

THE HYBRID PLAN:
A NEW
GAINSHARING PLAN

by

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the University of Manitoba in partial fulfillment of the requirements
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ABSTRACT

The objective of this thesis is to find an incentive plan to increase labor productivity and to improve labor-management relationship. A review of existing individual and group incentive systems indicates that both exhibit a lack of completeness and are becoming less effective in today's competitive environment. The major plantwide incentive systems are re-examined: profit sharing, productivity gainsharing and employee stock ownership plan. This re-examination shows that productivity gainsharing is the most appropriate form of incentive system to motivate an entire workforce to work productively, efficiently and effectively in today's society. The review of the three most commonly-used gainsharing plans (the Scanlon Plan, the Rucker Plan and the Improshare Plan) shows that each plan has unique merits as well as specific deficiencies.

A new plan, known as the Hybrid Plan, which combines selected features from the Scanlon Plan, the Improshare Plan and profit sharing is proposed. The primary purpose of the proposed Hybrid Plan is to instill a greater commitment from employees through a three-part reward system. The first two parts of the reward system are similar to the existing gainsharing plans. However, the third part is unique and is

based on a point system. The point system is used to encourage employee involvement and commitment. The bonus for the point-system is similar to profit-sharing.

The proposed "Hybrid Plan" also attempts to include productivity gains through efficient utilization of all major input factors into its bonus calculation. All productivity gains, including investment-induced gains, are shared equally (50% each) between the company and its employees.

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Chapter I
INTRODUCTION

The issue of productivity has become a major concern in all industries especially in the manufacturing industries. The term "productivity" is often confused with the term "production" and "performance": "Production" refers strictly to the quantity of output, while "Performance" encompasses effective behavior of the total organizational system. Productivity is simply one of the measures of efficiency.[95] Productivity is defined as the efficiency relationship between the quantities of input required to produce a specific quantity of output. Quantitatively, productivity is related as follows :

$$\text{Productivity} = \frac{\text{Output Produced}}{\text{Input Used}}$$

Productivity can be improved through proper utilization of labor, material, capital equipment and management techniques. Most modern, western companies focus on computer-aided technology for forecasting, material planning, product design and manufacturing as the primary means to productivity improvement. Investment of capital

does not automatically increase productivity. As defined above, productivity improvement is dependent on the efficient use of input resources. If no humans are present, the productivity of an entirely automated company will always remain constant. Only the acquisition of better technology can improve on existing constant level of productivity.

Since no company is totally controlled by machines, it is essential to motivate the employees (the labor component) towards productivity improvement with incentive systems as the most common technique used. Proper motivation techniques should concentrate not only on the physical effort but also on the mental effort of the employees. In addition to incentive systems, the labor and management must be capable of working harmoniously and cooperatively toward agreed-upon and recognized common productivity goals.

It is essential for all employees to work cooperatively as a single unit rather than as disconnected individuals if one wishes improve the overall productivity of a company. The Hawthorne Studies indicates that a cohesive work group has a very powerful influence on productivity.[81,84]

The development and establishment of a labor-based productivity program, usually must involve the consideration of the following main points in an iterative manner, (figure 1.1):

1. Productivity measurement
2. Productivity evaluation
3. Productivity planning
4. Productivity Improvement

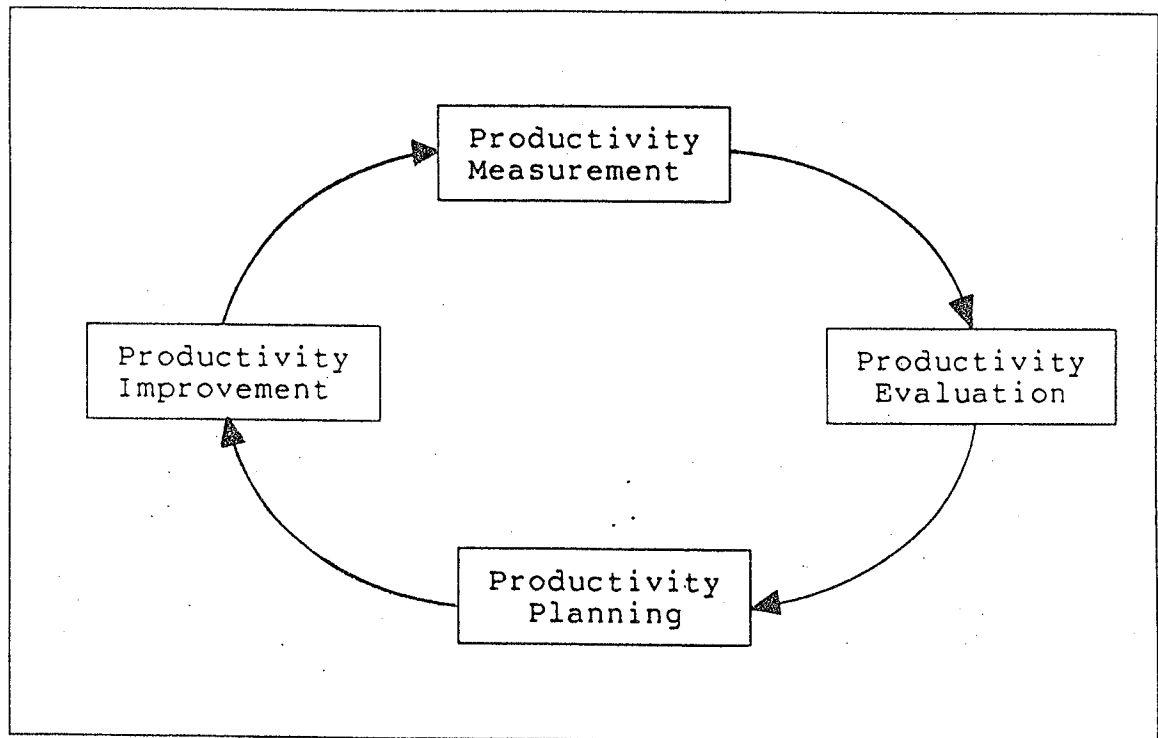


Figure 1.1: The Productivity Cycle
(From ref.#101, p.48)

1.1 HISTORICAL DEVELOPMENT OF INCENTIVE SYSTEMS

The major influences on the chronological development of the different incentive systems are shown in figure 1.2. Slavery and "management-by-punishment" are probably the oldest methods to manage a workforce. Two major examples of such management are the building of the Pyramids in Egypt and the building of the Great Wall in China. The individual incentive system is also a very old form of incentive system. The origin of the individual incentive is difficult to trace because it could have been used during the time of slavery and "management-by-punishment". Slaves or "workers" could be rewarded with more food or better accommodation for outstanding performances.

The most distinctive beginning of the individual incentive system is perhaps during the period of the Industrial Revolution.[36] The work of Adam Smith [97] and Charles Babbage [3] helps to formularize individual incentive payments. Taylor's [104] development of the Scientific Management, and the work of Frank and Lilian Gilbreth [36] further enhanced and encouraged the use of the individual incentive system. Other contributions to the individual incentive system includes the work by Gantt [30], Merrick [61], Emerson [19], Halsey [35], and Rowan [105].

The realization of the potential of the group incentive system is mainly due to the Hawthorne Studies which were

conducted by Elton Mayo and his colleagues between 1927-33.[13,81,84] In 1930, Joseph Scanlon [29] developed and promoted the plantwide employee involvement system, which then gave birth to the plantwide incentive system. Other approaches to the plantwide incentive system includes the Rucker Plan, the Kaiser Plan, profit sharing and the Improshare Plan. It is important to note that in many "developing" countries, the "management-by-punishment" method is still alive and well. The more common types of punishments are salary freezes, demotion and layoffs.[101] However, in industrialized nations, this method of management is disappearing. Although some cases (mostly exploitation of employees) still exist, they are relatively insignificant.

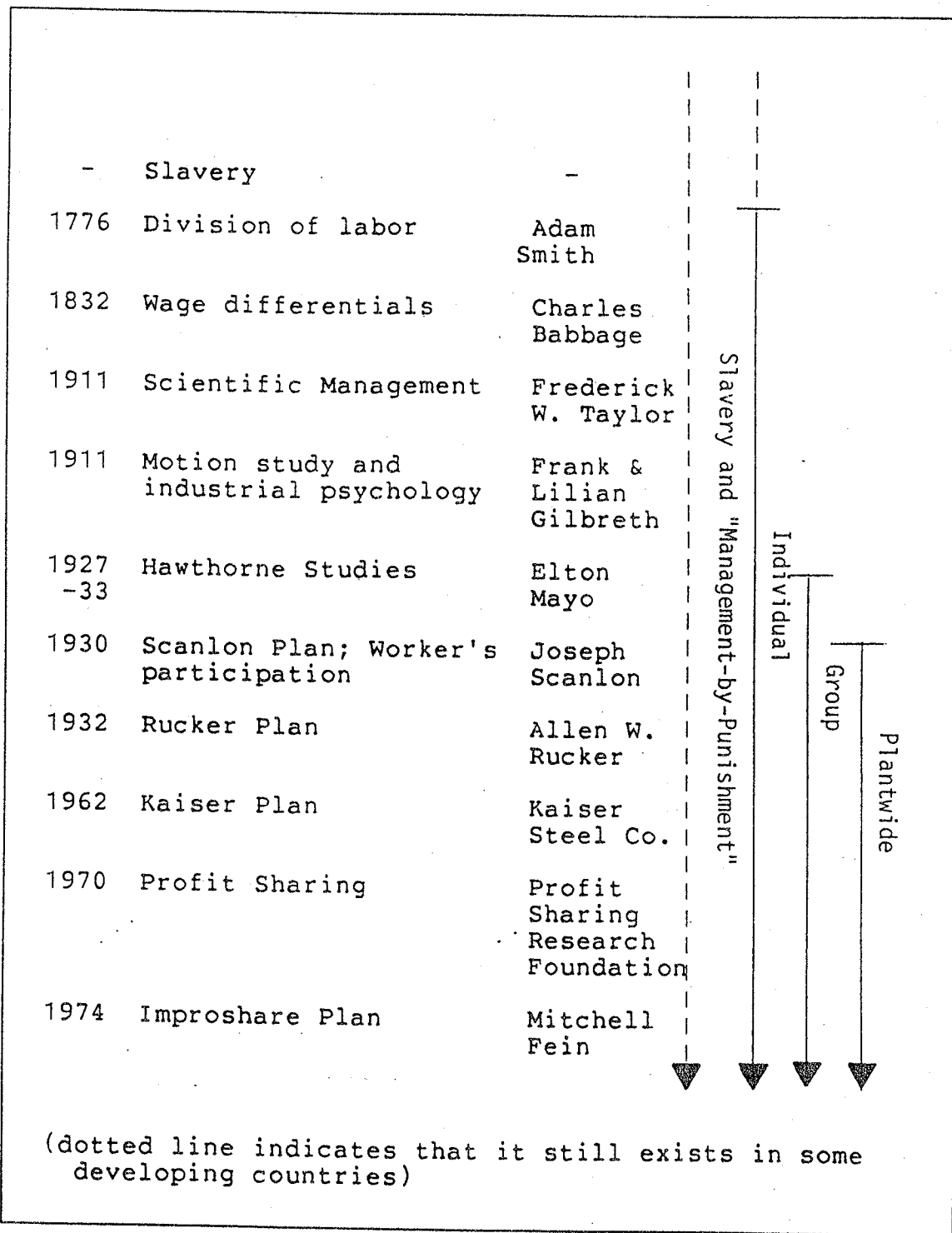


Figure 1.2: Chronological Influences to the Development of Incentive Systems

1.2 MOTIVATIONAL DRIVE (A MODERN VIEWPOINT)

The two most important priorities of concern to most employees are income and job security. Other factors such as job enrichment, job enlargement, personal recognition, promotion and improved working conditions are also essential to motivate the employees toward productivity improvement. Surveys [41,42,44] by the Institute of Industrial Engineers (IIE), as shown in figure 1.3, indicate that motivation is not as strong and people work less hard in the North American society. However, proper motivation can lead employees to work more effectively with greater dedications.

The research work of the three of the most prominent behavioral scientists provides a good view of the typical human's attitude towards work. Maslow's "Hierarchy of Needs" [57] states that each individual is motivated to seek satisfaction from the lowest-order needs to higher-order needs in ranked order. The order is ranked from physiological needs, the lowest order, to self-actualization needs, the highest order. Since the lower-order needs are easily attainable, job enrichment plays an important role in the motivation of employees in modern society.[7] Herzberg [39] differentiated that some job factors can create job satisfaction while others can lead to job dissatisfaction. Dissatisfying factors are defined as factors extrinsic to the job (e.g. pay, benefits and working conditions) while

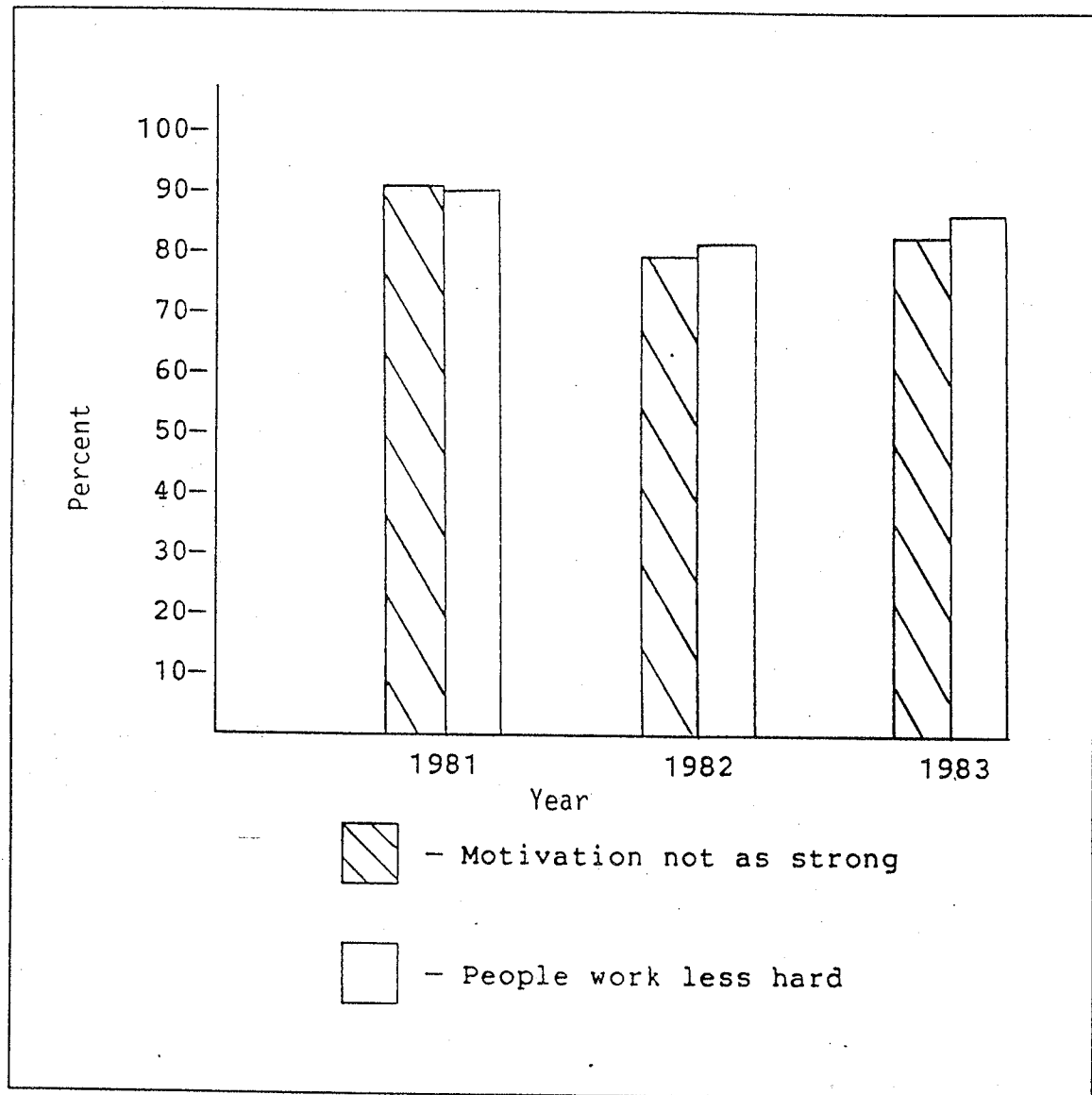


Figure 1.3: Survey of IIE

satisfying factors are intrinsic to the job (e.g. recognition, achievement and responsibility).[79] Unfortunately, humans must often perform the dissatisfying factors to satisfy their basic needs. McGregor [60] developed two famous theories, namely, Theory X and Theory

Y. Theory X states that the average individual dislikes work and tends to avoid it if possible. Thus, some enforcement is required to make him work. Theory Y, on the other hand, states that an individual will exercise self-control and self-direction, if allowed to assume appropriate responsibilities.[29,66,81]

In addition to increasing productivity, proper motivational drives also contribute to decreased absenteeism, labor turnover, sabotage and maintenance costs.

1.2.1 Monetary Reward

The 1981 Survey by the IIE [41], as shown in figure 1.4, shows that monetary reward ranked above all other motivational drive. Sufficient monetary rewards can lead most employees to work better, harder or faster. Indirectly, money rewards also provide recognition and feedback on the employee's performance.[50]

Money Reward	41%
Personal Recognition	26%
Promotion	26%
Other	3%

Figure 1.4: Motivational Drive as Ranked by Workers

1.2.2 Job Enrichment and Job Enlargement

Job enrichment permits employees to perform a variety of tasks, thus increasing their input and responsibility regarding a particular product. Job enrichment can be loaded horizontally or vertically. Horizontal loading simply assigns employees to perform different tasks, while vertical loading, similar to job enlargement, increases the employees decision-making and responsibility.[7]

Job enrichment provides satisfaction for most employees because they can identify their work input more closely with the end-product. This makes their work more meaningful, in contrast to previous trends to work simplification, which only treated employees as "intelligent machines".

1.2.3 Personal Recognition

Management recognition of employees' accomplishments is very important. Such recognition makes employees feel valued which in turn increases their self-confidence, motivation and ambition. Personal recognition instills a sense of achievement, self-appreciation, loyalty and belonging in all employees.

Personal recognition can be accomplished through promotion, tangible reward or simply communication.

1.2.4 Improved Working Conditions

A pleasant and tidy working environment is an important factor in productivity improvement. An organized layout is more pleasant to work in than a highly unorganized one. Since employees spend one third of their normal life working, it is important to make them feel comfortable in their workplace.

Proper lighting, reduced noise and vibrations, together with proper temperature and humidity setting are all essential to a pleasant working environment.

Chapter II

INDIVIDUAL AND GROUP INCENTIVES

Most companies adopt some sort of incentive plan to motivate their employees to perform at their best. Such, incentive plans are directed either towards the individual or towards groups.

2.1 INDIVIDUAL INCENTIVE SYSTEMS

The individual wage incentive system, probably the oldest type of incentive system, remains the more popular type in most industries. The three most common type of individual incentive plans are based on piecework, hourly and measured day work respectively. The use of individual incentive plans is especially common in small, privately owned and labor-intensive companies. Employee needs, however, evolve over time. Stagnant productivity and increased labor-management tension in many companies with individual incentive plans indicate that these plans are becoming less effective. Moreover, the individual incentive plan can also be considered as an incomplete form of incentive plan because it focuses primarily on the productivity of individual employees and not on the overall productivity of the company which should be the final objective of the process.

Individual incentives, when applied properly, can definitely increase company productivity when no other type of incentive plan had been previously implemented. However, the benefits and drawbacks of the individual incentive plan should be weighed before its implementation.

There are many advantages and disadvantages related to the individual incentive system. The major ones are explained below.[10,92,101]

2.1.1 Advantages Of The Individual Incentive System

Simplicity

Individual incentive plans are relatively easy to understand and to administer.[101] The mechanics of the plans are very simple and straightforward, and employees usually require minimal or no explanation.

Since the work performed by each employee is recorded individually, the calculation for his pay is very simple. Each employee's pay is simply equal to the amount of work performed multiplied by a specified pay-rate.

Fair Reward

All production employees are rewarded according to their individual performance. Better or more hardworking employees will receive more pay than lazy employees.

Therefore, penalties are self-imposed for the less effective employees.[92] However, each individual has the opportunity to earn as much as possible, in proportion to his output.

Constant Production Level

Since penalties are self-imposed on each employee for any lowering of his normal productivity, he tends to maintain a constant rate of production to protect his usual income. Therefore, the production levels of all employees are relatively consistent and predictable. This facilitates production costing, production scheduling and other production planning functions.

Production Employees Exert Maximum Effort

Individual incentives encourage production employees to perform at their best, and thereby optimize the production capacity of all the production employees. Each employee usually tries to find ways to increase his rate of output because of the potential monetary reward. Therefore, the individual incentive system provides the best potential for the highest average productivity per production employee.[92]

2.1.2 Disadvantages Of The Individual Incentive System

Does Not Motivate Non-Production Employees

Individual incentives may optimize the productivity of most production employees. However, company-wide productivity may not increase because it is dependent on both production and non-production employees. Non-production employees, such as quality control inspectors, material handlers and mechanics, are usually omitted from the individual incentive system. The major reason is that their work is usually not measured, although recent development has allowed such measurement.[77] Thus, while all the production employees are motivated to produce at their optimum capacity, non-production employees simply do what they are told. Some of them might even try to find ways to minimize or delay their work without being noticed.

Emphasis on Production Rate

Most of the incentive-motivated employees place their major emphasis on the rate of output. The maximum average production rate is usually attainable for each employee in the individual incentive system. However, as figure 2.1 shows, human physical capabilities are limited. Initially, the learning effect of each operation causes the production rate to increase quite rapidly. Upon reaching a certain point (known as the peak rate) the rate of increase can

decline. Any further exertion after the peak level can actually decrease the production rate because of fatigue or boredom.

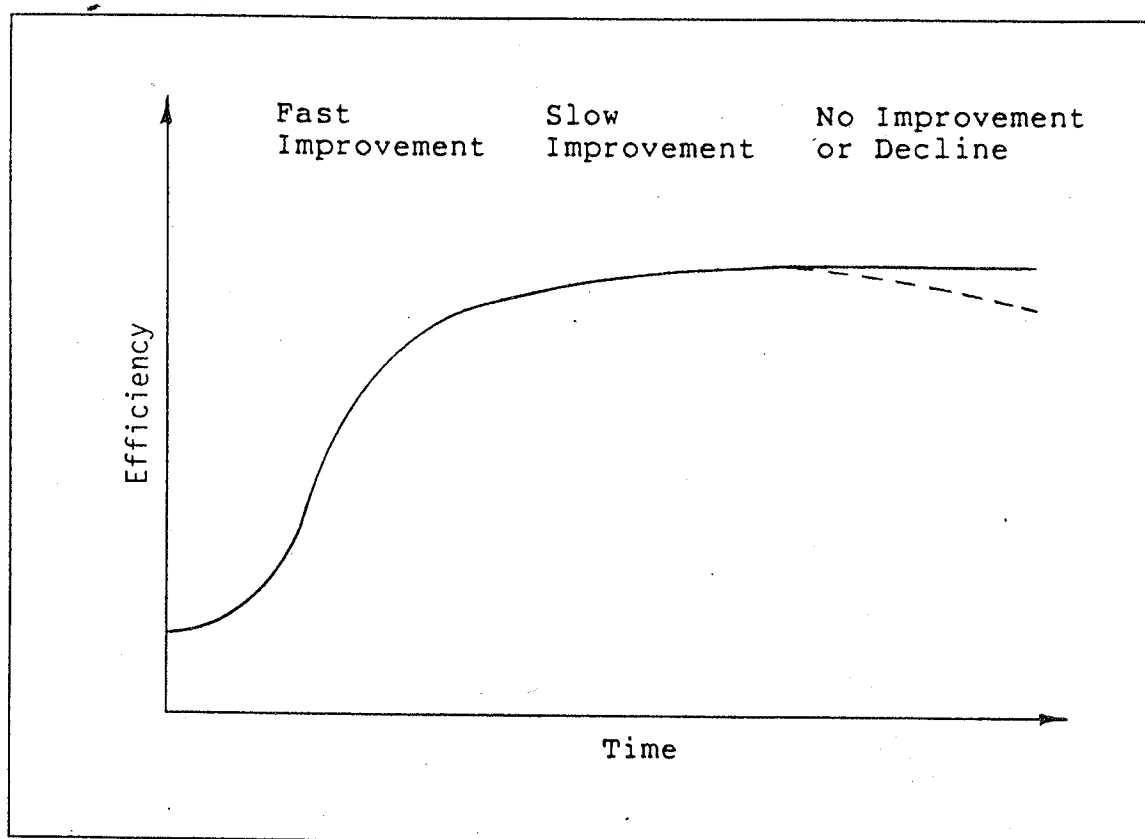


Figure 2.1: The Learning Effect of a Job

Limited consideration is given to the integral of the "quality of production" which has become of increasing importance in our modern competitive, litigative and harsh social environment. Overemphasis on production rates causes production employees to be less interested in the quality of

their output, and lessens their responsibility and creativeness. Minimally acceptable quality becomes sufficient for production employees because, they can produce more if they inspect less. Each employee tries to produce at his maximum speed, without concern about creating bottlenecks for downstream lines. Responsibility for clearing up bottlenecks fall on shop-floor supervisors. Machine wear increases since maximum permissible speeds are usually used. Material usage and scrappage likewise increase. Tight supervisory control is required to run such a shop floor efficiently. In such a setting, most employees fail to consider possible methods for improving the operation, and simply leave the job of studying work methods and recommending changes to the engineers.

The constant fight against time precludes a focus on improvement methods. Operators usually try to work "fast" rather than "smart". Minor innovations often enable operators to produce at a faster rate and/or with reduced effort. Thus, higher output can be achieved with less fatigue.

Very Secretive Working Environment

If an operator finds a work method that simplifies and quickens production, he may apply it for his gain but try to keep it secret. His intention in so doing is to maintain high production rate without having engineers or supervisors

revise the existing standard. High productivity in an individual operator is desirable, but the company benefits most when the method is shared with other employees performing the same operation.

Operator-Paced Production Rate

Since each individual can set his pace of work, the production rate is highly dependent on the operators.

Individual incentive systems impose a self-penalty for slower-than-normal production. This encourages employees to work at their normal pace in order to maintain a constant production rate for the company. Unfortunately, the self-penalty factor also produces a negative effect: a production employee may decide suddenly to work at a slow pace. Such an occurrence can interrupt the entire production line and management control is very limited.

Feeling of Insecurity

The individual incentive plan induces certain feelings of insecurity. During times of economic difficulty, the company may be forced to lay off the less efficient employees. As the cost of hiring and firing are high, this action is detrimental both to the employees and to the company.

Resistance to Change

Operators under an individual incentive system are very resistant to both technological and method changes. Most of them are preoccupied with the idea that management is trying to replace them with machines or to make them produce more while receiving limited increases in pay.

Employees also hate to transfer or take up new tasks. Employees prefer to stay on one particular job because a new job requires training and reduces the individual's efficiency.

Unfriendly and Competitive Atmosphere

Operators strongly resent supervisory interruptions because they affect their individual rates of production.

The internal competition to excel over another causes employees to become selfish and uncooperative. An employee (especially a new employee) often finds it extremely difficult to seek help from his co-worker.

Minimal Creativity

Incentive rates are usually based on time standards. The use of time standards is actually quite an inhumane and primitive way to determine employees' earnings.¹ Time

¹ This statement is highly debatable and not agreeable to most industrial engineers; it is strictly my personal viewpoint.

standards force the employees to focus primarily on their physical effort, while employees' mental potentials are basically left untapped. The lack of mental stimulation often leads employees to hate their work.

2.2 GROUP INCENTIVES

An alternative to the individual incentive system is the group incentive system. The group incentive is a more complete plan because it focuses on complete production units. Group incentives are applicable to most types of industries. However, like the individual incentive system, the group incentive system has both advantages and disadvantages.[58,92,101]

2.2.1 Advantages Of Group Incentives

Cooperative and Friendly Working Atmosphere

Since the incentives paid are dependent on the number of product units completed by the group, everyone needs to contribute his share of work to ensure constant incentive earnings. Idle time is minimized. Those employees who would be idle are obliged to busy themselves in order to blend in with the on-going activities. They may assist co-workers in their operation, material handling or inspection, or set up machines for the next production run. Each individual will do his utmost to produce more, because more output from the group means more money for the group.

Moreover, an employee in difficulty can easily obtain assistance from another employee. Willingness to help is ensured, because only the total productivity of the group is considered. An employee who is experiencing difficulty can hamper the group's productivity. Thus, employees will help each other in order to ensure a continuous, constant production rate. This inter-assistance among employees creates a friendly working environment. Employees' attitudes towards each other usually improve, not only because their earnings are dependent on the group's performance, but also because they have created a trusting, helpful and cooperative working unit.

Less Supervision

Because the peer group pressure encourages each member to perform with equal effort, the need for supervisory control is significantly reduced in the group incentive system. Unlike the individual incentive system, where employees can perform according to their mood and only individuals are penalized for unsatisfactory performance, a member performing below the usual pace in a group causes the entire group to be penalized. Thus, the psychological pressure of the peer group helps ensure constant performance.

Group leaders are usually elected to ensure that each member contributes his respective effort to the total productivity. In addition, the group leaders assist the

plant supervisors in many minor supervisory functions. The indirect supervision performed by the group leaders reduces the need for extra supervisory personnel.

Consistent Quality

Incentives paid are based only on the satisfactory output of the group. Every group member is obliged to check his own work before passing it on to the next station. Individual speed is no longer the major concern. Group incentives may not necessarily improve the quality of the output because the output quality is dependent on many factors beyond the group's control, such as insufficient training, poor material, poor equipment or bad product design.

However, product quality is usually better than in the individual incentive system. Bad jobs can be detected quickly. Members of the group can either apply pressure or offer assistance in order to solve whatever is causing the poor outputs.

Reduced Number of Persistent Slackers and Absentees

Slackers know their consequences if they slack continuously. Other employees will despise and reject the slackers, causing them to feel "outcast". Thus, the peer group pressure helps to reduce, if not eliminate, the number of persistent slackers.

Employees also know that their individual work is an integral part of the total group's performance. Each member tends to feel that he is a link in the chain of production. Employees know that their absenteeism or idling can retard the flow of production.[58] Therefore, each member knows the importance of his contribution to the group's earnings and will try to avoid idling and unnecessary absences.

Improved Information Flow

The group incentive plan encourages employees to become active in the company's plans. The employees are more knowledgeable about production plans, product designs and the overall company situation. Information regarding work simplification is shared more willingly and easily in the group. The improved information flow facilitates production planning, improves the efficiency of the company and helps to reduce backlogs.

Non-Production Employees Included

As mentioned in the discussion of individual incentive system, exclusion of non-production creates certain difficulties. However, in the group incentive plan, non-production employees can be included in the group. Their inclusion not only motivates them to perform their work more efficiently but also to use their idle time to do extra work.

Easier to Adopt Changes

Individual resistance to change in the group is not as strong as in the individual incentive system. The group can influence the individual to accept any changes whatsoever, if the majority of them favor the changes. It is easier for a group to accept changes because most changes are exercised on one operation at a time. The individual(s) involved may or may not like the changes, but group pressure can alter attitudes. As long as other members see that the change can increase group earnings, they will exert their influence on the individual to make him accept the change.

Reduce Overall Cost

The two major costs affected are supervisory costs and clerical costs. The reasons are because i) group leaders help to reduce the number of supervisory personnel, and ii) work-recording and timekeeping is simplified.[58]

Since each employee works at his most comfortable pace, scrappage level is reduced. The average overhead cost per unit is also reduced because of the group's willingness to produce more.

Other Advantages

Working in a group helps to reduce the employees' occupational stress. Unlike employees who tend to work as

fast as they can in the individual incentive system, employees in the group incentive system tend to work at their most comfortable pace.

2.2.2 Disadvantages Of Group Incentives

Necessity for Competent Leadership

In the group incentive system, the cohesiveness of the group is very dependent on the group leader and poor leadership may cause the group to disintegrate. A disorganized group causes confusion among members of the group, which in turn will affect their productivity.

The leader must also be unbiased. Each member should be treated equally, or, problems will develop within the group. Moreover, group leaders should not try to take advantage of or to exploit, the members of the group. Obviously, a group leader with all the above qualities is not easy to find.

Greater Productivity Fluctuation Possible

A disorganized group in a group incentive plan can cause a greater productivity drop than a few disorganized individuals in the individual incentive system. Confusion in an individual in the individual incentive system affects only the particular job involved, whereas in the group incentive plan, a confused group can interrupt all the operations performed by the entire group.

Difficulty in Detecting and Controlling Occasional Slackers

Since no individual penalty is imposed on the employees, the potential for occasional slackers is present. These slackers may manage to slip by the supervisors and the group leaders. However, other members of the group are bound to find out and resentment toward the slackers will develop. Once a bad reputation is established, it is difficult to reverse; it is extremely difficult to regain the trust of one's fellow members. Therefore, management is usually compelled to fire slackers.

However, there are also very clever slackers who are able to slack off undetected. This creates a serious problem because it is unfair to the other employees and it lowers the productivity of the company.

No Employee Exerts Maximum Potential

The group incentive plan does not encourage each employee to exert his maximum potential. The more highly skilled operators do not perform at their individual peak because benefits do not come directly to them, but are shared with other employees in the group. This attitude exists not only among the better employees but among almost all the employees: each employee tends to work slightly below his maximum. Another possible harmful attitude is that each employee may rely on other employees to raise the group's

earnings. If each employee relies solely on his co-workers, the total productivity can never grow. If the earnings of the better employees drop, these employees may leave the company to look for better prospects in other companies.

New Operators Are Not Welcome

Introducing a new operator into a group is like an army replacement recruit joining a veteran group. A new operator is usually less efficient, and this inefficiency reduces the total earnings of the group. Thus, if a good operator leaves and a new substitute is brought in, the cooperativeness and cohesiveness of the group may be adversely affected. Acceptance of the new operator into the group takes time and during that time the productivity of other members will decline.

Internal Competition Between Groups

Groups may start competing with each other in order to gain more earnings without concern for economical use of material, inventory control or ethical work techniques. If a group knows that there will soon be an inventory shortage on a common part, it may try to find ways to hoard these parts. Therefore, the productivity of that particular group remains constant at the expense of other groups.

Problems between interdependent groups also exist. One group may produce at a very high rate, causing a great deal

of work-in-process for another group. A slow group may affect the production rate of the immediately following group, especially if the latter group is a very fast one. The above problems cause serious difficulties in line balancing.

Other Disadvantages

The group incentive plan requires a high level of discipline and cooperation among employees. Excellent group coordination is essential for consistently smooth production. Coordination depends on the integrity of the supervisors, of the group leaders and of all the members of the group.

Chapter III

PRODUCTIVITY GAINSHARING

Japanese methods of management, especially those related to the labor productivity, have been very much admired by many other countries. Japanese employees are known to be loyal, hardworking, motivated-to-achieve and able to work cohesively. Duplication of the Japanese employees' attitude towards work is extremely difficult, if not impossible, for most other countries to achieve. The methods used in Japan may not be applicable in other countries because of the differences in culture.[15,75,82,112] However, many countries are trying to find methods to improve labor-management relation and labor productivity. The governments of many European countries encourage different forms of plantwide incentives through labor-laws and tax-incentives.

The total plantwide labor productivity improvement and better labor-management relations has led to a new incentive technique, namely gainsharing. During the last few years, the term "productivity gainsharing" has become popular among industrial engineers, industrial psychologists, and management. The more commonly used plans are the Scanlon Plan, the Rucker Plan and the Improshare Plan. All these plans incorporate the same basic concept, i.e. sharing productivity increases between employees and the company.

3.1 DIFFERENCES BETWEEN PROFIT SHARING AND PRODUCTIVITY SHARING

The term profit sharing is often confused with productivity sharing. The primary focus of both of them is to improve the performance of the company. However, profit sharing emphasizes the enterprise level while productivity emphasizes the production level.

3.1.1 Profit Sharing

Profit sharing focuses on the corporate-level performance. As the term implies, the major emphasis is on the profit attained at the end of an accounting period. The major drawback of profit sharing is that many of the factors influencing the overall company's performance, as shown in figure 3.1, are beyond the employees' control.

Because of their complexity, the various functions of an organization may be difficult for the employees to understand. This is especially significant during difficult economic times. The company's productivity may continue to increase but the employees may not be able to realize any benefits. Poor management can generate losses despite the achievement of constant productivity improvement by the employees. Therefore, direct benefits achieved through the employees' contribution are unrealizable by the employees themselves.

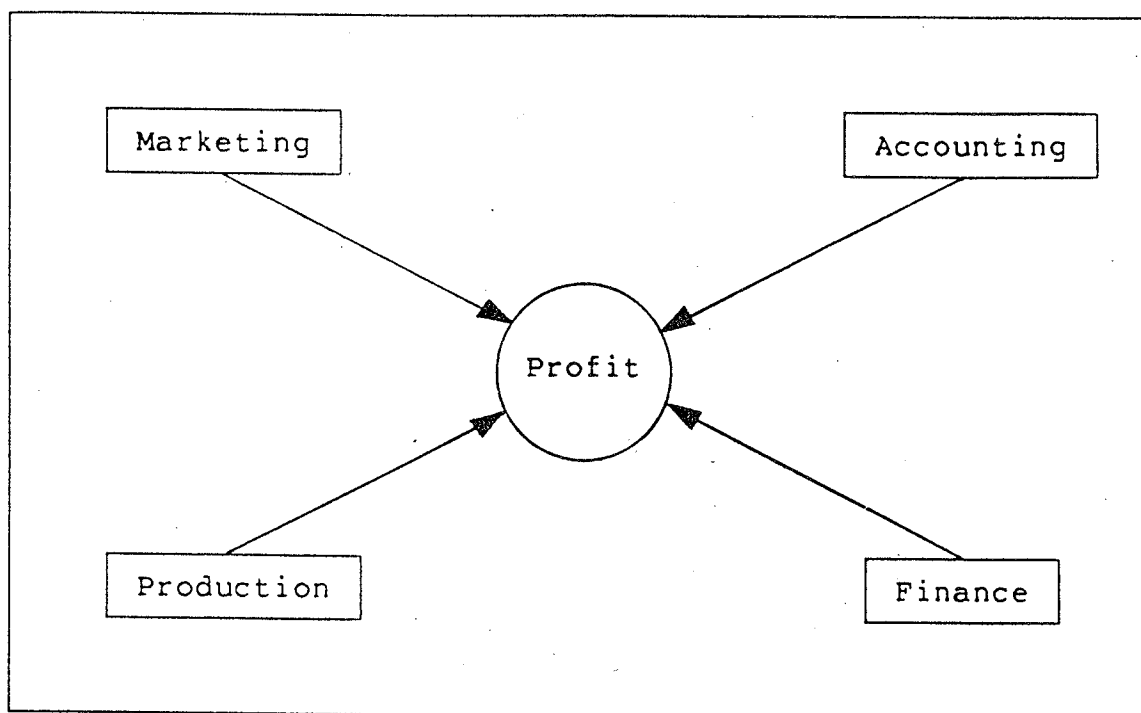


Figure 3.1: Factors Influencing a Company's Profit

The profit of an organization may not necessarily be attributed only to excellent productivity. Good financing and proper marketing are essential in achieving profits. On many occasions, the use of accounting techniques can manipulate a company's profit figures.

Most enterprises calculate their profits on an annual basis. Therefore, employees often have to wait until the end of the year to find out if there is any bonus. Bonuses, if available, are then payable either in lump sums or divided into payments at periodic intervals.

Since production is a part of the total organization function, this organizational level of incentive program links all of the enterprise's goals. This may seem beneficial to the management but employees may not be interested. Employees prefer instantaneous feedback and rewards for their individual or group performance, rather than for organizational performance.

The major benefit of profit sharing is that it helps employees to become more knowledgeable about corporate performance relative to the competitors' performance. This can help the company during times of turmoil. Every employee knows that when the future of the company is at stake, his own job is also at stake.

3.1.2 Productivity Sharing

In productivity sharing, which is a plant-wide incentive system, employees benefit from the productivity improvements attained. Bonuses resulting from productivity improvement are calculated and paid at designated periods, (monthly, for example).

Periodic bonuses not only motivate employees to improve their performance, but also provide up-to-date feedback. Poor earnings in a given period indicate to the employees that productivity problems exist.

Productivity sharing is better than profit sharing because productivity can be directly controlled by all employees. However, profit can be influenced by other organizational functions and also by factors external to the company.

Bonus calculations are usually easier for employees to understand. Numerous methods of calculation are available, ranging from the very simple to the rather complex, depending on the type of plan involved.

3.2 PRODUCTIVITY GAINSHARING PLANS

The three most common plans are the Scanlon Plan, the Rucker Plan and the Improshare Plan. Each of these plans is summarized below.

3.2.1 The Scanlon Plan

The Scanlon Plan was developed by Joseph Scanlon in 1930.[29,51,66] Its primary objective is to improve productivity through labor-management cooperation.

The three elements of the plan [66], as shown in figure 3.2, are :

1. To develop organizational identification.
2. To promote labor involvement.
3. To share productivity gains attained.

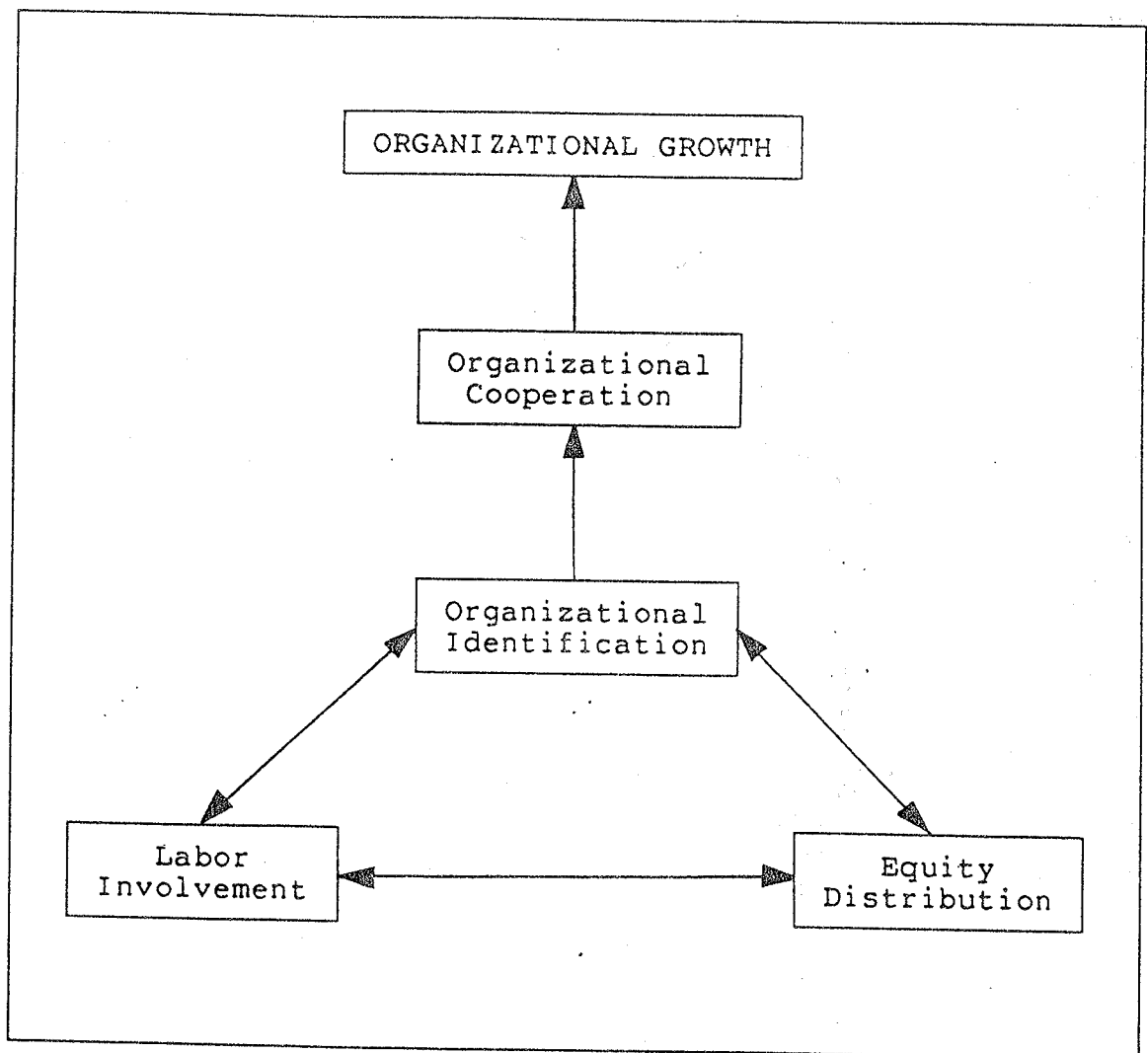


Figure 3.2: The Three Elements of the Scanlon Plan

The first element, organizational identification, is divided into corporate identification and individual identification. Corporate identification primarily refers to the definition of the company's goals and objectives. Organizational plans, problems, opportunities and competitiveness position relative to other companies are also part of the corporate identity. Information on all these factors is shared with the employees. This allows the employees to understand the company's position better and to assist in achieving corporate goals. The objective of the individual identification process is to instill a feeling of entity, awareness and purpose in each employee toward the organizational system. The organizational identification element promotes better understanding between labor and management, and ensures integrity in the system

The second element, employee involvement, enables and encourages all employees to participate in organizational activities. The purpose of employee involvement is to establish personal opportunities to comment on, and to suggest ways of improving certain productivity issues. Figure 3.3 shows how the suggestions process works. Production committees, consisting of foremen and elected employees, are formed for each department to stimulate participation and suggestions for improving productivity. Production committees are authorized to approve and implement minor suggestions affecting only the department

concerned and requiring little expenditure. Interdepartmental and expensive changes are referred to a screening committee, which is composed of elected members from management and the production committees. In addition to evaluating suggestions, the screening committee is responsible for communicating issues to labor and management, and reviewing monthly performance.[66]

The involvement process leads each individual to reexamine his work. This re-examination helps to increase the quality of outputs while reducing costs. Constant reinforcement is used to orientate employees towards the definition and eventual solution of existing problems. According to McGregor's Theory Y, each individual, when given opportunity and responsibility, will inherently become more motivated towards his work.[29] The involvement system encourages each individual to work "smarter" rather than "harder". If the involvement system is fully embraced by every employee, the potential for productivity improvement is enormous.

The last element, sharing the productivity gain, is the most important motivational drive. All the employees expect a reward for their invested effort. The bonuses distributed are dependent on the productivity increase over some base reference period.

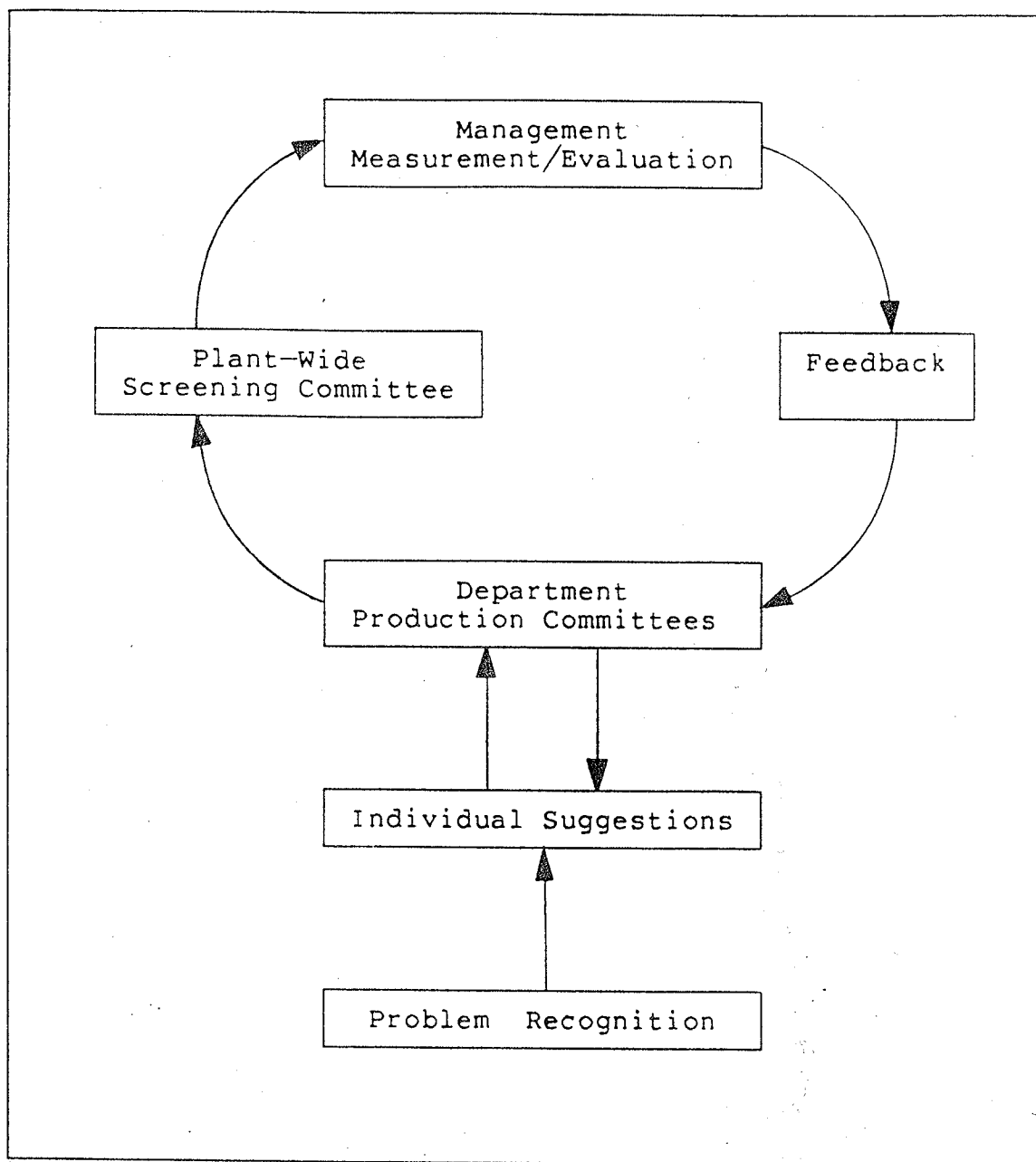


Figure 3.3: The Involvement System Process
(adopted from ref.#73, p.191)

The most commonly applied formula for calculating the base ratio is as follows [66]:

$$\text{Base ratio} = \frac{\text{Labor Costs}}{\text{Sales Value of Production}} \quad (3.1)$$

This base ratio is usually determined by averaging the historical data of the company.

The simplest form is the single-ratio formula. An example of the single-ratio method for calculating a typical Scanlon Plan bonus is shown in figure 3.4. The percentages of the allocated bonus pool for the company, employees and reserve for deficit months depend on the policy of the individual company. The suggested percentages are: 25% for the company and 75% for the employees.[66] Twenty-five percent of the bonus allocated to the employees is placed in a reserve pool. The reserve pool is used to smooth out deficit months. The accumulated amount, if positive, is usually distributed at the end of the year. If the amount is negative, the company absorbs it completely.

The simple Scanlon formula proved to be incomplete, because many companies have multi-product lines. Each different product has correspondingly different labor costs. Therefore, a complex formula, also known as the split-ratio formula, is used. A sample calculation for a two product-

1) Sales	\$1,100,000
2) Less: Sales returns, allowances and discounts	25,000
3) Net sales	1,075,000
4) Add: Increase in inventory	125,000
5) Value of production	1,200,000
6) Allowed payroll costs (#5 X .20)	240,000
7) Actual payroll costs	210,000
8) Bonus pool	30,000
9) Company share (25% X #8)	7,500
10) Subtotal	22,500
11) Reserve for deficit (25% X #10)	5,625
12) Employee share (#10-#11)	16,875
13) Participating payroll	168,750
14) Bonus percentage (#12/#13)	10%

Figure 3.4: Typical Scanlon Plan Bonus Calculation
 - For Base Ratio = 0.20
 (adopted from ref.#66, p.71)

mix company is shown in figure 3.5. As the product-mix increases, the calculation of bonuses can become very complicated, making it extremely difficult for employees to comprehend.

	<u>Single Ratio</u>	<u>Split Ratios</u>		
	<u>Typical One ratio</u>	<u>Product A</u>	<u>Product B</u>	<u>Total</u>
Sales value of production	\$1,800,000	\$1,200,000	\$600,000	\$1,800,000
<u>Allowed payroll costs :</u>				
One ratio: 20%	360,000			
Split ratio				
10% Product A		120,000		
20% Product B			180,000	300,000
Actual payroll	300,000	140,000	160,000	300,000
	<u>60,000</u>	<u>-20,000</u>	<u>20,000</u>	<u>0</u>

Figure 3.5: Bonus Calculation for a Two-Product Mix
(adopted from ref.#66, p.75)

3.2.2 The Rucker Plan

The Rucker Plan, developed by Allan W. Rucker in 1932, is based on the value added concept, similar to cost accounting except that it is used here to measure productivity improvement.[31,66] The Rucker Plan is slightly more involved than the Scanlon Plan because the labor, material, supplies and other production-related costs are accounted for. Figure 3.6 shows an example of the bonus calculation. The method of calculating base ratios is similar to that of the Scanlon Plan. The major difference is that materials,

supply as well as other non-labor production expenses are subtracted from the value of production to obtain the value added. Bonus calculation thereafter is similar to that of the Scanlon plan. The company share under the Rucker Plan is usually 50%. [49]

1) Sales		\$ 900,000
2) Less: Sales returns, allowances and discounts		25,000
3) Net sales		875,000
4) Add: Increase in inventory		125,000
5) Value of production		1,000,000
6) Less: Purchases		
Material & supplies	\$500,000	
Other costs	160,000	660,000
7) Value added (#5-#6)		340,000
8) Allowed labor costs (#7 X 41.17%)		140,000
9) Actual labor costs		120,000
10) Bonus pool (#8-#9)		20,000
11) Company share (50% X #10)		10,000
12) Employee share (#10 - #11)		10,000
13) Reserve for deficit (20% X #12)		2,000
14) Bonus pool (#12 - #13)		8,000
15) Participating payroll		80,000
16) Bonus percentage (#14/#15)		10%

Figure 3.6: Typical Rucker Plan Bonus Calculation
 - For Base Ratio = 0.4117
 (adopted from ref.#66, p.81)

This plan provides a more reliable measure than the Scanlon measure of payroll dollars per dollar sales value because, under the value-added method, the value of all purchased materials are excluded.[25]

3.2.3 The Improshare Plan

Improshare, meaning "improved productivity through sharing", was developed by Mitchell Fein in 1974.[24,66] Unlike the Scanlon Plan and the Rucker Plan, the Improshare Plan measures productivity gains in employee-hours instead of in dollars.

Improshare is a work-measurement-based plan. The standard hours required to produce one unit of product can be easily determined for the production employees through time-study techniques. However, a production system involves non-production employees also. Improshare uses the Base Productivity Factor (BPF) to relate total employee-hours (production and non-production hours) to standard production hours. The BPF is obtained by dividing the total production and non-production hours by the total standard production hours, as expressed below :

$$\text{BPF} = \frac{\text{Total production and non-production hours worked}}{\text{Total standard hours produced}} \quad (3.2)$$

Figure 3.7 shows the derivation of the BPF for a two-product company. The BPF is applied as a scaling factor to all engineered production time to obtain the total standard hours required for the products. The BPF represents the total clock hours required during the base period to produce one standard hour of product in the production system.

<u>Production Hours</u>		
	<u>Product A</u>	<u>Product B</u>
Standard production hours per unit	5	8
Units produced	80	50
Total standard production hours = (5 X 80) + (8 X 50)		
= 800		
 <u>Non-Production Hours</u>		
Non-production employees : 10		
Hours worked per employees : 40		
Total non-production hours = 10 X 40		
= 400		
 <u>Base Productivity Factor</u>		
BPF = (800 + 400) / 800		
= 1.5		

Figure 3.7: Improshare BPF Calculation
(modified from ref.#49, p.24)

The bonus calculation uses the BPF to determine the total number of standard hours. The total standard hours are obtained by multiplying the standard production hours by the BPF. The difference between actual hours and standard hours represents the productivity gain. The productivity gain is translated into dollar-value by multiplying each payroll by the percentage gained. Figure 3.8 shows an example of the bonus calculation. Productivity gains are shared equally between the company and employees (50% each) because both parties contribute changes toward productivity improvement.

All such operational changes, contributed by either the management or the employees, cannot change the established standards. However, standards can be changed when new equipment or technology is adopted. Capital equipment and technology gains are shared 80/20. Eighty percent of cost savings attributed to the changes is subtracted from the measurement standards and 20% is left in. This 20% is then shared 50/50 between the company and the employees. Thus, management is actually receiving 90% of the gains.

An agreed-upon ceiling is used to control productivity earnings. Earnings above the ceiling are banked for future periods. Figure 3.9 shows an example of the banking method for a ceiling of 30%. A lump sum cash payment is used to buy back the measurement standards if they continue to exceed the ceiling consistently.

Unit produced :

Product A - 100
 Product B - 70

Base Productivity Factor, BPF = 1.5

Total employee hours = 1200

Bonus Calculation

1) Standard hours	
Product A (100 units X 5 hours X 1.5)	750
Product B (70 units X 8 hours X 1.5)	840
2) Total standard hours	1590
3) Total actual hours	1200
4) Hours gained (#2 - #3)	390
5) Company share (#5 X 50%)	195
6) Employees share (#4 - #5)	195
7) Percentage additional pay (#6/#3)	16.25%

Figure 3.8: Bonus Calculation for Improshare
 (modified from ref.#49, p.25)

Under the Improshare Plan all benefits and wages are protected. Normal pay for the employees remains the same; only the bonuses fluctuate.[24]

(1) Period (Week)	(2) Actual Hours	(3) Improshare Hours	(4) Cumulative Actual	(5) Cumulative Improshare	(6) Excess (Banked) Hours	(7) (5)+(6)	(8) Hours Saved (7)-(4) 100%	(9) Hours Saved (7)-(4) 50%	(10) Employee Productivity Share (9)/(4)
1	360	490							
2	380	700							
3	360	500							
4	350	410	1450	2100		2100	650	325	22.4%
5	380	760	1470	2370		2370	900 882	450 441	30.6% 30% Adjusted
6	400	480	1490	2150	18	2168	678	339	22.8%
7	370	550	1500	2200		2200	700	350	23.3%

Figure 3.9 : Improshare Bonus Calculation with the Ceiling Effect
 (Ceiling = 30%)
 (From ref.#49, p.25)

3.3 EMPLOYEE STOCK OWNERSHIP PLAN

Another commonly used plan to encourage employees to work and to be committed to the company is the employee stock ownership plan.

Traditionally, the corporation role and benefits of employees and stockholders is as shown in figure 3.10. Employees are compensated with wages and other benefits for their investment of time, talent and energy, and stockholders are compensated with dividends for their financial investment.

This traditional method of operation does not provide enough incentives for employees to feel committed to their company. However, the employee stock ownership plan allows employees to become financial partners. All employees can invest in the "employee stock ownership trust".[46,64,88] Their financial investment not only increases the working capital of the company, but more importantly instills more commitment from employees. Since it is a known fact that owners of any company usually work harder, the employee stock ownership plan is designed specifically for that purpose.

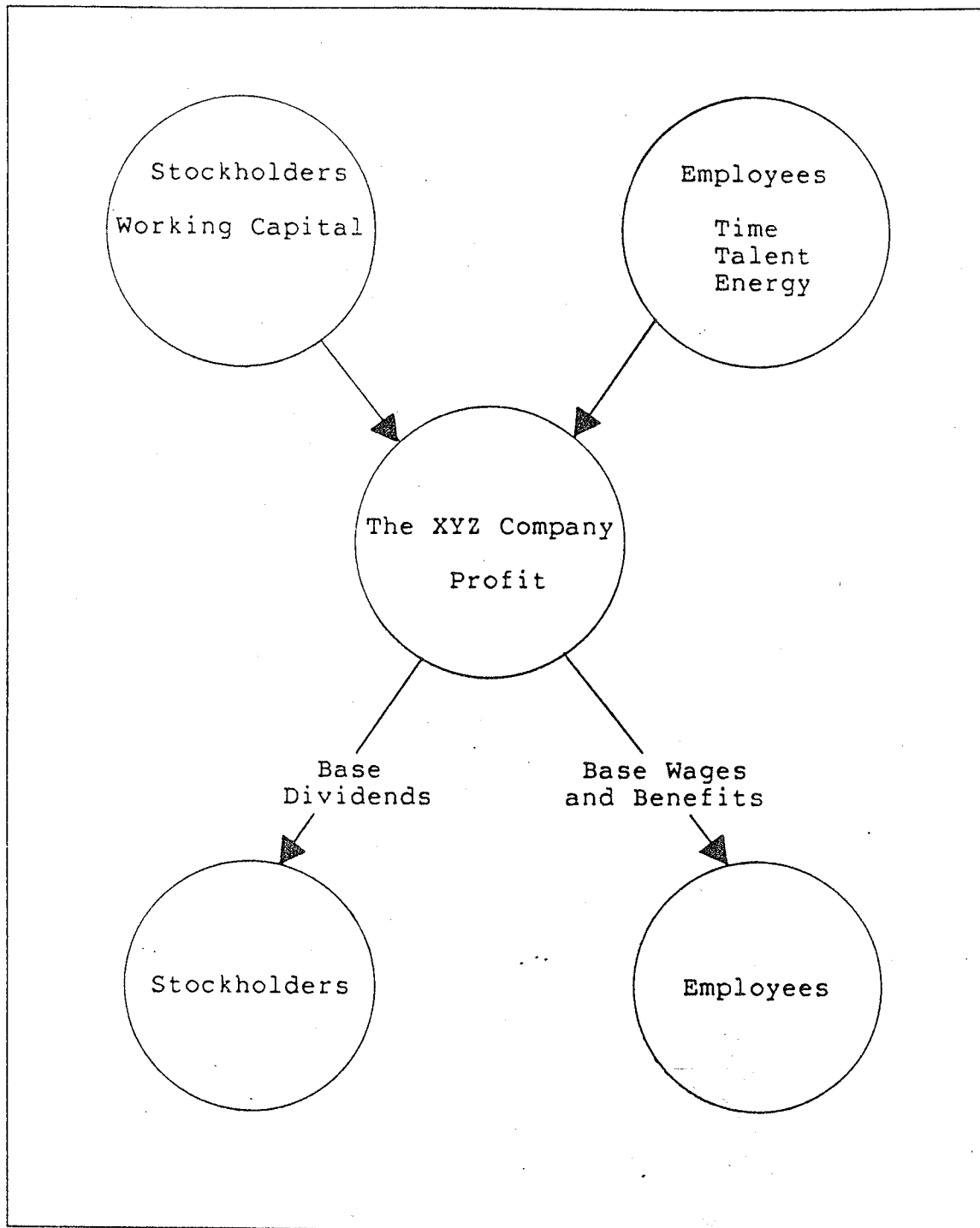


Figure 3.10: Traditional Role and Benefits of Employees and Stockholders
(modified from ref.#64, p.217)

Chapter IV

THE HYBRID PLAN

Since each incentive system has its own merits, it is not easy to determine which incentive system is the most appropriate for a particular company. Different companies have different preferences in incentive systems. Hence, most companies modify these standard incentive systems to suit their specific requirements.

Productivity gainsharing is perhaps the most complete type of incentive system. All of the commonly used gainsharing plans, as demonstrated in the previous chapter, have their definite and unique merits. It is desirable, therefore, to develop a plan which would incorporate the best features of each individual plan.

The main contribution of this thesis is the development of the proposed "Hybrid Plan". The Hybrid Plan basically selects the best features from the Scanlon Plan, the Improshare Plan, profit sharing and the employee stock ownership plan in order to come up with a more flexible and useable plan. Figure 4.1 shows an overview of all the features borrowed from the different plans.

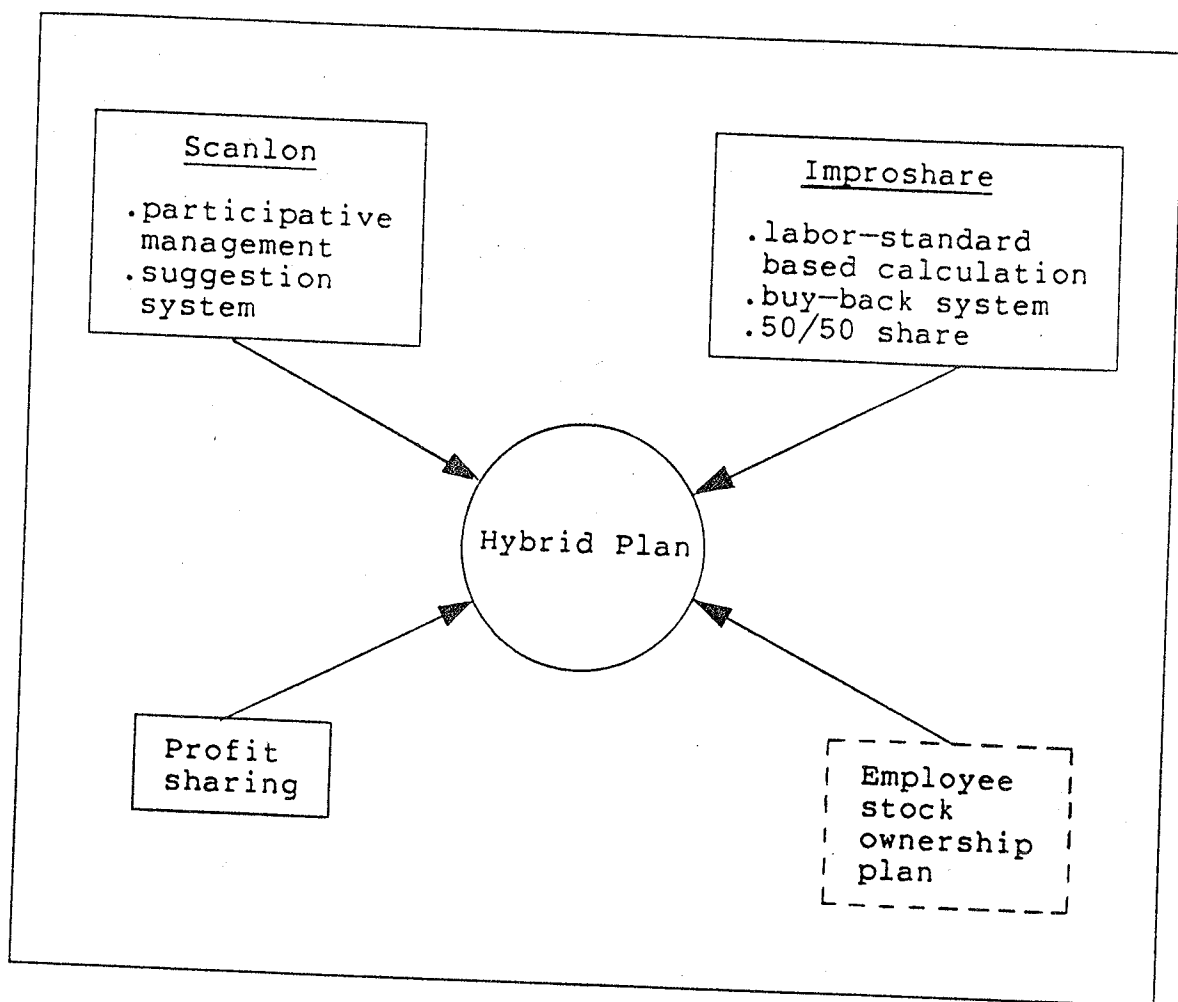


Figure 4.1: Overview of Selected Features of Other Plans Used in the Hybrid Plan

4.1 HYBRID PLAN OVERVIEW

The primary objective of our proposed new plan is to establish full commitment from all employees towards productivity improvement. Both non-financial and financial incentives are used to accomplish this objective. Figure 4.2 provides a general view of the different components required. .

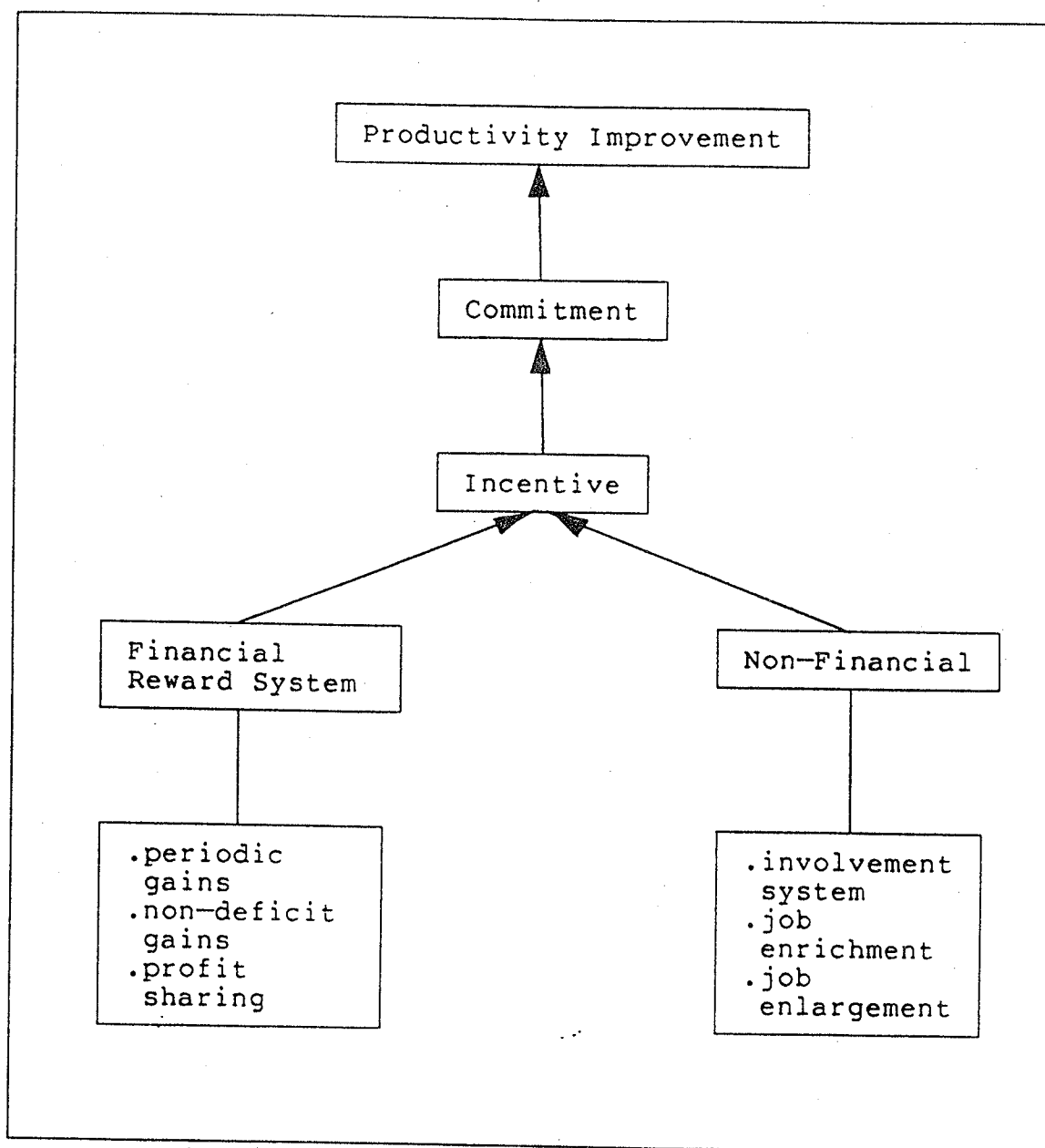


Figure 4.2: Components of the Hybrid Plan

The major non-financial incentives are the involvement system, job enrichment and job enlargement. The involvement system is aimed at encouraging employees to participate in

productivity improvement decisions and to develop better communication with management. This participation enhances the employees' sense of usefulness and worth. Job enrichment and job enlargement are used to make employees' jobs more interesting and challenging. Promotion and individual recognition are not encouraged in this plan because they can engender jealousy among employees. Individual contributions are however rewarded through the third part of the reward system, as explained below.

Financial incentives are divided into three parts: this three-part reward system is the essence of the Hybrid Plan. (A brief overview of the three-part reward system is summarized below; details are explained in chapter seven.)

The first part of the reward system is based on direct productivity improvement. The productivity of each period is evaluated against a standard base. The gains attained are translated into money rewards. A certain percentage of the gain is placed into a reserve pool, explained later, with the remaining amount shared between employees and their company. This is aimed at encouraging employees to devise methods of improvement and to maintain a consistent and continuous effort.

The second part is based on the accumulated reserve pool, whose purpose is to ensure a continuous effort among employees to maintain or to improve their productivity. Any

loss of productivity reduces the reserve pool, a result which is undesirable for the employees. The accumulated gains are shared by the company and the employees. However, if the accumulated amount is negative, the entire loss is absorbed by the company. The purpose of this complete loss absorption is to demonstrate to the employees that the plan is indeed favorable to them.

While the first two parts are features of existing productivity gainsharing plans, the third part is new and unique to the Hybrid Plan. A point system is established. The purposes of the point system is to retain experienced employees, to reduce absenteeism, to encourage suggestions and to promote a sense of ownership. Different point values are assigned to each employee depending on his seniority, attendance record and contribution of suggestions. The points assigned for seniority act as "phantom stocks". These points increase each year. In contrast, points for attendance and contribution are not cumulative; they are reset to zero at the beginning of each year. The points accumulated by each employee determine his respective share of the assigned percentage of the company's profit. The percentage assignable from the company's profit can vary between 10 to 30 percent, depending on the company. It is an additional bonus, because production is just one of the many factors contributing to the company's profit.

4.2 FEATURES OF THE HYBRID PLAN

The main features of the Hybrid Plan are :

1. Simplicity
2. Plantwide motivation
3. Reduced hierarchy
4. Fair reward
5. Multiple factor measurement

4.2.1 Simplicity

This feature is one of the most important for the employees. A plan must be well understood by all employees in order to gain their trust and confidence. The method of calculating productivity indexes and bonuses is simplified to the lowest order. Employees must feel secure with the plan. The plan cannot function effectively if the slightest mistrust or doubt exists. A simple plan also reduces the time spent in explaining the plan to employees.

4.2.2 Plantwide Motivation

Under a plantwide motivation system, all production and non-production employees are considered as one working unit. Fabricators, assemblers, quality inspectors, material handlers and maintenance crews are all essential to the production of the end-products.

The primary objective of this feature is to promote company-wide cooperation and coordination. Under such conditions, employees know that helping their co-employees is beneficial to all. It is more desirable for the entire workforce to work as a single unit, rather than as separate individuals. Working as a single unit helps to eliminate unnecessary and harmful internal competition. Production employees are encouraged to perform at their most comfortable speed while non-production employees ensure that all the works are properly channelled, equipment is functioning efficiently and the quality of output is consistent.

Plantwide motivation can also reduce the number of quality-control inspectors. Since all employees are producing at their most comfortable pace, they usually ensure that the quality of their work is acceptable. They also understand that poor quality work could affect all their lines downstream, which in turn would adversely affect the total productivity of the company. Since every employee is working towards plantwide productivity, individual employees are more willing to help and to share ideas with their co-workers. This is especially beneficial to new employees, as they can obtain assistance easily and can learn various work-simplification techniques from more experienced employees.

Supervisory personnel are included in the working unit. Their roles are essential in maintaining a smooth, continuous flow of all floor operations and in assisting employees with any difficulties that may arise.

4.2.3 Reduced Hierarchy

This feature is commonly used in Japanese companies. The main purpose of reduced hierarchy is to promote more communication between the different levels of management and employees. Traditionally, decisions are made by upper management and transferred down through various middle management levels. This form of management is known as directive management system. Another form of decision-making process, known as participative decision-making is gaining wide popularity now. The major difference between directive decision-making and participative decision-making, as shown in figure 4.3, is that employees are allowed to intervene in the decision-making under the participative system, whereas employees just follow orders made by the management in the directive system. The directive system can also cause information to be diluted, changed or lost when transferred through the various management levels.

The reduced hierarchy of the Hybrid Plan is based on the participative management system. In the reduced hierarchy management structure, management is divided into two levels:

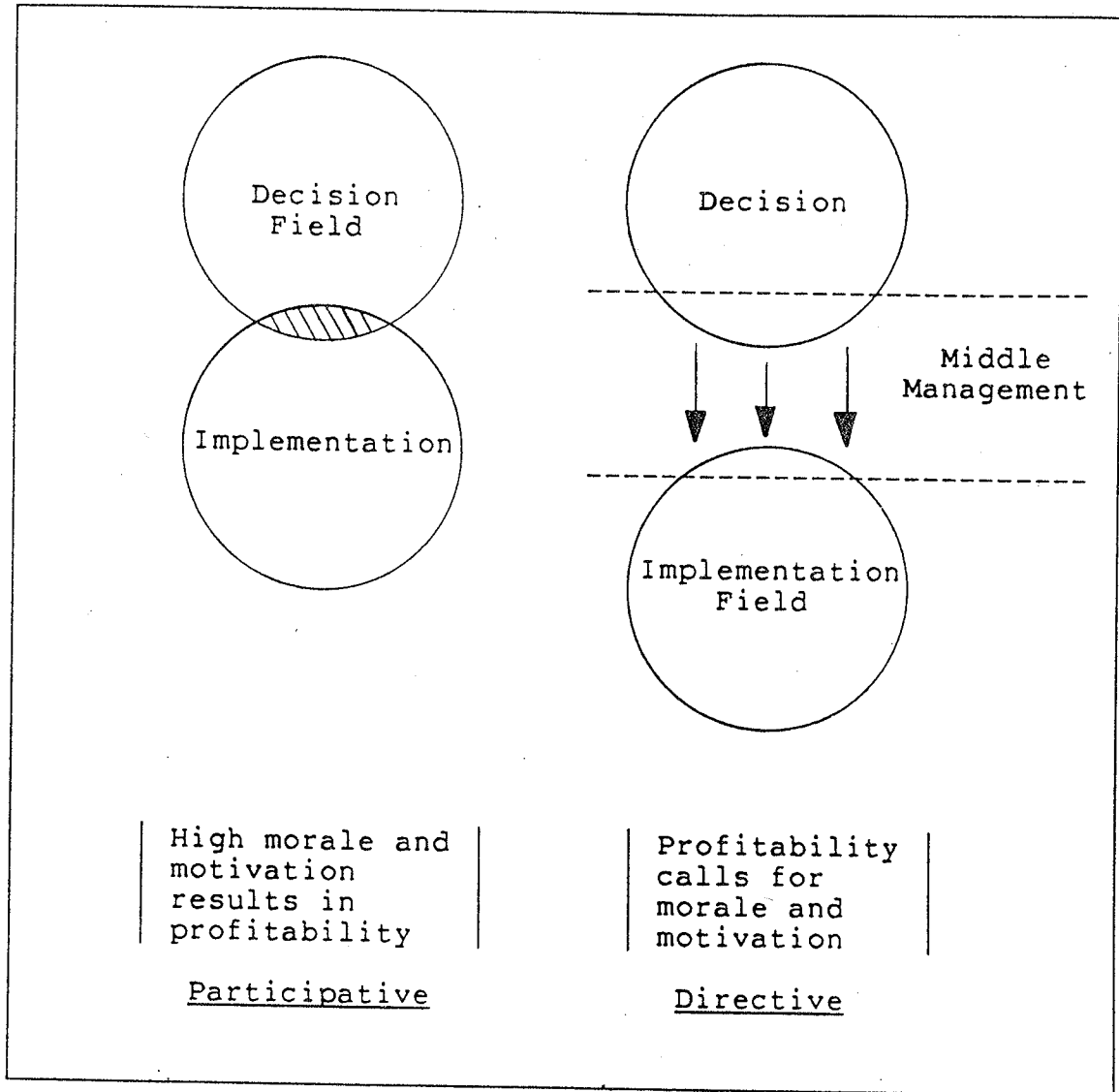


Figure 4.3: Participative versus Directive Decision-Making
(adopted from ref.#85, p.78)

the corporate level and the production level. The corporate level is responsible for all major corporate decisions such as policy making, financial strategy and marketing strategy. The production level, which includes the production manager, engineers, supervisors and all employees, is concerned only with the productivity of the company.

All production decisions are made by the production team, which is made up of elected members from management and the workforce. This method of decision-making reduces the risk of losing information and leads employees to accept decisions more readily. In addition, decisions generated by this group are generally more sound because making decisions jointly allows employees and management to understand each other's potentials and limitations.[66]

The reduced hierarchy structure also promotes better interaction between labor and management. Because it encourages the two groups to become acquainted with each other on a personal level, labor-management relations are improved. Thus, the end-benefits are improved productivity and reduced labor-management tension. The reduced hierarchy structure also enhances the effectiveness of the participative management process, which is discussed in the next chapter.

4.2.4 Fair Reward

All employees expect a fair reward for contributing extra effort. Therefore, fair rewards are essential to stimulate and to encourage all employees to contribute continuously. This fair reward feature is a feature adopted directly from the Improshare Plan. Productivity improvements are shared on a 50-50 basis between employees and the company. A

different percentage distribution might seem unfair both to employees and to the company, because both parties contribute to productivity improvement. It is usually very difficult to determine who contributes more.

Employees are encouraged to provide on-going suggestions for improving existing work methods. These contributions can be translated into rewards: employees receive 50% of the savings achieved through their suggested improvements while the company receives the remaining 50%. Since management is continuously trying to increase plant efficiency by modifying plant layouts, improving work techniques and implementing minor modifications to equipment, they too make significant contributions to productivity improvement. Therefore, even if individual employees are not able to contribute any direct improvements they still benefit.[24]

The financial benefits resulting from such suggestions and changes make it easier for employees to accept the changes. Employees understand that changes are beneficial both to the company and to themselves, and will eventually become tangible in terms of bonuses.

Fair reward is essential to prevent employees' feeling being exploited or unfairly treated. Any unfairness perceived by employees can be extremely detrimental to the entire plan.

4.2.5 Multiple Factor Measurement

Most productivity gainsharing plans consider only the labor utilization factor. Labor improvement, however, is not the only way to improve productivity. Material usage, supplies, utilities and maintenance are all essential to the production of a single unit of output. Productivity is considered to be improved even if the labor cost remains constant, provided all or some of these other costs are reduced.[96]

The use of multiple factor measurement ensures that all important factors contributing to productivity improvement are considered. Figure 4.4 shows the flowchart for developing the multi-factor measurement technique.[34]

The selection process begins with the identification of all the company's productivity contributing factors. It is important to note that increasing the number of factors makes the calculation process more complex, which is counter to the purpose of the first criterion. Therefore, a careful selection and evaluation is important. A maximum of three or four factors should be sufficient. All factors are evaluated according to their importance. The more important factors are implemented in the plan first. It is often appropriate to begin the plan with the two major factors, namely the labor and material utilization factors. These two factors are inter-related and usually contribute most to

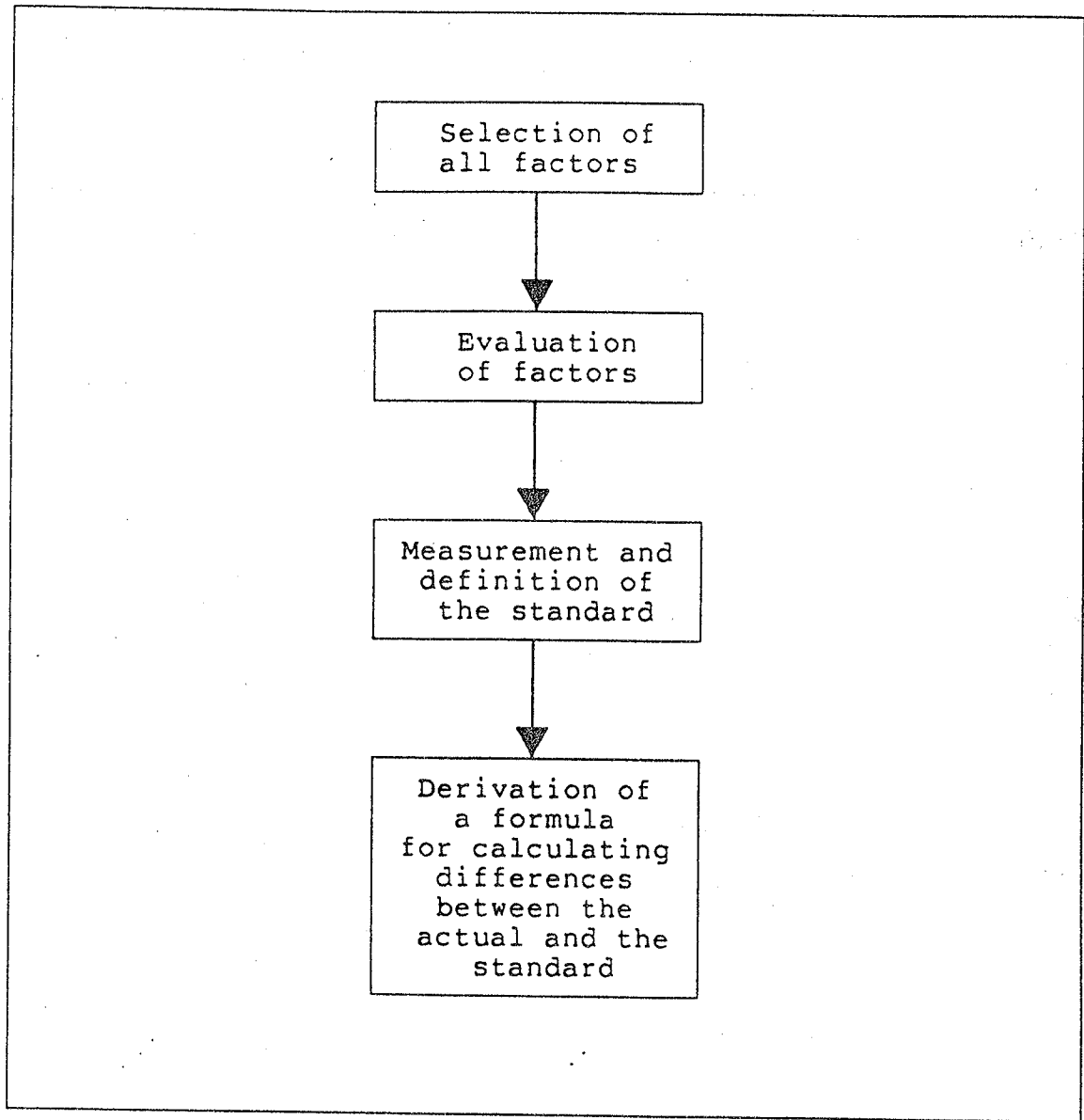


Figure 4.4: Multi-Factor Measurement

the reduction of production costs. As the plan progresses and employees gain a better understanding of the plan, additional factors may be added one at a time.

Past measurements or engineered standards can be used to establish the standards for each factor. The method of standard setting is dependent on corporate history and policy. A highly modern enterprise may seek more sophisticated techniques than a traditional enterprise. No matter which technique is used, management should ensure that employees understand the derivation of all standards used in the productivity formula.

Chapter V

MECHANISM OF THE HYBRID PLAN

5.1 EMPLOYEE INVOLVEMENT

This mechanism employs features from the Scanlon Plan, which identifies the importance of employee participation in total plant operations. Employee involvement can create team effectiveness and congruence, both of which are extremely important to a successful gainsharing plan.[86]

In the Hybrid Plan, employees are given complete freedom to express their viewpoints. Management should be open to criticism. The purpose of this approach is to reduce the chasm between management and employees. All members of the company must be treated as equal human beings: no one should be ranked above others. The only difference between management and employees is that they are responsible for different functions within the company. The involvement system improves labor-management relations because hidden antagonism is reduced. Open communication enables both management and employees to understand each other better and to solve problems more effectively. Figure 5.1 demonstrates this interaction process between management and employees.

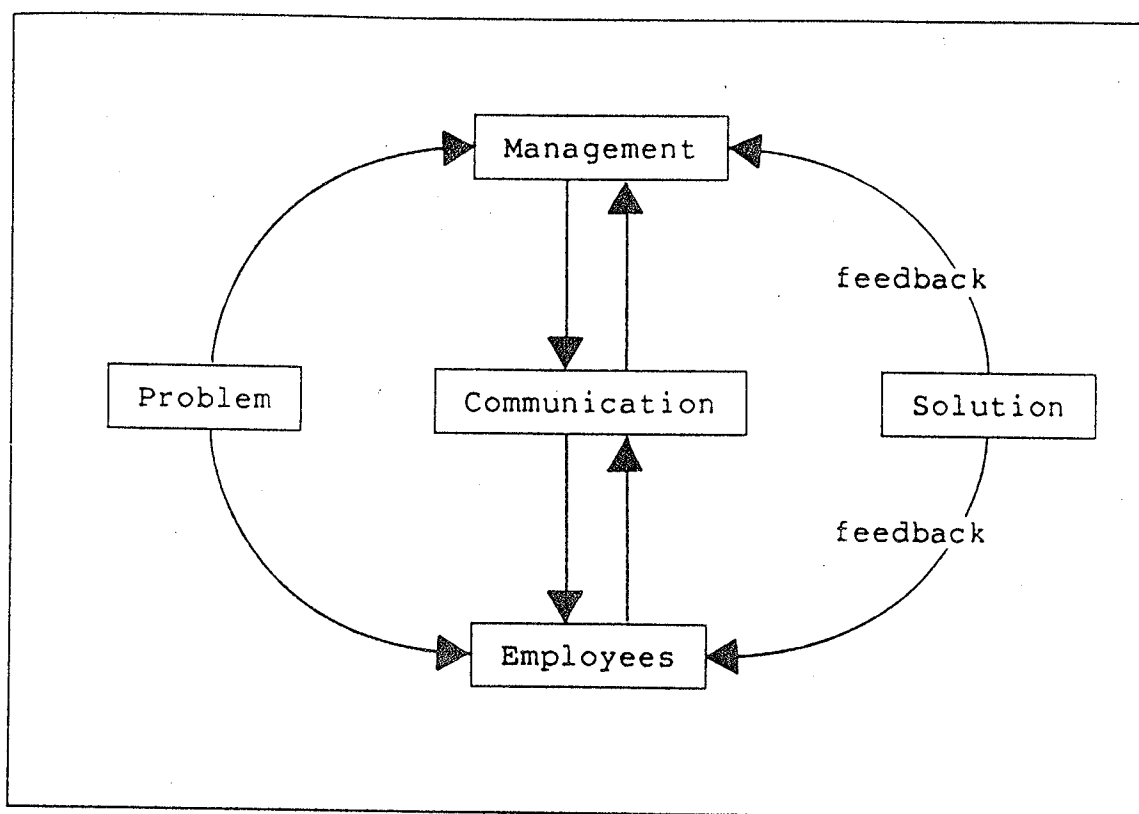


Figure 5.1: Interaction between Management and Employees in the Problem Solving Process

The involvement process encourages all employees to think, to suggest changes and to assume responsibilities. Since it is the employees who best understand the nature and the intricacies of their work, they can easily detect any inefficiency in their work method and can suggest possible improvements. All suggestions should be brought to the supervisor or to elected members of the workforce. Each suggestion is then recorded immediately and then evaluated during a special meeting of the productivity team composed

of management and elected members of the workforce. Suggestions that are accepted and approved should be implemented as soon as possible. All rejected suggestions must be reviewed by industrial engineers. If the suggestions are still infeasible or inappropriate, industrial engineers should explain the reasons to those who made the suggestions. This might be considered a waste of time but it is essential to help employees to regain confidence in their suggestions. Rejection tends to deflate employees' confidence and motivation. Thus, proper personal communication may benefit those employees affected.

Group suggestions are encouraged because greater cost savings are usually realizable. Both production and non-production employees are encouraged to discuss the possibility of improving their overall efficiency instead of simply the efficiency of an individual's work task.

Employees' involvement is a voluntary measure. In this plan, a point system is used to encourage suggestions. Points are given for all suggestions, whether the suggestions are approved or not. This is to encourage all those whose suggestions are rejected to continue their contributions. The value of the points depends on the usefulness of the suggestions and on realizable cost savings they would make possible. Figure 5.2 shows a typical example of the different values assignable to various

classes of suggestions. Since it is possible for an individual employee to submit a large number of infeasible suggestions to accumulate points equivalent to a suggestion of large economic benefit, points are only allocated to a limited number of infeasible suggestions (e.g. a maximum of 3) per employee per year. All subsequent infeasible suggestions cannot earn any points. The points accumulated by each employee are used to calculate his annual bonus. Detailed calculation of the annual bonus distribution is discussed in chapter seven.

Point Value	Characteristic of Suggestions
10	Infeasible
10 - 100	Minor changes with little economic benefit
100 - 200	Changes with reasonable economic benefit
> 200	Changes with large economic benefit

Figure 5.2: Typical Point Value Assignable to Different Classes of Suggestions

A list of possible methods designed to increase and encourage the contribution of useful suggestions by employees is outlined in figure 5.3.[79]

Methods ... Can you

1. Simplify present procedures ?
2. Eliminate any unnecessary operations ?
3. Simplify your own job ?
4. Suggest new methods ?

Machinery or Equipment ... Can you

1. Simplify any machines or equipment ?
2. Improve machine output ?
3. Improve design or construction ?
4. Improve quality ?
5. Reduce machine setup time ?
6. Reduce machine down time ?
7. Reduce maintenance time ?
8. Change the machine, flow of work or storage of materials and supplies to simplify your job ?

Materials ... Can you

1. Simplify handling ?
2. Speed delivery ?
3. Find use for scrap ?
4. Reduce scrap, waste and spoilage ?
5. Reduce costs ?
6. Eliminate delay ?
7. Suggest alternative materials ?

Figure 5.3: Ideas for Generating Productivity Improvement Suggestions

Paper work ... Can you

1. Reduce, combine or simplify filing ?
2. Eliminate unnecessary reports ?
3. Eliminate duplicate work ?
4. Reduce chances of error ?

People ... Can you

1. Help train a new employee ?
2. Combine your operation with another employee ?
3. Help a fellow employee with a difficult task ?

Interdepartmental ... Can you

1. Suggest ways to improve another department ?
2. Cooperate or merge operations with another department?

Product ... Can you

1. Find ways to improve existing product design ?
2. Reduce any unnecessary work or parts ?
3. Suggest new products ?
4. Obtain any users suggest improvements ?

Figure 5.3(continued): Ideas for Generating Productivity
Improvement Suggestions
(modified from ref.#79, p.211)

5.2 THE PRODUCTIVITY TEAM

The productivity team is similar to the production and screening committees suggested in the Scanlon Plan. The only difference is that the two committees are combined into one entity instead of two entities. The primary function of the productivity team is to find new methods of improving productivity.

The team is made up of members of the workforce and management. Members of the workforce include supervisors and elected representatives of the employees. It is essential to allow most employees to become a representative at least once in their career. This helps them to understand the functions of the team and the mechanisms of the plan better. Rotating employees is the best method of accomplishing this objective. Creative and experienced employees should be encouraged to become representatives more often.

The functions of the supervisors and the elected representatives in the shopfloor are :

1. To encourage suggestions
2. To record all suggestions
3. To discuss and evaluate suggestions
4. To assist in the implementation of approved ideas.

The evaluation of each suggestion is conducted by the entire productivity team. This method eliminates bias, ensures careful screening and promotes better communication. During the evaluation, the productivity team can come up with other ideas for improvements or can integrate several different suggestions.

5.3 REWARD DISTRIBUTION

Rewards are distributed only to established participating employees. New employees must undergo a probationary period before they are eligible to share the gain.[66] The purpose of the probationary period is to protect the bonuses receivable by all the participating employees. New employees usually have to go through a learning period during which their productivities are usually low and can therefore drag down the total productivity of the other employees. Figure 5.4 shows a typical effect on the combined productivity of a participating employee and a new employee. Since it is very rare to have a one-to-one correspondence between a new employee and every participating employee, the relative position of the combined line will shift up or down depending on the ratio of new employees to participating employees.

As mentioned in chapter four, the Hybrid Plan consists of a three-part reward system. The first two parts are based

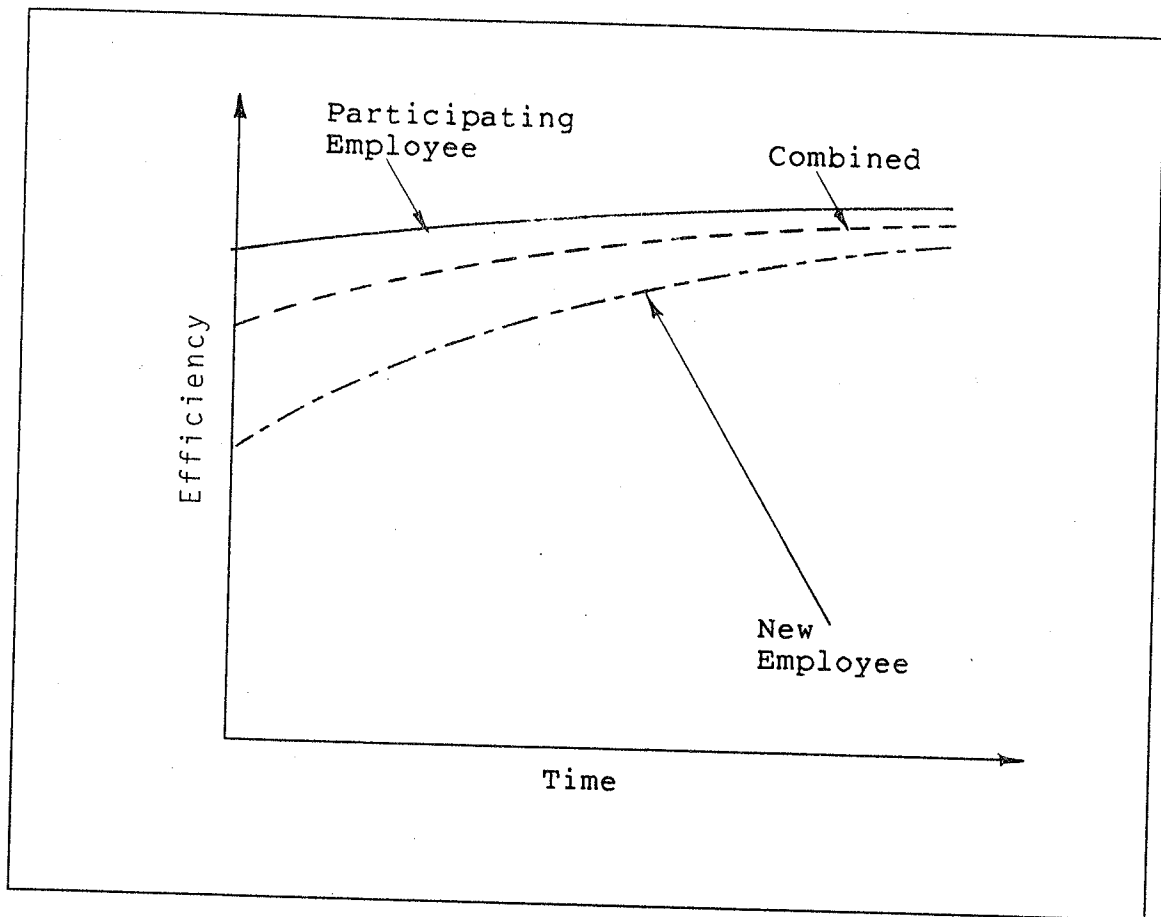


Figure 5.4 A Typical Combined Effect of the Productivity of a Participating Employee and a New Employee

on any productivity improvement, which is shared equally between the company and employees. The third part is based on profit sharing.

The first part is based on the productivity gain for each period. The bonus pool allocated for the employees is distributed according to their salaries. The individual bonus (IB) is calculated as follows:[66]

$$IB = \frac{\text{Individual salary X Bonus pool}}{\text{Total participating salary pool}} \quad (5.1)$$

The total participating salary pool instead of the total actual payroll is used as the denominator because of the exclusion of probationary workers. For example, suppose that the bonus pool is \$5,000 and the total participating salary pool is \$35,000. Thus, the individual bonus for an employee earning \$700 is :

$$IB = \frac{\$700 \times 5000}{\$35000} = \$100$$

The second part is based on the reserve pool established to smooth out deficit months. During months of declining productivity, the reserve pool is used to continue incentive allocation. However, employees are notified that their incentives are coming from the reserve pool. The percentage of the bonus pool to be distributed during the deficit months depends on the size of the pool. The amount allocated is the same as the bonus distributed during the previous period or the entire pool, whichever is less. If the pool amounts to zero, no incentives are allocated. If, however, there are no deficits, the reserve pool is allowed to accumulate for a certain period of time. Then, a lump sum of the bonus pool is distributed. The amount receivable

by each participating employees in the lump sum payment is also calculated by equation 5.1.

The third part of the reward system is distributed annually because it is dependent on the annual contributions of each employee and on the company's profit. The points accumulated by each employee determine his respective share. The formula for calculating each individual annual bonus (IAB) is given by :

$$IAB = \frac{\text{Individual points X Point bonus pool}}{\text{Total points of all employees}} \quad (5.2)$$

Note: a detailed example of the application of the Hybrid Plan is given later.

5.4 ESTABLISHING NEW PRODUCTIVITY STANDARDS

Generally, once the productivity standards are established, they are left unchanged. Any operational improvements, contributed either by employees or by the company, cannot alter any standards. However, subjected to continuous improvements the established standards can become obsolete after a period of time. A method is required to revise the standards once there is a sufficient evidence of significant improvements. Compensation are paid to workers to offset reduction in bonus payments due to new standards.

A ceiling is set for all the standards. In contrast to the Improshare Plan, this ceiling in the Hybrid Plan does not affect the employees' earnings. All gains above the ceiling are distributed normally, as are the gains below the ceiling. The primary function of the ceiling is to keep track of established standards. If the productivity index of employees exceeds the ceiling on a continuing basis, e.g. for four to six consecutive production periods, this signifies that the old standards have lost their effectiveness. Thus, this ceiling provides a continuous audit of the established standard.

The method used to establish a new standard is adopted directly from the Improshare Plan.[24,49] A lump sum payment, known as the buy-back payment, is used to compensate all participating employees for the revision of standards.

A multiplier (M) is used to revise all the standards. New standards are obtained by multiplying all existing standards by M. This multiplier is expressed as follows :

$$M = V/A \quad (5.3)$$

where

V = ceiling level productivity

A = average actual productivity
at the time of the buy-back

The buy-back payment is then used to purchase the old standard back. The buy-back payment (B) for each employee is calculated by :

$$B = 2000(S)(R)(A-V) \quad (5.4)$$

where

S = employees' portion of productivity sharing

R = employee base hourly pay rate

The constant, 2000, represents the number of work hours per year. This constant is variable, depending on the policy of each company. An example of the buy-back calculation is shown in figure 5.5.

Another reason for establishing new standards is the acquisition of new capital equipment or technology. This is a rather sensitive issue because most employees feel that they will one day be replaced by machines. In order, to stay competitive, however, a company must maintain a policy of continuous technological updating. New equipment and technology commonly reduce the time required to perform the same operation(s); thus, the setting of a new standard becomes necessary.

In the Hybrid Plan, savings gained from the acquisition of new capital investment are shared 50/50 between the company and its employees. This helps employees to accept the changes more readily.

Consider :

Ceiling level, $V = 160\%$
 Employee base hourly rate, $R = \$8.00$
 Employees' share, $S = 50\%$

where the productivity index for 6 periods is :

Period	1	2	3	4	5	6
Productivity Index	165	165	170	175	180	180

Thus,

Average Productivity, A

$$A = \frac{170 + 170 + 180 + 180 + 190 + 190}{6}$$

$$= 180$$

Multiplier, M

$$M = \frac{V}{A}$$

$$= \frac{1.6}{1.8}$$

$$= 0.89$$

Buy-Back Payment, B

$$B = 2000(S)(R)(A-V)$$

$$= 2000(0.5)(8)(1.8 - 1.6)$$

$$= \$1600.$$

Figure 5.5: An Example of the Buy-Back Calculation for the Hybrid Plan

Calculation of the amount to be shared begins with the average productivity index (S_a) for the past six periods prior to the acquisition of the new capital investment. The suggested formula is given as:

$$S_a = \frac{\sum_{i=1}^6 S_i}{6} \quad (5.5)$$

where

S_i = productivity index for past period i

A new productivity index is then estimated. The factor (D) for computing the difference between the new estimated productivity index (S_n) and the average productivity index (S_a) is calculated by:

$$D = S_n - S_a \quad (5.6)$$

This factor (D) remains frozen for computing the bonuses to be shared for the entire life of the investment. Another factor (F) used to multiply all the standards to bring the new estimated productivity index back to the average productivity index prior to the acquisition of the new investment, is expressed as follows:

$$F = \frac{S_n}{S_a} \quad (5.7)$$

The bonus (EB) attributed per year-life of the new investment is calculated by:

$$EB = (HO)(D)(TPR) - (I/EL) \quad (5.8)$$

where

HO = estimated hours of operation per year

TPR = total base rates of all the participating employees

I = investment cost, including all the necessary costs to bring it to operational status and all interest expenses

EL = estimated life of the investment in years

Therefore, the employees' aggregate share (ES) per year is given by :

$$ES = 0.5 (EB) \quad (5.9)$$

The individual bonus receivable by each employee (IES) is based on his base hourly rate (B). The equation for calculating the IES is as follows:

$$IES = \frac{B}{TPR} (ES) \quad (5.10)$$

This share can either be distributed annually or divided into periodic payments. Figure 5.6 shows an example of the investment-induced change in a standard. The investment-induced gains are shared for the entire estimated life or until the piece of equipment is replaced again. The bonuses must be calculated separately every year because of different labor rates.

Suppose :

The productivity indexes for six periods prior to the acquisition of the new investment are:

Period	1	2	3	4	5	6
Productivity Index	110	110	115	120	115	120

Estimated new productivity index, $S_n = 130\%$
 Estimated hours of operation per year, $HO = 2000$
 Investment cost, $I = \$100,000$
 Estimated life of the investment, $EL = 5 \text{ years}$
 Total participating base rates, $TPR = \$1,000$
 Base labor rate, $B = \$8.00$

Thus,

Average productivity index, S_a

$$S_a = \frac{110 + 110 + 115 + 120 + 115 + 120}{6}$$

$$= 115$$

Standard difference factor, D

$$D = 130 - 115$$

$$= 15\%$$

Standard revision multiplier, F

$$F = 115/130$$

$$= 0.885$$

Equipment-induced bonus, EB

$$EB = (2000)(0.15)(1000) - (100,000/5)$$

$$= \$280,000$$

Figure 5.6: An Example Calculation for the Investment-Induced Bonus for the Hybrid Plan

Employees' aggregate share, ES

$$\begin{aligned} \text{ES} &= 0.5 (280,000) \\ &= \$140,000 \end{aligned}$$

Individual employee share, IES

$$\begin{aligned} \text{IES} &= (8/1000)(140,000) \\ &= \$1120 \end{aligned}$$

Therefore, assuming that the base rate of a particular employee and the total participating base rates for the entire life of the investment are as given below; the individual bonuses receivable by the employee are as shown below.

Year	1	2	3	4	5
B(\$)	8.0	8.5	9.0	9.5	10.0
TPR(\$)	1000	1200	1300	1400	1500
IES(\$)	1120	1204	1281	1357	1433

Figure 5.6(continued): An Example Calculation for the Investment-Induced Bonus for the Hybrid Plan

5.5 PRODUCTIVITY FEEDBACK

This factor, equally as important as the bonus, is often not emphasized in other plans. In the Hybrid Plan, accurate feedback enables employees to understand the causes of poor productivity.

Feedback may take various forms. Bonuses as discussed earlier, are one form of feedback. Graphical representation is a most effective method of demonstrating the trend of each factor. It is important that all major factors be considered. If the productivity is not increasing or is actually decreasing, employees must be able to identify the major factors to be focused on.

The feedback process should begin slowly. It is important not to overload employees with information. Too much information causes confusion to the employees. This confusion may later cause the employees to ignore completely all information provided. Additional information should only be added only when employees request it.[66] At the same time, irrelevant information that may have been provided previously should be removed. Thus, continuous screening of the type of information being fed to employees is essential in the feedback process.

A stagnant or declining growth in productivity may cause employees to put their heads together and develop workable

solutions. The main objective is not to ensure that they come up with new ideas but rather, to enable them to realize that their productivity and the company's competitive position is at stake. Such a realization generally is accompanied by their ready acceptance of appropriate changes.

The contribution of each factor towards productivity gain must be clearly identified to the employees. This allows employees to concentrate on improving input factors with slower or declining productivity growth. Each factor may be improved on a rotative basis. Thus, productivity improvement becomes more meaningful, more challenging and more interesting. Figure 5.7 shows an example of the rotative sequence of improving two factors.

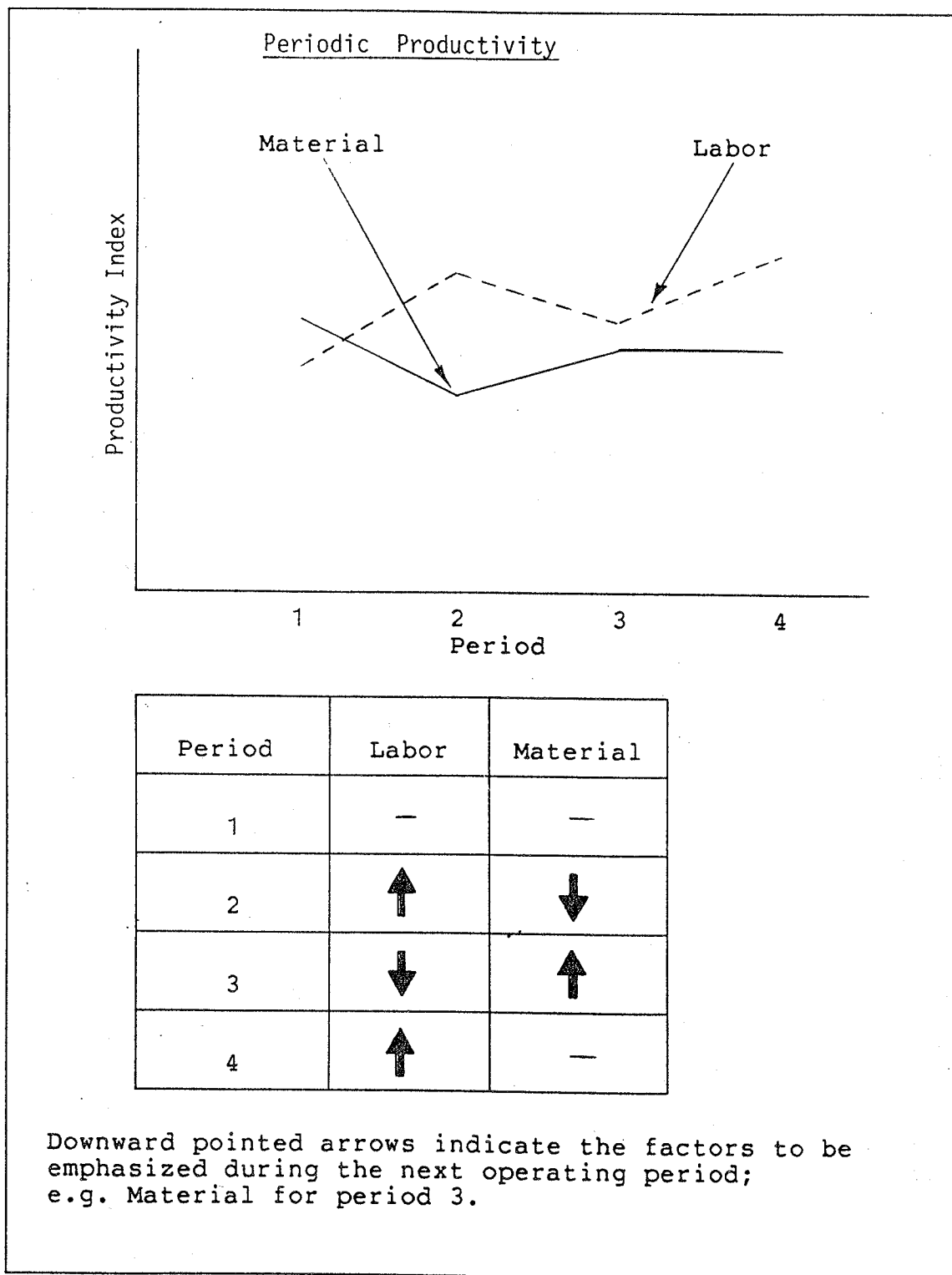


Figure 5.7: An Example of the Rotative Productivity Sequence for Two Factors

Chapter VI

PRODUCTIVITY MEASUREMENT

Productivity measurement is used to demonstrate and to compare the productivity level of a company for a given period of time. It indicates the trend of the company's productivity.

There are many approaches to measuring productivity. Figure 6.1 shows the common approaches used by economists, accountants, managers and engineers.[101]

Economist	Accountants	Managers	Engineers
.Index approach	.Capital budgeting approach	.Array approach	.Index approach
.Production function approach	.Unit cost approach	.Financial ratios approach	.Utility approach
.Input-output approach			.Servo-system approach

Figure 6.1: Approaches to Productivity Measurement

Each approach uses different methods of calculation and emphasizes different factors. However, productivity measurements are basically divided into three types: total productivity, multi-factor productivity and partial productivity. The total productivity method includes all relevant inputs necessary to the production of the outputs. The general equation is :

$$\begin{array}{l} \text{Total} \\ \text{Productivity} \\ \text{Index} \end{array} = \frac{\text{All Outputs}}{\text{All Inputs}} \quad (6.1)$$

The multi-factor productivity method includes a combination of selected inputs in the denominator. For example, suppose the two selected inputs to be considered are labor and material then, the equation is given as :

$$\begin{array}{l} \text{Multi-factor} \\ \text{Productivity} \\ \text{Index} \end{array} = \frac{\text{Outputs}}{\text{Labor Inputs} + \text{Material Inputs}} \quad (6.2)$$

The partial productivity method measures the output in relation to each factor. For example, the partial productivity index equations for the labor input and the material input are :

$$\begin{array}{l} \text{Partial} \\ \text{Productivity} \\ \text{of Labor} \end{array} = \frac{\text{Outputs}}{\text{Labor Inputs}} \quad (6.3)$$

$$\text{Partial Productivity of Material} = \frac{\text{Outputs}}{\text{Material Inputs}} \quad (6.4)$$

The use of total productivity or multi-factor productivity is beneficial to the company. Unfortunately, the calculations for these measurements are often complex and they do not indicate how each factor influences the total productivity level. Partial productivity indexes are more appropriate for measuring the productivity level in production environment. The productivity index of each factor identifies the efficiency of usage of each resource. Therefore, it is the partial productivity index method which is adopted in the Hybrid Plan.

In the partial productivity index method, the output of each factor is described independently with appropriate measurement units in relation to the input. For example, the output for the partial productivity of labor is described in hours whereas the output for the partial productivity of material is described in dollars. However, if possible, it is better to eliminate the use of monetary units in the calculation because of the effects of inflation. Other more standard units, such as physical units, product units and work content, are recommended.[83]

The indexes obtained may be used to compare the company's performance to other similar companies for which such data

may be available. This comparison provides the company and its employees with information regarding its productivity-competitiveness with respect to other companies.

6.1 PRODUCTIVITY BASE IN THE HYBRID PLAN

The productivity improvement of each period is compared to a base known as the productivity base or standard.

The average historical performance is the most commonly used base. Unfortunately, this form of base is not highly reliable. Past performance is not necessarily the standard performance. The use of the actual standard base is preferred. The standard base is defined as the actual input allowable to produce a unit of product. However, the standard base is often difficult to derive for companies with multi-products. Complicated equations for deriving the standards should be avoided because the method used should be easily understood by all employees.

Productivity measurement should always be made against the standard base. The standard established at the beginning is frozen because constant updates on the standard would conceal all the productivity improvement. Figure 6.2 shows the effect of a constantly varying standard. The methods for establishing the standard for the major production inputs controllable by employees, namely labor, material and other variable production expenses, are explained below.

Period	0	1	2	3
Productivity as compared to base period 0	100%	110%	120%	130%
Productivity improvement as compared to period (n-1)	100%	110%	109%	108%

Graphical Representation

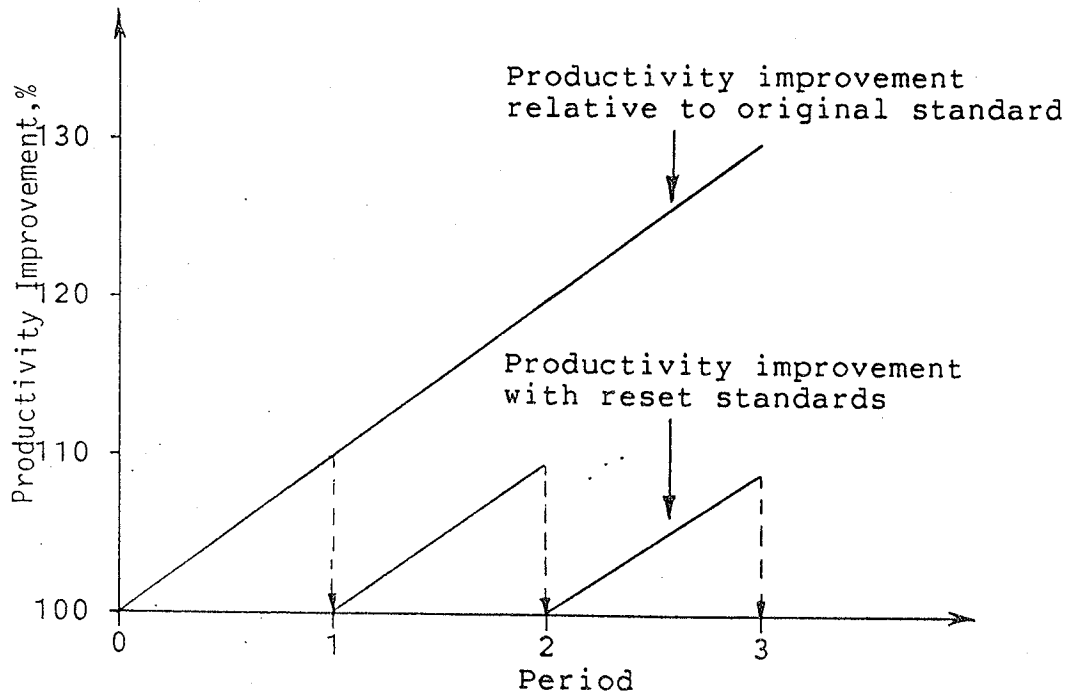


Figure 6.2: The Effect of Varying Standard

6.1.1 Labor Standard

Standard labor hours for production employees can be obtained scientifically by time studies. Time standards for non-production employees are usually not measured. The Improshare's Base Productivity Factor (BPF) is used in the Hybrid Plan to relate production and non-production hours to standard production hours. The initial standard non-production hours must be estimated by carefully evaluating the historical data.

$$\text{BPF} = \frac{(\text{Production and Non-Production Hours})}{(\text{Standard Production Hours})} \quad (6.5)$$

Once the BPF is established, all standard production times are multiplied by the BPF to reflect the standard allowable labor times. For example, suppose the standard production hours for a period are 300,000 hours and the company's BPF is 1.75. Then the total allowable standard hours are :

Total Allowable Standard Hours	=	Total Standard Production Hours	X	Base Productivity Factor	
		= 300,000			(6.6)
		= 300,000 X 1.75			
		= 525,000 hours			

Note: Recently some new methods have been developed specifically for measuring the non-production or

"service"-type work input.[77] Companies using this measurement techniques can omit the use of the BPF. The total allowable standard hours will be simply equal to the sum of the standard production hours and the standard non-production hours.

An improvement index is used to reveal the improvement by either the production or non-production employees. For example, the actual production hours are 275,000 hours and the actual hours are 500,000 hours. The standard labor hours are the same as in the above example. The general equation is :

$$\text{Improvement Index} = \frac{\text{Standard Hours}}{\text{Actual Hours}} \quad (6.7)$$

Hence,

$$\begin{aligned} \text{Total Improvement Index} &= \frac{525,000}{500,000} \\ &= 1.05 \end{aligned}$$

$$\begin{aligned} \text{Production Improvement Index} &= \frac{300,000}{275,000} \\ &= 1.09 \end{aligned}$$

$$\begin{aligned} \text{Non-Production Improvement Index} &= \frac{525,000 - 300,000}{500,000 - 275,000} \\ &= 1.0 \end{aligned}$$

Operational changes, except for major capital and technological changes, cannot reduce the total standard hours. Since the BPF is dependent on the standard hours, it can change only when the standard changes. Thus, as long as the BPF remains constant, the changes will reflect productivity gains. The method of changing the standard, including changes due to major capital and technological investment, is discussed in chapter five.

6.1.2 Material Standard

The term "material" includes both raw materials and purchased parts. The standard for material usage can be anticipated during the product-design stage. Each product requires a relatively fixed standard amount of material. Allowances for loss, scrappage, material defects and work rejects are included in the anticipated amount. This forms a standard base for accounting the material usage for a single type of product. Accounting for material usage is a complicated process. To simplify the process, only the finished products of completed production runs are accounted for. Tracking the flow of work-in-process is very complicated and confusing to employees to understand.

All the materials acquired for a production run are recorded. The process involves the use of materials procurement forms, such as shown in figure 6.3.

Department No.:			Date :			
Job No.:			Employee No.:			
Production Code :			Production Period :			
Part No.	Description	Quantity Issued	Quantity Returned	Quantity Consumed	Unit Cost	Total Cost
Filed by :			Date :			

Figure 6.3: A Sample Materials Procurement Form

The finished products are multiplied by the standard base to obtain the total standard allowable material :

$$\begin{array}{l} \text{Total Allowable} \\ \text{Standard} \\ \text{Material} \end{array} = \begin{array}{l} \text{Quantity of} \\ \text{Good Finished} \\ \text{Products} \end{array} \times \begin{array}{l} \text{Allowable} \\ \text{Standard} \\ \text{Per Product} \end{array} \quad (6.8)$$

For a multi-product production run, the total allowable standard material is given by :

$$\begin{array}{l} \text{Total Allowable} \\ \text{Standard} \\ \text{Material} \end{array} = \sum_{i=1}^n \left(\begin{array}{l} \text{Quantity of} \\ \text{Good Finished} \\ \text{Products} \end{array} \times \begin{array}{l} \text{Allowable} \\ \text{Standard} \\ \text{Per Product} \end{array} \right)_i \quad (6.9)$$

where

n = the number of product types

6.1.3 Other Variable Production Expenses

Other variable production expenses, such as supplies and utilities, are relatively constant. An average of past requirements provides a relatively good standard base. Therefore, the allowable standard is equal to the average consumption of past periods.

6.2 CALCULATION OF PRODUCTIVITY GAINS

The productivity gain for each individual resource is calculated separately. The purpose is to differentiate and identify the percentage contribution of each resource towards the total productivity improvement of the company.

The general equation for the calculation of the productivity gain of each resource is expressed as :

$$\begin{array}{rcl} \text{Productivity} & & \\ \text{Gain} & = & \text{Total Allowable} & - & \text{Total} \\ & & \text{Standard} & & \text{Actual} \\ & & \text{Consumption} & & \text{Consumption} \end{array} \quad (6.10)$$

Thus, the equations for each resource, expressed in more detail, are as follows :

Labor Productivity Gain (LPG)

$$\text{LPG} = \frac{\text{Total Standard Labor Hours}}{\text{Total Actual Labor Hours}} - \frac{\text{Total Actual Labor Hours}}{\text{Total Actual Labor Hours}} \quad (6.11)$$

Material Productivity Gain (MPG)

$$\text{MPG} = \frac{\text{Total Allowable Standard Amount of Material}}{\text{Total Actual Amount of Material Used}} - \frac{\text{Total Actual Amount of Material Used}}{\text{Total Actual Amount of Material Used}} \quad (6.12)$$

Other Productivity Gain (OPG_x)

$$\text{OPG}_x = \begin{array}{l} \text{Total Allowable} \\ \text{Standard Consumption} \\ \text{of } x \end{array} - \begin{array}{l} \text{Total Actual} \\ \text{Consumption} \\ \text{of } x \end{array} \quad (6.13)$$

where

x represents the factor to be computed.

Chapter VII

BONUS CALCULATION

The sharing of productivity gains is the most important part of the plan. Financial rewards distributed to employees demonstrate to them that the plan is working. Moreover, it motivates them to excel and provides feedback on their past performance.

The bonuses to be distributed fall into three categories. Instant periodic (e.g. monthly) bonuses are calculated from the periodic productivity improvement. Accumulated bonuses achieved through no-deficit productivity are distributed semi-annually or annually. The final bonus is earned from the accumulated point system. This bonus is based on an established percentage of the company's profit.

7.1 PERIODIC PRODUCTIVITY IMPROVEMENT BONUS

These bonuses are based on the designated periodic productivity improvement. The period of the interval is variable, depending on each company's policy. The use of a monthly interval is recommended because it coincides with the employees' normal pay. It is recommended to pay the bonus by separate check, in order to make the reward more

noticeable and tangible for the employees.[107] The productivity of each period is measured and compared to the standard base. All improvements are translated into dollar values.

The calculation process is quite simple. Actual inputs are subtracted from the allowable standard inputs. The productivity gains of all the different factors are then added together. Twenty percent of the productivity gains are reserved for deficit months. The remainder of the productivity pool is shared 50/50 between the company and employees. Figure 7.1 shows an example of the calculation.

<u>Labor Productivity Gain</u>		
1) Allowed standard labor hours	2200	
2) Actual labor hours	2000	
	<hr/>	
3) Labor hours gained (#1 - #2)	200	
4) Percent improvement (#3/#2)	10%	
5) Participating payroll	\$20,000	
	<hr/>	
6) Labor gain (#4 X #5)		\$ 2,000
<u>Material Productivity Gain</u>		
7) Standard material	\$1,000,000	
8) Actual material used	995,000	
	<hr/>	
9) Material gain (#7 -#8)		5,000
<u>Other Productivity Gain</u>		
<u>Supplies</u>		
10) Standard supplies allowed	\$2,000	
11) Actual supplies used	1,800	
	<hr/>	
12) Supplies gain (#10 -#11)		200
<u>Utilities</u>		
13) Standard utilities	\$3,000	
14) Actual utilities	3,200	
	<hr/>	
15) Utilities gain (loss) (#13 - #14)		(200)
16) Total productivity gain		7,000
17) Reserve for deficit months (#16 X 20%)		1,400
		<hr/>
18) Productivity pool (#16 - #17)		5,600
19) Company Share (#18 X 50%)		2,800
		<hr/>
20) Employees' bonus pool (#18 - #19)		2,800
21) Participating payroll		20,000
		<hr/>
22) Percent bonus (#20/#21)		14%
		<hr/>

Figure 7.1: An Example of the Periodic Bonus Calculation for the Hybrid Plan

7.2 NO-DEFICIT DISTRIBUTION

Once the reserve pool has reached a certain amount, it is distributed. The reserve pool is first decreased by a certain amount. This amount ensures that there is always a reserve pool to compensate for any decline in productivity.

The amount to be maintained in the reserve pool can either be fixed or variable. The fixed amount can be any amount which seems most appropriate to the company and its employees. This method is simple. It does not, however, consider the trend of productivity fluctuations.

A variable function for determining the amount to be left behind provides a better buffer. It provides a larger reserve if productivity growth is low or declining, and a smaller reserve if productivity growth is high. The weighted moving average type function is used to accomplish this. The function is shown below :

$$\text{Reserve Amount} = RP_0 - \frac{RP_0}{\sum_{i=1}^n i} \left[\sum_{i=1}^n \frac{i}{n} \left(\frac{RP_i}{RP_{i-1}} - 1 \right) \right] \quad (7.1)$$

where

RP_0 = the reserve amount of the previous distribution

n = the number of periods

RP_i = the reserve pool of period i

The calculated reserve amount is subtracted from the accumulated reserve pool. The difference is shared 50/50 between the company and employees. The employees' pool is distributed in proportion to the participating payroll. Figure 7.2 shows an example of the no-deficit calculation.

<u>Period</u>	<u>Reserve Pool</u>
0	\$1400
1	1200
2	1300
3	1500
4	1700
5	1900
6	1800

$$\begin{aligned}
 \text{Reserve Amount} &= 1400 - \frac{1400}{\sum_{i=1}^6 i} \left[\sum_{i=1}^6 \frac{i}{6} \left(\frac{RP_i}{RP_{i-1}} - 1 \right) \right] \\
 &= 1400 - \frac{1400}{21} \left[\frac{1}{6} \left(\frac{1200}{1400} - 1 \right) + \frac{2}{6} \left(\frac{1300}{1200} - 1 \right) \right. \\
 &\quad + \frac{3}{6} \left(\frac{1500}{1300} - 1 \right) + \frac{4}{6} \left(\frac{1700}{1500} - 1 \right) \\
 &\quad \left. + \frac{5}{6} \left(\frac{1900}{1700} - 1 \right) + \frac{6}{6} \left(\frac{1800}{1900} - 1 \right) \right] \\
 &= \$1386
 \end{aligned}$$

Bonus Calculation

1) Total reserve pool	\$10,800
2) Reserve amount	1,386
3) Distributable reserve pool (#1 - #2)	9,414
4) Company share (#3 X 50%)	4,707
5) Employees' share (#3 - #4)	4,707
6) Participating payroll	65,898
7) Percent Bonus	14%

Figure 7.2: No-Deficit Bonus Calculation for the Hybrid Plan

7.3 POINT BONUSES

This annual bonus is the simplest to calculate. All points accumulated by all employees are added together. These points include suggestion points, seniority points and attendance points. Point values assignable to different classes of suggestions is discussed in chapter five. Figure 7.3 shows an example of points distribution for each employee's attendance and seniority.

Seniority		Attendance	
Years	Points	Percentage	Points
1 - 2	20	100	50
3 - 4	30	95 - 100	40
5 - 6	40	85 - 94	30
7 - 8	50	75 - 84	20
9 - 10	60	65 - 74	10
11 - 12	70	55 - 64	5
13 - 14	80	Less than 55	0
15 and more	100		

Figure 7.3: Typical Points Allocatable to Seniority and Attendance

A certain percentage of the company's pre-tax net profit is allocated to the point bonus pool. The amount to be allocated is divided by the total points accumulated by all employees, to obtain the dollar value per point. The bonus receivable by each employee is based on his own individually

accumulated points. Therefore, each individual bonus is obtained by multiplying his accumulated points to the dollar value per point. An example of this bonus calculation is shown in figure 7.4.

<u>Accumulated points from :</u>		
1) Suggestions	15,000	
2) Seniority	10,000	
3) Attendance	5,000	
	<hr/>	
4) Total	30,000	
5) Pre-tax net profit		\$300,000
6) Percentage allocated for point bonus pool		20%
		<hr/>
7) Point bonus pool (#4 X #5)		60,000
		<hr/>
8) Bonus per point (#7/#4)		\$2
		<hr/>
Suppose the accumulated points of an employee are 700 ; then his bonus is equal to \$1400.		

Figure 7.4: An Example of the Point Bonus Calculation for the Hybrid Plan

Chapter VIII

IMPLEMENTATION

The success of the Hybrid Plan proposed in this thesis depends very much on the implementation process. The implementation process can be divided into three stages: preliminary studies, actual implementation and follow-up. Each of these stages is explained below.

Prior to the actual implementation, preliminary studies must be conducted to survey the attitudes of management and employees towards the introduction of such a plan. Appendix A provides a checklist of conditions for assessing the readiness of the company to accept a gainsharing plan.[77] Once management and supervisory personnel have understood the basic needs for the plan, the company must then evaluate the willingness of the employees to accept the plan. The presence of a union can either help to develop the employees' acceptance or create a major obstacle. Thus, companies with unions must take precautionary steps during the introduction of the plan. In any case, questionnaires should be handed to employees to obtain a general view of their present situation and to assess their readiness towards the plan. Appendix B shows a list of possible questionnaires for conducting such assessment. Sufficient

time must be provided to the employees to answer them. Therefore, it is suggested that they should answer them carefully at home.

Once the company and the employees are ready to accept the plan, proper orientation and training programs must be planned for the actual implementation. During the actual implementation, the company should explain the major mechanics of the plan to all employees. This will include conducting small seminars and training programs. It is important not to overload employees with excessive details in a short period of time because the details can confuse employees. Distributing booklets outlining the basic features and mechanics of the plan would be helpful to the employees.

The follow-up should take place approximately one month after the actual implementation. This follow-up consists of further training and more detailed explanation of the plan. Another questionnaire-survey is appropriate at this time to evaluate the employees attitude and comprehension of the plan after exposure to its effects.

After the plan has been completely implemented, it will not take care of itself. Constant monitoring is imperative to ensure that the plan continues to function smoothly. At this stage, further meetings and training may be necessary to provide the employees with more details. Annual surveys

should be conducted to evaluate how well the plan is working.

The monitoring process also includes the evaluation and control of all the activities of the plan. Any difficulties in the plan must be resolved immediately. Otherwise, these problems may grow and eventually cause the entire plan to fail. Should such a failure occur, it will be extremely difficult to regain the employees' confidence in the plan.

It is vital to stress repeatedly the importance of the employees' trust and confidence because the success or failure of the plan is dependent on employee participation. Open communication between management and employees must be maintained. This allows both management and employees to discuss and find solutions for any problems or obstacles hindering productivity growth.

The Hybrid Plan can also be used in most non-manufacturing industries with slight modifications in the calculation of standards. All the other mechanics of the plan remains basically the same.

As an addition to the Hybrid Plan, an employee stock ownership plan may be implemented. This is highly recommended because it can instill further commitment and a sense of belonging in employees by creating a feeling of "ownership".

Chapter IX

CONCLUSION

The main contributions of this thesis through the proposed "Hybrid Plan" are summarized below:

1. Combines selected features from the Scanlon Plan, the Improshare Plan and profit sharing.
2. Develops a three-part reward system with the third part, namely the point system, being different from those used in all existing gainsharing plans.
3. Develops equations for the consideration of other input factors such as labor, material and other major variable production expenses, in the calculation of productivity gains.
4. Develops a buy-back method to establish new standards to utilize new capital investment.
5. Develops a new method for distributing the reserve bonus pool.

9.1 ADVANTAGES OF THE HYBRID PLAN OVER THE THREE COMMON GAINSHARING PLANS

Involvement Process

The most well-known process of involvement is given in the Scanlon Plan. However, there is no or insufficient motivational drive to promote greater involvement from all employees. The point system in the Hybrid Plan is designed specifically for motivating and encouraging employees to contribute ideas continuously.

The Hybrid Plan's productivity team is more efficient and effective than the two separate production and screening committee of the Scanlon Plan, because it permits better evaluation of the employees' suggestions. This is very important because an initially small idea can be of extreme economical benefits if modified slightly or combined with other ideas.

Multi-Factor Consideration

All the three major existing gainsharing plans focus only on the labor factor. Since labor is not the only possible factor for inducing productivity gains, other input factors should also be considered.

The Hybrid Plan provides a method for the consideration of all other important input factors.

Sharing of Productivity Gains

The percentage distribution used in the Scanlon Plan and the Rucker Plan would not look very fair to the employees. The 50/50 sharing used in the Improshare Plan is perhaps the fairest because neither the management nor employees can claim that they contribute more. However, the Improshare Plan does not allocate a certain percentage of each periodic gains to reserve pool as in the Scanlon Plan and the Rucker Plan. The Improshare Plan uses a ceiling to set aside reserve amounts. This is not a very good method because

1. it is difficult to reach the ceiling,
2. there will be no reserve if the ceiling is not reached, and
3. upon reaching the ceiling on a continuous basis, all standards will be reset and therefore returns to the problem listed in (1) above.

The Hybrid Plan shares all productivity gains equally (50/50) between the company and its employees. However, before sharing the initial amount of each period's productivity gains, a certain amount is allocated to the reserve pool.

Standard-Based Calculation

The base ratios used in the Scanlon Plan and the Rucker Plan are based on past performance data. The Improshare

Plan is work-measurement-based and thus allows a scientific approach to the productivity gain calculation.

The Hybrid Plan uses the Improshare method for determining the productivity gain of the labor factor. In addition to the labor factor, the Hybrid Plan also calculates the productivity gain of other major input factors. Generally, all productivity gains of the other inputs are determined by subtracting the actual input consumed from the standard allowable input.

Compensation for New Standards

The Improshare Plan is the only plan that compensates employees for revision of standards. The Hybrid Plan adopts both Improshare's ceiling to audit standards and the Improshare's buy-back method to revise standards.

However, Improshare's method for compensating employees for adopting new capital investment may not be very fair in employees' viewpoint. In the Hybrid Plan, productivity gains through new capital investment are shared equally between the company and its employees.

Self-Adjusting Reserve Pool

Both the Scanlon Plan and the Rucker Plan, have a reserve pool to cushion any decline in productivity. When the accumulated reserve pool is distributed, the entire pool is

reduced to zero. This method of distribution does not provide any cushion if there is a productivity decline in the following productivity periods. The Hybrid Plan always retain an amount in the reserve pool. This amount is self-adjusting and is dependent on productivity of previous periods.

Additional Features

The Hybrid Plan's point system is also designed to decrease absenteeism and retain experienced employees. Points are allocated according to each employee's attendance record and seniority to determine their individual share of the pool allocated from the company's profit. The objective of these seniority-points is to provide recognition of seniority and to encourage long-term commitment from employees.

9.2 SUGGESTION FOR FURTHER WORK

The Hybrid Plan is only at its developmental stage. Additional work and refinement are necessary to improve the present stage of our proposed Hybrid Plan. Some of the possible immediate directions for further research are summarized below:

1. Improve the method of computing the productivity gain for the material input factor.

2. Attempt to develop a better and fairer point system to encourage more employee involvement and still more commitment to their work.
3. Develop a better method to calculate the amount to be left aside before the distribution of the non-deficit bonuses.
4. Expand and define the functions of the productivity team more specifically and more clearly.
5. Generalize the existing Hybrid Plan to allow it to be used in non-manufacturing industries, including pure service industries.
6. Include the employee stock ownership plan into the Hybrid Plan (instead of allowing it to be optional).
7. Test the Hybrid Plan in some small industries.

Note: Recently, an opportunity has been identified for possible further improvement of the Hybrid Plan. It involves the use of the total participating points, instead of the total participating salary, to calculate each individual share of the bonuses. Of course, this will require modification to the proposed existing points structure to include the difference in base wage factor. This will become necessary because some jobs, or tasks, are more important and more "valuable" than others.

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Appendix A

Checklist For Management And First-Line Supervisors

Is there :

1. confidence and trust in the management ?
2. concern for increasing the quantity of work ?
3. concern for increasing the quality of work ?
4. concern for decreasing costs ?
5. cooperation between individuals and department ?
6. participation by everyone in the work process ?
7. feeling of being informed about information vital to the functioning of the firm ?
8. interest in and concern for the firm's future ?
9. extensive of sharing know-how of the job ?
10. wide range of suggestion making, focused on decreasing costs, increasing quantity or quality of product ?
11. the situation where labor costs are competitive when compared with other similar firms ?
12. means by which technological change is easily handled?
13. current managerial information systems that show how productivity is achieved ?

(modified from ref.#66, pp.17-19)

Appendix B

Preliminary Survey: Questionnaire For Employees

1. Are you satisfied with your job ?
2. Are you satisfied with this company ?
3. How do you feel about your future with this company ?
4. Do you think you are receiving a fair pay ?
5. Do you think this company is competitive with other similar companies ?
6. Do you have confidence and trust in your supervisor ?
7. Do you have confidence and trust in the management ?
8. Do you like to work in a group ?
9. Do you think you can perform your job better if given more freedom ?
10. Do you think you can suggest some improvement methods?
11. Do you like to participate in some decision-making ?
12. Do you like to have better communication between the management and employees ?
13. Do you think you can help to promote such a communication process ?
14. Do you think all employees can cooperate to increase the productivity of the company ?

15. Do you think you can help management to improve the company's performance ?
16. Do you agree that the company should share more information with the employees ?
17. Do you agree that the company should share some profit with the employees ?
18. Do you like to share in the company's productivity ?
19. Would you like to try a plan that allow you to share the company's productivity gain ?
20. Do you think the union is beneficial to you ?
21. Do you think the union is beneficial to the company ?
22. Do you believe that an employee is responsible to some degree for the success of his employer ?
23. Do you believe that you can contribute to the company's greater success in the marketplace ?

(modified from ref.#66, pp.157-164)