, suggests that *some* workers are both more productive and better satisfied, in light repetitive operations, when they are paced by a conveyor; others when their tempo is self-controlled.<sup>17</sup> This result might be attributed to some supposedly unanalyzable factor like "responsibility," or to relative freedom for day-dreaming; or possibly in some measure to the influence of an externally-suggested rhythm.<sup>18</sup>

<sup>16</sup> See, for example, reports of the Western Electric studies, cited in Chapter 15; also Hoppock, *op. cit.*

Hersey mentions, as leading factors in "the ideal extra-plant environment," "cooperation and consideration in the family circle; ability to live within income; variety and change (a little excitement); sane and healthful recreation; satisfactory sex relationships." He remarks sagely: "Whatever the cause that may force him into debt there is no doubt that it brings upon him an added depressive tendency. A hard thing for a woman to learn is that she usually defeats her own end when she fails to live within her husband's income. Instead of putting him into a psychological mood where he will be more efficient, she is really liable to make him less capable and more prone to accidents." (*Op. cit.*, pp. 391, 392.)

<sup>17</sup> M. Viteles, *Industrial Psychology*, pp. 543-544 (1932). (Research by Gemelli and Galli.) Compare the British soap-wrapping case cited below.

<sup>18</sup> K. Bücher's *Arbeit und Rhythmus* (1896, 1899) brings together considerable data on the use of folk-tunes and chants as accompaniments to work, from prehistoric down to modern times; and more recent studies have also



**Intelligence, Temperament, and Job-Interest.**—Again, several studies have shown that the girls who make higher scores in mental tests of the “general intelligence” type are more susceptible to boredom in light repetitive work than are those who make lower scores—at any rate that there is a “critical” mental test score, above which the individual is pretty sure to be dissatisfied with simple routine work. Perhaps even better predictive factors may be found within the range of “temperamental” characteristics. Among Wyatt’s experimental group of ten girl operatives it was found that those who were most dissatisfied with their repetitive factory work had also found their school work specially irksome. “Apparently the individual who is unable to give the necessary attention to comparatively interesting and frequently varied school subjects will not be able to endure the longer periods of unvaried work in industry.”<sup>19</sup> Appreciable differences, moreover, were observed by Wyatt in the relative capacities of a given individual for doing and/or liking various types of light repetitive work in the same shop. A *general* aptitude is thus frequently discernible, but it may be overlaid with many highly specific aptitudes, even within the realm of simple routine jobs.

Such experimental findings, to be sure, make a rather modest beginning in disentangling the web of compound causation. It may be plausibly argued, for instance, that the people who make the highest mental test scores have usually come from the higher-income homes; that their superior social status makes them es-

been made on this topic. Very likely some industrial rhythms are more congenial to the human factor than others, so that there is perhaps considerable scope for better adjustment of jobs to workers in this respect.

The length of time required for each stint of output within a work-spell is also a factor in boredom. “During the course of an investigation connected with the manufacture of cigarette tins, the operatives were supplied with three gross at a time in order to provide a suitable statistical unit, while under ordinary conditions they received batches containing five gross. After the completion of the investigation the workers requested that the smaller and more frequent method of supply should continue as the work seemed less tedious under these conditions.”—I.H.R.B., Rept. No. 56, p. 35. (Compare the notion “end-spurt” in the literature of fatigue.)

<sup>19</sup> I.H.R.B., Rept. No. 69, p. 46. For data on other matters discussed in my paragraph above, see *ibid.*, pp. 31, 47, 50; Rept. No. 56, pp. 29-32; and Viteles, *loc. cit.* Compare also A. W. Kornhauser, “Workers’ Motivation and Production,” *Personnel Service Bulletin*, Vol. 9, No. 2 (Jan. 1933).

pecially dissatisfied with repetitive or any other work which tends to be low-paid and of low respectability. Again, a worker may enjoy the easy routine of his job so long as his materials for day-dreaming are rosy, but come to hate it when it gives him all too much opportunity to brood on his troubles.<sup>20</sup> But at least we may see that the personal traits of the human material are variable in a great many ways which affect their interest and efficiency at work, and that these traits may be engineered, as they are better understood, toward better adaptation of worker to work. Fitting the man to the job by various arts and sciences of vocational placement is a main variety of such engineering; yet the man fits his job somewhat differently almost from hour to hour, so that the adaptation depends on many factors, such as the capacities of his supervisors.

### B. Factors in His Job

1. **Real Wages.**—Our worker, then, is prepared by his antecedents and private life to react to the conditions presented by his job. Let us now consider some rewards and penalties which are largely distinct from the social experiences and workshop features considered below in the next two sections. Such incentives may, on occasion, include fines and even corporal or other criminal punishments for poor work or negligence; but let us concentrate on the real wages which are more important in our own society, and which are likely to be mediated by money.<sup>21</sup>

Pecuniary rewards are strategic in the whole science of incentives, by reason both of their own strength and of the indirect measurement which they may afford of the strength of non-pecuniary motives. By sufficient study of school teachers' earnings, for example, we might approximate the relative values

<sup>20</sup> See Hersey, *op. cit.*, Ch. 10.

<sup>21</sup> All except misers, of course, want money fundamentally for the sake of what it will buy. Hence, as Florence points out (*Logic of Industrial Organisation*, Ch. 5), we may study not merely pecuniary and non-pecuniary stimuli to labor but also "trans-pecuniary" stimuli—i.e., the motivation provided by the goods which the laborer can actually buy with his money wages. In Soviet Russia, and to some extent elsewhere, workers have occasionally reached a point where they had little desire for higher money earnings, not because they were over-worked or all their consuming wants were satisfied, but because so few goods were expected to be available for purchase with the extra earnings.

which they set on life in various types of communities, such as college towns. We have all heard, too, I take it, that bank clerks and government employees are partly paid by the respectability of their employments. Our Federal Government's *Wage and Personnel Survey* of 1929, however, found that the lower-grade clerical operations were more highly paid in banking and insurance firms than in any other private industry; and that such occupations were still more remunerative in the Federal service than in financial houses! Professional and executive work, to be sure, was paid less well by the Government than by private business. These variations are doubtless due to interactions among such factors as political over-payment, the blind-alley aspects of some government services, and relative social status and security of tenure.

Mention of tenure suggests that wage and salary statistics to some extent may be "deflated" by allowance for average unemployment, so that attention may be fixed upon average *annual* earnings. It is clear enough that many or most workers do a little calculating of this sort; for instance, you may hire a farm laborer or a plumber for year-round work, at salaries whose average daily yields are much lower than members of these trades can earn in short-tenure employments during their busy seasons. Some timid souls, however, may irrationally cling to supposedly secure but very low-paid posts when they could improve their annual earnings by facing some chance of unemployment; while others, over-bold, grasp after high wages whose continuity is too doubtful.<sup>22</sup>

There is abundant evidence, of course, that fear of unemployment is prominent in most workers' minds and is a vast damper on their wholehearted effort. This fact has been familiar to economists for several generations, and the newer schools

<sup>22</sup> Notice that, while some government jobs are attractive in their security of tenure (notably those under merit system rules), others are alluring *in spite of* their great insecurity. The official whose employment is at the mercy of current political events is a familiar figure in all lands; all politicians have frequent bitter experiences with such insecurity. Yet the supply of candidates is always abundant. The attractions of political life include, sometimes, material spoils of office, and always the chance of indefinite advancement in knowledge and power. Similar observations apply to the political aspect of private business relations, especially in "company politics" within large concerns.

of employee-interviewers are bringing it more forcibly to the attention of the general public.<sup>23</sup>

Another element in real wages, which often operates in a direction opposite to that of risk of unemployment, is the chance of promotion. Many workers are content, for the time, with lower immediate wages than they might be earning elsewhere, because they regard their present jobs as stepping-stones toward better things. This factor, I believe, has not yet been subjected to measurement.

**2. Social Reactions.**—From relatively individualist and material bases of interest we pass to social and relatively immaterial incentives—usually mediated, however, to some extent by money. The approval and disapproval of other people are of vital concern to nearly every one. Most of us desire, if possible, to surpass and lead our fellows in various ways; for instance, in wealth-getting. To that extent we want to be different from the common herd. We must usually be content, however, with the more modest hope of not straying too far afield from our herd,—of *not* being different from other people in such ways as to incur widespread disapproval. Whiting Williams pictures many of the forms which this “wish for worth” assumes among manual workers: even an oil-can, for example, may become a badge of social distinction in the eyes of common laborers. Money is wanted, in considerable part, for the social status it confers; and the foreman’s words of approval or of “bawling out” carry double significance because he is at once a fellow-creature and a heavy weight on the purse-strings around his men’s wages.

Somewhat allied to (a) these emulative and herd interests in social approval and disapproval is (b) the spirit of comradeship, expressed in friendly visiting and confidences. Sargent Florence has nicknamed these stimuli (a) “Respectability” and (b) “Sociability.” The emulative and the non-emulative reactions are very difficult to discriminate empirically, however. It is more convenient to consider, in turn, the worker’s total re-

<sup>23</sup> See, for example, Kornhauser and Sharp, *loc. cit.*; writings of Whiting Williams; and Chapter 8 above.

sponses (so far as these affect his work) to other people of three classes: (a) his neighbors and the wider "public," (b) his fellow-workmen, and (c) his bosses.

(a) **Neighbors and General Community.**—Among these three social interactions we may notice first the relative concern of maker and user for each other. Clearly the worker is always potentially affected, as to the care and attention he gives to his work, by his attitude toward the consumer and other persons affected by the merits and defects of "his" product, of his work. A "labor of love," in the most literal sense, is one by which the laborer tries unselfishly to benefit the consumer—as is commonly the case when a parent directly serves the children. The housewife-mother is more fortunate in this respect than is her spouse who works in some large organization; she can visualize the real persons who consume the fruits of her labors, while the users of his handiwork are to him but dim and far-away abstractions. Shrewd labor managers strive to devise means of bringing home to the laborer ways in which other persons are affected by the quality of his performance. Thus, when the Baltimore and Ohio railroad stimulates its employees to get new customers and to please the old, it is arousing their interest in work in a double sense,—showing them concretely how their own bread is buttered by service to these consumers, and reminding them of the various ways in which their services are consumed. Again, when the Telephone Company dramatizes, in its advertising, the vital needs to which its servants are ministering, these workers, as they read the advertisements, are incidentally made more fully conscious of what they are doing.

Although the anonymity of his consumer does remove one of the interest-factors which was present in the old production for local use, yet the modern mass-production worker retains some spontaneous concern that his work be really useful. In Wyatt's experiment, for instance, one of the wares became over-supplied. "As soon as the workers realized that the products were not for sale, but were being returned in order to keep them employed, they began to lose interest in the process although they continued to be paid by results. Remarks such as 'This is a silly business'

. . . illustrate the prevailing attitude and indicate the weakening of the incentive to work produced by the impaired belief in the value of the operation."<sup>24</sup> This well-nigh universal distaste for what the individual considers to be social waste is the nub of Veblen's "Instinct of Workmanship." I think it is rather a habit-attitude, based on the ancient and widespread and obvious need of private waste-avoidance.

Next let us consider the possibility that his vocational or social superiors will "recognize" the good work of an individual or group by some formal decoration or honorary award. Laurel wreaths, titles—instruments of *kudos*, in short—are ancient and universal affairs for the "leisure classes," in sports, politics, fine arts, learning; and it is a rather modern idea that common workers also could be powerfully motivated by honorary distinctions as well as by material gain. The Soviet Union has taken up schemes of honorary motivation of work with great vigor, conferring such awards as Hero of Labor and Order of Lenin on individuals, shops, villages, and even on provinces, for exceptionally meritorious industrial achievements. It has also swept millions of workmen into Shock Brigades, whose members obtain official praise as well as material advantages. It would appear that we have here a wage currency which is capable of very considerable inflation before it becomes worthless, in spite of its extreme susceptibility to debasement by favoritism and slackness in selecting the recipients of the honors.

We should never forget, however, the back-lash of envy. When one person is decorated, others are thereby made to realize their lack of distinction. If the capitalist is not available to be envied, the fellow-worker who seems to have a too-easy job or a too-great material or honorary reward is always with us. Complaints, quarrels, discouragement of the poorer workers, are probably more characteristic of piece work and bonus payment than of straight time work.<sup>25</sup> Jealousy manifests itself, however, under straight time work in complaints from those who think they are giving better service than others, for no more pay.

<sup>24</sup> I.H.R.B., Report No. 69, pp. 26, 27. Compare Hersey's earmarks of "a congenial job," summarized on page 434.

<sup>25</sup> I.H.R.B., Rept. No. 69, pp. 20, 49.

In addition to explicit and formal distinctions, there is a social status which is automatically conferred by one's "job"—i.e., by one's occupation and by one's employer. The worker's respectability tends to vary with his income, of course; thus a locomotive engineer is much higher in the social scale than a trackman, in part because the former earns larger wages; and as between two locomotive drivers, I imagine that one is apt to be the more distinguished who works for the more prosperous railway. Workers prefer, other things being equal, to work on "high grade" materials and products—in part because of the aura of pecuniary respectability which they shed. Yet jobs may be respectable out of all proportion to their immediate remunerativeness or associations with prosperity. The low-paid "brain worker," for example—be he priest, professor, lawyer, artist, or military or civil official—may carry off some pretensions of social superiority over many people with higher incomes—especially the *nouveaux riches* types. Likewise the respectability of the service of Employer A, compared with Employer B, does not rest entirely on their relative *present* pecuniary capacities, though ultimately evidences of economic competence tend to carry respectability in their train. To some extent this type of reputation is within the control of Employers A and B, by means of advertising and other devices like the missionary work of their personnel officials.<sup>28</sup>

(b) **Fellow Workers.**—The second group of social stimuli affecting our workman's productivity is composed of his relations with fellow-workers in his shop. These contacts, of course, contain manifold possibilities of content and discontent, effi-

<sup>28</sup> See L. D. White, *The Prestige Value of Public Employment in Chicago* (1929). White's research collected responses from 4,680 persons, mainly residents of Chicago, to ascertain the esteem or prestige which they associated with specific jobs in the city service, as compared with jobs similar in duties and pay, with specified private employers. The aggregate of responses ranked nearly all these city jobs lower than the corresponding private jobs. This tendency was more decisive among the older, more prosperous, and more educated subjects than among the younger, poorer, less educated. The real evils of the city government of the time were great enough; and perhaps they were also magnified in the eyes of the public by reactionary newspapers. The testimony of these responding subjects as to personal experiences with city employees was more favorable to the latter than were their generalized opinions.

ciency and inefficiency, in one's job. Our prejudices, for example, seem to predispose us to be irritated with people of other races, political complexions, and religions. It is claimed that some employers have deliberately recruited heterogeneous labor elements, for the purpose of warding off unionization of their employees. Such a policy is surely costly in terms of the other types of cooperation which the employer wants among his workers. Recent researches have shown that the chief single means of job-finding in several industries and places has been the efforts of employees to get friends into vacancies in the same establishments with themselves.<sup>27</sup> The efficiency of this employment agency has decided limits; yet the great reliance placed upon it is one partial index of the importance of friendship as a factor in business personnel relations.

Wyatt and his associates in the British Industrial Health Research Board have made several other quantitative studies in this field of social influences. I have already mentioned their finding, with respect to light repetitive work, that during spells in which the worker is talking with another she tends to feel less bored but to turn out less production than during spells in which she is not talking. In a more recent investigation the effect, on each worker's output, of the performance of her immediate neighbor was observed, after changes of positions.<sup>28</sup> Both "before" and "after" this change, all were wrapping candies (at which task they had had not less than nine months' experience) on a straight piece rate. Four of the ten operatives increased their rates of production by 10% or more; and three decreased their outputs by 10% or more. In general each one adapted her pace toward that of her new neighbor; but some other elements of relative congeniality, talkativeness, and domination were also evident.

Fellow-workers influence each others' outputs most conspicuously in *competitions*, of which there are many varieties, formal

<sup>27</sup> D. De Schweinitz, *How Workers Find Jobs* (University of Pennsylvania, 1932).

<sup>28</sup> Rept. No. 69, pp. 36 ff. Some of the data are given in my table shown on page 318. Compare article by T. N. Whitehead, in *The Human Factor* (London), Nov. 1935, which gives data relative to similar shifts of workplaces in the Western Electric experiments.



and informal. Nearly every one likes some competitive sports or games, including various degrees of gambling; and this spirit not seldom gives rise to spontaneous races in production among operatives in a workshop, even when no material gain for themselves is in question. The research cited in the preceding paragraph found various instances of this sort; and the investigators argue in somewhat the same vein as F. W. Taylor, in favor of production records which shall enable each worker to know at all times his current rate of working and how it compares with the past rates of himself.

Here we are also reminded of Robert B. Wolf's "non-financial incentives" (chiefly graphic records of quantity, quality, and economy, for each crew), which have become standard practice in some modern paper mills. Soviet Russia has made "Socialist Competition" a leading slogan. The *Moscow News* (English-language weekly) of May 1, 1934, prints a story of formally registered competition between two mechanics (piece workers), and adds: "It is not only the workers who are engaged in socialist contests. The cooks in the four dining halls of that same plant challenged each other to prepare better meals, while the waitresses compete with each as to who can serve more hungry workers in one shift. . . . From simple rivalry between two workers, socialist competition has grown until it has become an All-Union affair, embracing tens of millions of workers and peasants and thousands of mines, mills, farms and plants." Commonly, to be sure, these Soviet campaigns are complicated by prizes of money, holiday trips, or other desirable privileges; and the net results are vitiated somewhat by haste making waste and by slumps between competitions. American managers have long manipulated, *ad nauseam*, sales contests, safety contests, and all manner of other races among employees. Naturally competitions may become bitter and quarrelsome in some circumstances; and it is easy for the employer or the socialist director to fail to perceive wherein the workers who are invited to compete think the arrangements unfair to them,—e.g., as to division of material benefits. The familiar problems of restriction of output are also close at hand—the workman has some reason to fear that the spurt which he makes in a race will be presently

used as evidence of what he ought to do as a regular stint for a humdrum wage. If all the conditions are deemed sufficiently fair by the workers, however, competition may undoubtedly give extra zest to work.

(c) **Bosses.**—The climax among social factors in work-interest is reached in relations between the worker and his boss or bosses. In the first place, any employee's material prosperity depends largely upon his immediate superior's opinion of his effectiveness; in fact, the evaluation of subordinates is a leading part of any supervisor's job. Second, the subordinate tends to hold his boss accountable for many distasteful conditions which are really quite beyond this supervisor's control. Yet "company policy" is not an unfailing "alibi" for the foreman; for the respective morales of crews under different foremen in the same company are sometimes very different—here is the real test of the foreman's calibre. As Kornhauser and Sharp showed, workers of low morale will voice discontent with many features of their employment which pass unnoticed, or are actually approved, by fellow-employees similar in every respect except that they work under better supervisors.

Further material on this point is supplied by other personnel researches. In the Western Electric Company investigations, for example, cited in Chapter 15 above, the experimenters were much impressed by indications, from conversation in the test rooms and from large-scale employee-interviewing, of dissatisfaction with various features of the ordinary supervision in the large departments. The research was accordingly directed toward improving supervision methods. Hersey's study in the railway shops was also put to a similar use. He had shown many ways in which relations with foremen affected both the production and the feelings of the men; and Chapter 17 of his *Workers' Emotions in Shop and Home* contains not only his own "Inferences and Suggestions" but also comments of the foremen on his first write-up.

**3. Workshop Factors: Working Conditions and Hours.**—For the most part the "rewards and penalties" with which we

have been dealing are ulterior or extrinsic consequences of the worker's industry or lack of it. Now we are ready for a closer view of the heart of the interest-in-work problem: namely, the operations and other experiences which are relatively inherent and intrinsic in the task, and relatively independent of either pay or social relations. The first factor listed by our outline, in this group, is participation in management. It is doubtless of very great importance, when adequately interpreted, though obviously there are great variations among workers and jobs as to the scope and methods of participation which give the best results. Many trade union officials and advocates, for example, have explicitly disclaimed any desire for assuming managerial responsibilities; others, as was explained in Chapter 19 above, have aspired to cooperation with employers in various ways. In some instances labor groups such as the Amalgamated Clothing Workers and the Columbia Conserve workers have dealt with the whole range of management problems, including sales and finance; but as yet it would seem that more modest "worker's control" is in line with the capacities and desires of the mass of hired people. In the Soviet Union there have been incessant oscillations of the pendulum between centralization and decentralization of managerial authority. It seems inexpedient to expound these large matters in this book, further than to give the factor of industrial representation formal recognition. Some other major workshop factors (*viz.*, working conditions, hours, and skill), however, I propose to examine more closely.

Working conditions (in the sense of creature comforts and discomforts, and hazards to health and life which are directly ancillary to one's job) in the aggregate are very important; but when we attempt to get beyond the simplest platitudes about them, we enter a maze of technicalities, because of the great number and heterogeneity of such factors. Various arts and sciences, such as safety engineering and industrial physiology and medicine, are continually at work on these problems; and each employer has an obvious interest in arranging his working conditions, not only for the optimum physiological efficiency of labor, but also with a view to improving the attitudes of both his workers and the public toward his concern. To some extent he

must displease his employees in order to make them efficient—notably whenever he establishes some *new* regulation—even one, like a safety rule or an organized system of rest pauses, which a bystander might suppose should please them. In other cases he may increase their efficiency by measures about which they are indifferent, as by some improvements of illumination. In general, however, there is large scope for raising productivity by changes in working conditions which employees explicitly consider desirable.<sup>29</sup> Just now the art of air-conditioning is undergoing rapid and profound changes, which open up great vistas of increased efficiency by providing more nearly optimum heat and humidity the year 'round.

Allied to working conditions of bodily comfort are other conditions of mental comfort, especially where the work-operations are routinized. Relations between various *noises* and the efficiency and satisfaction of workers are the subject of considerable research nowadays, for example. And occasionally the nature of the job is such that the operative's efficiency may be increased by the *distraction from boredom* which results as the worker hears something of interest.<sup>30</sup> The old-time cigar makers employed one of their number to read to them as they worked; Samuel Gompers was such a reader in his time. (Here we have a hint of the limitations of joy-in-work in that handicraft era.) Radio technique seems now to offer considerable possibilities for combatting monotony.

An example of many intimate relations between individual and social factors is supplied by locker and washing facilities in workplaces. These are appreciated as mere creature comforts; and still more, perhaps, because they enable the workman to travel to and from his shop respectably cleaned and garbed. Thus

<sup>29</sup> First impressions, of course, are not entirely reliable. Thirty girls wrapping and packing soap were persuaded to try a new method in which an automatic conveyor was used, which method made their work more narrowly repetitive than it had been, and also at first required more attention and effort and gave less opportunity for conversation. All the operatives were strongly opposed to the change; but in four months half of them had come to favor the new method. Their motions had become sufficiently automatized so that they could day-dream and talk again.—I.H.R.B., Rept. No. 56, pp. 37, 38 (1929). Unfortunately we are not told how their earnings were affected, if at all.

<sup>30</sup> See, for instance, I.H.R.B., Rept. No. 69, p. 53.

they affect his social status favorably, in the eyes of all who see him en route.

**Hours of Work.**—One dimension, so to speak, of working conditions is the *duration of the work*. Yet even the most cursory study of the vast literature of "fatigue and efficiency" will show that it is impossible to determine exactly the optimum hours of work, even for a given task and worker. Part of the difficulty is in control of, or proper allowance for, the worker's total motivation. Boredom is, in effect, a pseudo-fatigue; if the bored person is freed for an interesting activity, he goes at it with vim; his "fatigue" vanishes in a moment. And it is not mere boredom which shows this sort of interaction. Any one may notice occasions when he has worked long and strenuously and feels thoroughly tired at the end of the day; yet when an exciting stimulus like invitation to the dance is presented, he suddenly finds reserves of energy at his disposal. Within limits, change of work or recreation is as good as rest, though there are certainly many situations in which complete relaxation and insulation from stimuli of all sorts are needed to repair fatigue. Individuals differ widely in their capacities for various types and spells of work. Such are a few of the complications which have caused countless investigators of "the hours-of-work problem" and "fatigue" to broaden their survey to take account of the innumerable closely related "factors in human efficiency." In the course of such researches much light has been thrown on relations, for example, between strenuousness of work and optimum work-day, between tiredness and bad temper, between fatigue and proneness to accidents.<sup>81</sup>

It appears that most of the people who have put in twelve-hour or longer days habitually have not worked very strenuously during all those hours, due to physiological as well as psychological causes. In many cases men and women prefer jobs with very long hours, at low pay per hour, to other jobs with shorter hours at higher hourly rate—if the long-hour jobs bring somewhat higher total remuneration per week. Often, when

<sup>81</sup> See, for example, H. M. Vernon, *Industrial Fatigue and Efficiency* (1921); P. S. Florence, *Economics of Fatigue and Unrest* (1924).

these very long shifts were reduced, after a sufficient period of adaptation it was found that the hourly output per worker had increased more than enough to compensate for the reduction of hours. This process has limits, unquestionably—partly due to the low efficiency which is characteristic of the first and last half-hour (or thereabouts) of each work spell, unless supervision is very strict. Probably most workers, at most jobs, other things equal, will achieve maximum total productivity in a work day not much less than 8 hours and a work week not much under 40 hours.

Hours of work may be varied, not merely as to the total within a day or week, but as to the arrangement of spells. Such variations are made by rest pauses, and extra-long holidays, for example; and here arises in somewhat novel form the old contradiction between the worker's desire for pay and his desire for play. His desire for play, or rather for maximizing "his own time" (he is suspicious of the high-brow term "leisure," and if he is enterprising and lucky at job finding, he may use his own time for subsidiary gainful employment, or for home jobs), may lead him to favor short over-all hours in his chief employer's service, conveniently arranged during the week with reference to the time required for transportation between his home and his work. With a 48-hour week, most workers are now quite willing to work longer than 8 hours the first five days, in order to have the Saturday half-holiday; and if the week is 45 hours or less only five work days are desired by a great many. Organized rest-pauses tend to mitigate fatigue and improve daily output in strenuous or monotonous work. If these rest pauses aggregate half an hour a day, the worker's first reaction is that he would much prefer to forego them and leave his plant a half-hour earlier; but the daily productivity on which his pay ultimately depends may be favored by two or more pauses within the working day.

**Confinement by Work.**—Hours of labor affect the attitude and efficiency of any worker in two general ways: (1) the mechanical or physiological efficiency of the worker, taking account of exertion and tempo of work, susceptibility to accidents, bad

temper, and so on; and (2) the unpleasantness of confinement and loss of freedom. We have already dealt roughly with the first of these effects; and now a few words on the second will lead us to the last main section of this chapter—the dependence of interest on skill. Obviously the more the worker enjoys the operations of his calling, the less constraint does he feel while he is practicing it—chiefly because the weaker, relatively, are his wishes to be doing something else.

This unpleasantness of confinement to one's workplace may be mitigated in two ways. The most obvious is reduction in hours of labor; it is generally less irksome to be kept in a stuffy shop or office or school for shorter than for longer periods. (Within limits; for the "warming-up phase," at the beginning of each work spell, involves a gradual quiescence of the clamors of the leisure-time interests, and a gradual rise of contentment.) Most commentators on repetition work in modern industry have held that it is bound to be irksome to most laborers, who may find relief only through shortened hours. This chapter gives some hints as to other ways in which the burden of such work may be lightened; yet I think one of the greatest forces in past reductions of hours (lying unexpressed beneath the truths and fallacies by which such reductions are explicitly advocated) is the desire of innumerable people to diminish the part of the day during which they are confined in their principal places of employment.

Some jobs have always allowed the worker much freedom as to when, and sometimes even where, he worked; he may be "paid by results" which he produces in his own way. A conspicuous case is the free-lance literary writer. Surely we have all envied the successful novelist's apparent ability to work wherever he may want to live, and at any time of the day, week, month, year. Also, if we surveyed the ranks of employees of all sorts—professional men and executives, salespeople, even manual labor—we should find great variations in the rigidity of external compulsion as to details of time and place of work.<sup>32</sup> True,

<sup>32</sup> See Carter Goodrich, *The Miner's Freedom* (1926). Notice that I am here abstracting this feature of control of one's hours of work; though in fact those persons who have control over their own hours are usually engaged in occupations attractive on other counts also—pay, prestige, and skill.

the independent worker is likely to be most productive if he holds himself pretty rigidly to a regular schedule and within a rather circumscribed range of places; yet often he prizes highly the privilege of being his own task-master. Here, perhaps, is an important reason why so many people try their luck at self-employment, on farms, for example, despite the low earnings and the high business-mortality of small proprietors. Very likely the general trend within industrial countries is still toward larger-scale operating units, with larger fractions of the populations serving as employees in them, punching time-clocks regularly because of the value of the equipment with which they work and the importance of definite interlocking schedules in all departments. But those persons who are in any way concerned with industrial psychology should take account of the hypothesis that the congeniality of a job is in part a function, not only of the number of hours and their distribution in time and space, but of what independence the worker has in all these matters.

**Skill; the "Hobby-Nexus."**—When we have considered personal traits, remuneration, social relations, participation in management, fatigue and creature comforts, what important attractions and repellents of a job remain? None, perhaps; or rather it is possible that all major determinants of the worker's attitude may grammatically and logically be assigned to some branch or combination of the foregoing categories. Nevertheless, we may find in the development and exercise of skill some sources of intrinsic interest in work which are relatively independent of the others cited above. Let us approach them through a little elaboration of Florence's term "The Hobby Nexus" (between worker and work).

What is a hobby? Various aspects could be emphasized, notably reputation among fellow-hobbyists, and freedom from the constraint which makes it so difficult for the most frugal person to get a real hobby-feeling out of doing only "useful" chores in his spare time.<sup>88</sup> We may, perhaps, define it sufficiently as a systematic, cumulative sort of play. A hobby fascinates its

<sup>88</sup> See E. E. Calkins, *Care and Feeding of Hobby Horses* (Leisure League, 1934).



devotee mainly because it is a constantly growing thing, yielding him a succession of minor triumphs of increased knowledge, of understanding, of problems solved. At least these aspects of a hobby must be most relevant to the general topic Interest in Work, since work does not always yield an accumulation of material trophies like postage stamps and butterflies. The practitioner and the student or critic or historian, in a given field, abstractly considered are two distinct types of hobbyist.

Now the most highly skilled trade or profession is not entirely a hobby, for the person who depends on it for his living. Often he is exposed to compulsions as to when and where he practices, and other disagreeable incidents such as we have discussed above. Yet his occupation yields him many thrills in common with the mere hobby-rider, for both of them develop and practice complex systems of skill and knowledge. Time is required for such development, hence the average number of years required for competence is a commonplace index of skill. The nature of this competence, however, requires independent definition and measurement; and it is a baffling task to try to isolate and measure skill elements which are common to all crafts. A recent attempt is that of Miss Fairchild, who utilized the Gilbreths' motion study techniques.<sup>84</sup> The members of the various crafts and professions, each in his own way, develop not only knowledge and motor capacities but also special sensibilities—reactions to variations in color, tone, touch, and so on which are quite imperceptible to the untrained person. And the exercise of these "feels" of his job may be a source of pleasure to the craftsman.

Some investigators have found—it is not astonishing—that pleasure in work tends to vary directly with the degree of skill.<sup>85</sup> But of course the greater his skill, the less is the workman exposed to constant repetitions of short-cycle tasks, local fatigues,

<sup>84</sup> M. Fairchild, "Skill and Specialization," *Personnel Journal*, Vol. 9, pp. 28-71, 128-175 (1930). Compare H. Dubreuil, *Robots or Men?*

<sup>85</sup> Fairchild, *op. cit.*, pp. 136-142; H. de Man, *Joy in Work* (first ed. in German, 1927; partially translated into English, 1930; there is also a French translation). Man used questionnaires and essays written by some 78 members of European "working-class" study groups. His treatment is considerably molded by the instinct-psychology that is typified by McDougall.

undesirable hours and working conditions. And to disentangle his satisfaction in the exercise of skill from his satisfaction with relative income and social status is not possible in any complete sense. Practically, however, it is sufficient for the industrial manager to study the possibilities of promoting workmanship and initiative, even among his less skilled workers, by suitable measures of "recognition" of the workers who have shown these qualities, and by toleration of the blunders which any person who displays initiative must occasionally make. These interest-factors may be supplied, to some extent, by formal suggestion and cooperative schemes; but naturally they depend much on the personal touch of the supervisor.

The advice which William James gave to teachers, on the reciprocal effects of knowledge and interest, is significant here. In effect he was discussing interest in a special sort of task—namely, the pupil's school work—yet the principles have many wider applications. To keep the attention of the child, he said:

*Begin with the line of his native interests, and offer him objects that have some immediate connection with these.* The kindergarten methods, the object-teaching routine, the blackboard and manual-training work—all recognize this feature. Schools in which these methods preponderate are schools where discipline is easy, and where the voice of the master claiming order and attention in threatening tones need never be heard.

*Next, step by step, connect with these first objects and experiences the later objects and ideas which you wish to instill. Associate the new with the old in some natural and telling way, so that the interest, being shed along from point to point, finally suffuses the entire system of objects of thought.*<sup>50</sup>

Mr. Mitten's slogan (for the Philadelphia transit workers), "Knowing Why Makes Doing Easier," is psychologically sound, though I do not endorse all his applications of it. Of course the doctrine that knowledge begets interest, which in turn begets more knowledge, does indeed meet many difficulties in practice. Innate differences in various types of intelligence, for example,

<sup>50</sup> *Talks to Teachers*, pp. 95, 96 (1899). Italics in original. See also H. D. Kitson's comments, *J. Pol. Econ.*, Vol. 28 (1920), pp. 332-38. This general doctrine, called the "experience hypothesis," has been attributed to Wilhelm Wundt.

must be considered; and it is also true that new knowledge of a job's dangers, and of unfair features of its compensation, will tend toward increased distaste for that job rather than increased positive interest in it. Yet whatever the learner's aptitude, his capacity in, and his taste for, a given occupation is pretty sure to grow through little increments; so slowly as frequently to discourage his masters, who must continually remind him as ingeniously as possible how the dull present tasks are means to ends which the novice *does want*—such as a vista of promotions in working conditions, in fame, and in fortune. If the teacher or propagandist tries to lead his pupils too fast, however, he is apt to bore and irritate them.<sup>87</sup>

**To Summarize.**—The master-problem here considered is to find the conditions under which an optimum of satisfaction in work may be achieved. Its principal sub-problems, perhaps, are due to the great variations among people in their reactions to a given set of objective conditions. The older philosophical and qualitative methods of study are now being supplemented by experimental and quantitative investigations, which are especially needed to give perspective to the variations in individual reactions. These newer methods deal not only with objective data like outputs and labor turnover, but with subjective data

<sup>87</sup> Robert Hoppock's report of his rather elaborate and intensive canvasses, especially throughout one Pennsylvania village and among several hundred teachers, on the extent and causes of "Job Satisfaction" may here be drawn on for suggestions as to relative weights among the factors. Considering only forty employed adults in this one village, who in the autumn of 1932 were interviewed and checked his scales, he found that 28 of these mentioned associates, such as customers and pupils, as features which they liked in their jobs, whereas only 9 spoke of associates as displeasing; 24 cited intrinsic operations in their work as sources of satisfaction, while 20 spoke of unpleasant job contents. The boss was third in order of frequency of mention, as a satisfaction-factor—11 citing the boss with approval, 7 with disfavor. Apparently all these data refer to contents of interviews. Another table, showing frequencies with which these people checked statements on the printed scales, shows that their checks were much more uniformly favorable to all aspects of their jobs, including "My work gives me a fine opportunity to help others, which I enjoy."—*Job Satisfaction*, pp. 122-125. The volume contains an excellent annotated bibliography, refreshing interview reports, and much pungent and level-headed analysis of problems and evidence. Hoppock's view is that not more than thirty per cent of gainfully employed workers today are predominantly and usually dissatisfied with their jobs.

derived from the worker's introspective reports about his feelings. Results are as yet but fragmentary and tentative; but they give such indications as these: Simple generalizations about factors like "monotony" in work are not likely to be very illuminating; and there is some degree of long-run positive correlation between the worker's enjoyment and his efficiency, in many or most cases. Thus study of all these matters offers the industrial manager at once incentives and means to increase work-interest among his staff.

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