

Copyright Warning & Restrictions

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted material.

Under certain conditions specified in the law, libraries and archives are authorized to furnish a photocopy or other reproduction. One of these specified conditions is that the photocopy or reproduction is not to be “used for any purpose other than private study, scholarship, or research.” If a user makes a request for, or later uses, a photocopy or reproduction for purposes in excess of “fair use” that user may be liable for copyright infringement,

This institution reserves the right to refuse to accept a copying order if, in its judgment, fulfillment of the order would involve violation of copyright law.

Please Note: The author retains the copyright while the New Jersey Institute of Technology reserves the right to distribute this thesis or dissertation

Printing note: If you do not wish to print this page, then select “Pages from: first page # to: last page #” on the print dialog screen

The Van Houten library has removed some of the personal information and all signatures from the approval page and biographical sketches of theses and dissertations in order to protect the identity of NJIT graduates and faculty.

2) CONSTRUCTION LABOR AND PRODUCTIVITY-
-PRODUCTIVITY IMPROVEMENTS

BY
1) STAVROS C. NICOLAOU

Thesis submitted to the Faculty of the Gradu-
ate School of the New Jersey Institute
of Technology in partial fulfillment
of the requirements for the
degree of Master of Science
in Civil Engineering

1987

APPROVAL SHEET

Title of Thesis: Construction Labor And
Productivity - Productivity
Improvements

Name of Candidate: Stavros C. Nicolaou
Master of Science , 1987

Thesis and Abstract Approved: _____

Lepturgos, Miltiadis Date

Assistant Professor

Civil and Environmental

Engineering Department

VITA

Name: Stavros C. Nicolaou.

Degree and date to be conferred: MS Civil Eng., 1987.

Secondary education: Nicosia Technical School, 1976.

Collegiate institutions attended-Dates -Degree-Date of Degree

City College of New York 1982-1986 B.S.C.E. May 1986

New Jersey Inst. of Technology 1986-1987 M.S.C.E. May 1987

Major: Civil Engineering.

ABSTRACT

Title of Thesis: Construction Labor And Productivity-
-Productivity Improvements

Stavros C. Nicolaou, Master of Science, 1987

Thesis directed by: Professor Leptourgos, Miltiadis.

Construction productivity has been on the decline in the last decade . Although an important factor in the nation's economy, productivity of construction labor has been given little attention over the years. A review of the literature dealing with construction was performed that revealed the importance of the declining productivity as well as the confusion among construction managers and labor leaders as to what productivity is all about and how it can be improved. It has been found also, that construction labor motivation, which is the most important factor in improving productivity, is almost nonexistent. Very few construction companies employ any kind of motivational programs and most of these programs are outdated and inefficient. It is recommended, therefore, that construction companies take

immediate action to install motivational programs that are up-to-date and efficient.

This paper also examines various ways of improving productivity in construction. The major ones are : (1) Management and unions should work together to establish job security; (2) absenteeism in construction must be controlled; (3) management must establish financial incentives; (4) communication in the construction site must be improved; and (5) management and unions must get themselves seriously involved in productivity bargaining. The paper further concludes that management and unions must work together to improve productivity. The feeling of togetherness, although nonexistent , is much needed in construction and much work should be done by both management and unions toward creating this feeling.

Blank Page

PREFACE

The economic situation of the United States has been and still is the subject of severe disputes among many leading economists. Some of these economists argue that the Nation's economy is stronger than ever and it will remain so despite the huge deficit in the Nation's budget. At the same time other economists argue that the economy of the Nation is only temporarily in good standing and that the huge deficit will soon bring the Nation to its knees.

Out of the many factors that affect the total economy of the country productivity of its labor force should be singled out as one of the most important. It is therefore very important and necessary to improve productivity in order to give a strong boost to the Nation's economy.

Productivity is a term composed by many variables relating inputs to outputs. It is a term that lacks specific definition and general acceptance, and as such it has caused marked confusion among executives and labor leaders.

The construction industry is one of the most significant in the total economy of the United States; it employs 4.5% of the nonagricultural labor force. New construction annually accounts for more than 10% of the Gross National Product; the maintenance of existing structures represents an additional 4%. Construction productivity has been steadily on the decline over the last decade and construction labor efficiency has been often cited as poor. Since labor costs comprise between 25-40% of the total project cost, reduced labor costs present a great potential source of increased productivity. While a firm's productivity is influenced by production factors other than labor, such as equipment, material, methods of construction, and management, these resources are inanimate unless they are transformed into productive uses by the human element. The quality of human performance depends, in large part, on human motivation a major focus of this paper.

So far, little has been done to raise construction labor motivation and thus efficiency. In order to increase the productivity of the construction labor it is vital to understand the psychology of these laborers. Finally ways to improve construction labor productivity are presented and discussed.

To
My Wife Eleni

TABLE OF CONTENTS

| Chapter | page |
|---|------|
| PREFACE..... | ii |
| I. PRODUCTIVITY AND CONSTRUCTION..... | 1 |
| 1. The Multiple Definition of Productivity..... | 2 |
| 2. Labor Productivity in Construction..... | 5 |
| 3. Productivity Measurement and Intepretations..... | 6 |
| 4. Benefits and Costs of Productivity Improvements.... | 10 |
| 5. Reasons for Productivity Decline in Construction.... | 11 |
| II. MOTIVATION AND FACTORS AFFECTING CONTRUCTION | |
| LABOR PRODUCTIVITY..... | 17 |
| 1. Motivation in Construction..... | 18 |
| 2. Construction-Related Motivation Studies..... | 22 |
| 3. Intrinsic and Extrinsic Motivation..... | 25 |
| 4. Creating an Effective Motivating Work Climate..... | 27 |
| 5. Important Job Factors for Construction Workers..... | 35 |
| 6. Labor Unions and their Impact onProductivity..... | 43 |
| III. PRODUCTIVITY IMPROVEMENTS..... | 48 |
| 1. Job security..... | 49 |
| 2. Improve Productivity by ControllingAbsenteeism.... | 51 |
| 3. Productivity and Financial Incentives..... | 56 |
| 4. Communication and Productivity..... | 60 |
| 5. Productivity Bargaining..... | 64 |
| SELECTED BIBLIOGRAPHY..... | 68 |

CHAPTER I

PRODUCTIVITY AND CONSTRUCTION

Industrial psychologists have long been interested in the subject of productivity. A quick review of the literature will reveal many texts, articles and reports of research studies dealing with this rather controversial subject. The main idea that comes out of all these writings is that the importance of productivity although well appreciated, the concept of it is not yet fully understood. It is unarguable that the question of maintaining or improving productivity is related to the health of the American economy and the standard of living of the American people.

The construction industry, in spite of its magnitude, has been ignored by the authors and researchers who publish in the industrial psychology literature. It is not a surprise then that the construction productivity has been steadily on the decline. So far, little has been done to raise construction labor motivation and thus productivity. This is reflected in the negligible number of recent studies focusing on this subject as well as in the meager number of construction companies employing any kind of motivational

program. An attempt to develop a whole new theory on construction labor productivity is unnecessary and inappropriate. What is needed is to use the existing knowledge on the industrial worker productivity and apply that knowledge in the construction industry. This is not an easy task but it is probably the best under the circumstances.

1. THE MULTIPLE DEFINITION OF PRODUCTIVITY

During the past 15 to 20 years there have been great concerns about the concept of productivity .When the miracles in productivity gains through technological changes stop occurring attention was turned to other factors thought to be influencing productivity. Suddenly everybody in the universities became an expert on the concept. Everybody was talking about productivity as though it is something simple, having a specific and well accepted definition which is easy to deal with. Well , the truth is that , it is not an easy concept and the best proof for this, is that productivity is still declining. The question that arises then is: What is wrong and what are the reasons for this? The answer to the first part of the question is a difficult one but an obvious reason for the second part is that a complete and universally accepted definition of productivity is still missing. Productivity is used to denote so many different concepts - only a few of which are measurable - that conflicting results are inevitable.

One good definition used for productivity is probably the following: Productivity is the amount of goods and services produced by a unit of a productive factor in a specific period of time. This is a general definition though and it needs some explanation. What are productive factors and how do they affect productivity? Productive factors are capital, machines, materials, land and labor. These factors of production are not independent but rather they are interdependent upon each other. It becomes evident then that to assess their relative effect on productivity is a difficult task. For example, if the worker's pay is double will his productivity increase? How about if he is given better materials or machinery to work with, will then his productivity increase? If the worker's output is increased over a period of time he might say that his productivity has increased. At the same time though the cost for the better material or machinery may cause the unit cost of the product to rise. The firm then might say that productivity has increased (measured as output per time) or productivity has decreased (measured as costs of factors of production or some other definition of productivity).

Another definition that is often used is that productivity is a measure of production efficiency; a ratio between output to input. Again this definition fails to take into account the different factors involved in the production

process. What factors are considered as input and what are their relative weights? A firm may increase its production by 10% over a period of time but the additional costs incurred may be seen as a decrease in productivity. It seems then that this definition is again general and somewhat vague.

A third possible definition of productivity is: Output per unit of time or some other given factor. Output may be measured in units of product, service dollars or some other measurable criterion. Productivity is again then the ratio of output to input. If the input, which is on the denominator of the ratio, is labor and it is measured in hours, a one-unit increase in output would then represent an increase in productivity. If, on the other hand, labor input is measured in dollars and those dollars are doubled, output would have to more than double to affect a productivity increase. This definition is again therefore incomplete.

A broader definition of productivity that encompasses all of the factors of production into a single output/input ratio although used in the past, carries with it two major problems: (1) comparability of measurement, and (2) inputs to be included. The first problem may be solved by expressing all inputs and outputs in dollar terms. This may be good enough in some cases but may create confusion in others. For example a change in the price of a material or

other input would affect productivity regardless of the reason for the price change. The second problem which inputs are to be included is much more difficult. Labor costs are certainly one of the inputs but how about the rest? Even labor costs may cause a problem. Consider for example two workers having different experience and therefore different wages. If both workers have the same rate of output is the more experience one less productive by virtue of having more inputs for the same output? According to the above broad definition the more experience worker will be considered less productive but this may not be the case at all.

2. LABOR PRODUCTIVITY IN CONSTRUCTION

The construction industry is a unique one, highly diversified and fragmented, and one that produces unique products. It is not therefore less difficult to define labor productivity in this industry than it is in the rest of the industry. Labor productivity is still a complex issue in construction and extremely difficult to measure due to the heterogeneity of the industry's products as well as of its inputs. Nevertheless a very good definition of labor productivity in construction, which if used properly, can reduce much of the confusion and misunderstanding that exist is as follow: "Labor Productivity is the amount of work performed (output) by the workers (input) over a specific period of time with a given labor-capital ratio". The amount of work performed can be so many blocks built in an hour, so many kitchen tiles

placed in an hour, etc. This definition if used throughout the construction industry will be a good basis for measuring labor productivity and make sure that everybody uses the same standards and means the same things when he speaks about the issue.

3. PRODUCTIVITY MEASUREMENT AND INTEPRETATIONS

The much confusion that exist in understanding the concept of productivity is partly due to the many ways used to measure productivity by different professionals . Managers in many companies often complain that they are finding the process of calculating productivity extremely complex. Yet without measurement , there can be no certainty that progress and improvement is really being achieved. So measurement is essential. In order to be meaningful though productivity measurement must be based on reliable data, and moreover in order to be useful ,it must be made up of controllable elements. However, productivity ratios are not useful by themselves alone. They should be evaluated and the best way to do this is by comparison.They should be compared with historical productivities, between differnt productive units and different productivity factors and against target productivities.

Productivity measures are needed to quickly highlight infficiencies within organizations and their constituent

departments so that remedial action can be taken. Unfortunately there is little agreement among industrial executives as to what are the criteria in designing productivity indices, and the theorists are equally divided.

Economists use productivity measures in a broad sense and their main purpose is to study whole economies and to compare productivities between industries or companies. They calculate indices that are all inclusive by using labor as the main input and converting all other factors into manpower equivalents. They convert these input factors by dividing their values with the average income for the related group of employees. Thus they end up with a total number of men which if divided into the output per year gives "output per man-year":

$$\text{Output per man-year} = \frac{\text{Sales Output}}{\text{Labor (live)} + \text{Labor (materialised)}}$$

$$\text{Where Labor (materialized)} = \frac{\text{Capital+External Expenses}}{\text{Average Earnings per Annum}}$$

The main problem with this index is that the sales output includes factors that are not controlled by the company itself such as prices and profits of other companies that supply materials and services. This problem can be minimized if instead of sales output another figure is used such as "value added". Added value is the sales value less value of external purchases. The new improved index then is

found by dividing "added value" with the number of employees. This measure of productivity is called "Net Output (or Added Value) per Employee":

$$\text{Net Output per Employee} = \frac{\text{Added Value per Annum}}{\text{Total Number of Employees}}$$

Where Added Value = Total Sales - External Expenses

"Total Number of Employees" is rather misleading though, because it does not show how many hours each employee has put into the production process. A more meaningful unit could be therefore, "man - hours worked".

Accountants are more financially oriented and they like productivity measures which are also financially oriented. Their objective is to provide management with ratios that show liquidity, funds and profitability. Theoretically, there are no limits to the number of ratios that can be derived. Some of these ratios are:

- (1) Profit / Capital Employed
- (2) Profit / Sales
- (3) Sales / Capital Employed
- (4) Sales / Fixed Assets
- (5) Sales / Stocks
- (6) Sales / Employees
- (7) Profit / Employees

These ratios can be useful to management but they are

not really measures of productivity. A closer examination of these ratios shows that they are rather sales oriented and yet the sales value (or profit) may have nothing to do with the efficiency of production but may be strongly influenced by supply and demand.

A better and more informative method used by accountants to evaluate productivity is the productivity costing method. This method aims at reducing all inputs and outputs into economic values , or monetary terms. According to the method then there are two productivity indices one primary and one secondary. The primary index, also called Total Earnings Productivity , is the ratio of the total earnings to the total costs. The secondary index, also called Profit Productivity , is the ratio of the total profits to the total costs. The primary index shows the profitability of the company and the secondary one indicates profit for positive values and loss for negative values.

Engineers are interested in the resources utilization of a company and they tend to measure productivity in terms of these resources. They want to measure the use of resources , generally excluding manpower and cash resources and concentrating on physical assets. They like to compute quantitative measures such as measures of production times, labor requirements, material requirements and waste levels, space and machine utilization and so on . Engineers regard

productivity as synonymous with efficiency. For them productivity is the quotient obtained by dividing product output (Ou) by one of the factors of production (If) whether it be capital, investment, or raw material. Hence:

$$\text{Pro} = \frac{\text{Ou}}{\text{If}} = \text{Eff} < 1$$

The input may be said to generate the output . Since the input is converted to the output it cannot exceed unity in the physical sense but may do so in financial values.

4. BENEFITS AND COSTS OF PRODUCTIVITY IMPROVEMENTS

As mentined earlier productivity is a factor that affects the total economy of the Nation. It also affects the standard of living of the American people. Improvements in productivity will affect positively the economy and the standard of living of the Nation. The opposite is of'course true, but what will happen if productivity remains unchanged for a period of time is a matter of dispute. Many believe that if productivity remains unchanged nothing will happen and things will remain the same. This is not true though. For things to remain the same productivity must still be increased although with a smaller rate.

Increases in productivity will therefore produce many

benefits. Productivity cannot be improved, however, without incurring costs. Examples are costs for research and development, education, training, and the more direct costs of studying present productivity and designing and implementing better methods. Unfortunately this is not recognized by many companies in construction and elsewhere.

5. REASONS FOR PRODUCTIVITY DECLINE IN CONSTRUCTION

There are many reasons as to why productivity in the construction industry has been steadily on the decline for the past 15 to 20 years. Since productivity is also declining in other industries it seems that many reasons are common to all industries. The assumption just made suggests that the construction industry cannot be isolated since this too is affected by changes in management practices, society trends, society problems, etc.

Educational levels: U.S. education has changed dramatically in two ways over the past 40 years. First the amount of education that is being offered has increased tremendously. In 1940 Americans received an average eighth years of schooling; In 1985 the total has increased to 13 years. Today approximately 40 percent of the present college age population is attending college, and 80 percent have graduated from high school. Second, in addition to more years of education, today's students also have wider variety of educational careers. The number of courses offered in high

schools and colleges has increased tremendously , and in grade schools, individualized, self-paced instruction has become popular.

There are no definite data on how trends in education are affecting the workforce. But it is reasonable to speculate that partially as a result of modern educational practices, employees now tend to be more aware of the total world around them , and they look for satisfaction both inside and outside the workplace. In addition , they are less willing to accept jobs that give them little freedom, and they are not easily motivated by jobs that do not utilize their skills, abilities, and education.

Another implication is that organizations can no longer rely solely on extrinsic rewards to motivate and reward their employees. To motivate employees who are concerned about autonomy and growth , other approaches must be taken . Otherwise , employees will be apathetic and uninvolved and will look for satisfaction outside the workplace.

Diversity of the workforce: The past 20 years have seen a dramatic increase in the number of women and minority group workers. In 1950 31.4 percent of the women in the United States worked; In 1985 the total had risen to over 50 percent. The increasing entry of minority groups and women has added to organizational workforce diversity through new

cultures, backgrounds, and value systems. The trend requires more individualized approaches to motivation because individuals differ significantly in the rewards they value. This makes the job of creating a motivating work environment more difficult because it is no longer possible to design one "right" motivation system for all employees.

Technological changes: Advances in equipment design bring a constantly changing technology to the workplace. Many organizations face decisions about adopting equipment that promises significant increases in productivity. Technological change itself is not a problem for motivation, but it can be troublesome if it results in the deskilling of jobs. It can take away from jobs the intrinsic rewards that people receive from doing their jobs well, thus decreasing both motivation and satisfaction. In some cases, this can substantially reduce the productivity of new equipment to the point where it is not worth the investment.

Union contracts : Union contracts directly affect what organizations can do in two key motivational areas—job design and reward systems. More and more union contracts seem to eliminate merit pay, prevent individualizing such things as fringe benefits, and contain rigid job descriptions that block practices such as job rotation and job enrichment. These restrictions are serious obstacles to creating a motivating work climate because they make it difficult to

create extrinsic motivation by tying pay to performance and because they hamper the creation of enriched jobs that will be intrinsically motivating.

Government regulations: Although many of the increasing numbers of government regulations have no direct impact on motivation , they all tend to decrease organization's options. OSHA regulations , NLRB rules, and so on, decrease organizational flexibility . It is simply becoming less and less possible for companies to operate in an individualized , nonstandardized manner that fits the needs of a diverse workforce even if the organization's way is in the interests of better motivation and higher satisfaction.

Organizational growth : The American work scene is increasingly dominated by large organizations. Research data suggest that the larger the organization , the lower the satisfaction for motivation levels of its workforce , particularly for lowerlevel employees. In large organizations employees are less able to see a clear connection between their own behavior and the over-all performance of their companies , making it difficult for management to produce extrinsic motivation by basing pay on performance. It also is harder to create conditions that favor extrinsic satisfaction and motivation because individuals don't have jobs that have some visible , measurable product or output.

Attractiveness of nonwork: Nonwork is becoming more attractive. Leisure is a major growth industry , and recreational and educational opportunities available to the nonworker are constantly increasing and can be enjoyed at all times during the day and year . Work has to offer something to the employee that cannot be obtained off the job. Formerly, organizations could rely on money in their competition with the lures of nonwork , but cash may now be losing some of its impact. For one thing large number of government programs help support the nonworker and the part-time or occasional worker , who may be eligible for unemployment compensation , welfare food stamps , and related benefits . In addition , people need to work fewer and fewer hours to pay for the basic necessities of life , and individuals can more easily survive with part-time jobs or irregular job attendance.

Drug problems : Over the past few years there has been a tremendous increase of the number of people using drugs . Life was never easy but in the past American people faced their problems and tried to deal with them . Today's people instead of facing their problems try to escape from them. Using drugs is an easy way out and many people cannot resist. Drugs besides endangering people's health , create many psychological problems to users which they cannot deal with. As a result of using drugs people loose their morale and interest in life . They become apathetic and their only

interest is getting their dose. Work for these people is just another of their problems and there is very little in what organizations can do in such case.

CHAPTER II

MOTIVATION AND FACTORS AFFECTING CONSTRUCTION LABOR
PRODUCTIVITY

Worker productivity is often discussed , often misunderstood , much maligned , and vitally important. The following statements are devived from many of the commonly held opinions regarding worker productivity.

Worker productivity is the key to economic viability and increased wealth.

Worker productivity is improved by capital investment.

Worker productivity is improved by labor specialization and job design.

Worker productivity is improved when labor works harder.

Worker productivity is improved when labor works smarter , not harder.

Worker productivity increases mean work spoad-up and exploitation of labor.

Worker productivity increases are a primary determinant of job elimination and unemployment.

Worker productivity increases are opposed by labor

unions. The worker's productivity is a function of the worker's ability and

Worker productivity refers to the output of direct labor in manufacturing jobs.

Worker productivity is a function of the worker performing the task.

Worker productivity is a function of management practices and policies.

Worker productivity is a function of pay.

Worker productivity is a function of the environment .

Worker productivity is a function of a complex system of interrelated variables ; individual , organizational , and environment.

The statements above provoke debate concerning their truth and applicability depending upon the background and orientation of the individuals involved and their definition of terms . The only general conclusion that can be drawn from the many articles , speeches , government resolutions , conferences , case studies , and research efforts is that we just now beginning to realize how important , yet how complex , is the subject of "worker productivity".

1. MOTIVATION IN CONSTRUCTION

There are four determinants of a worker's productivity: the duration of the worker's effort , the intensity of the worker's effort , the effectiveness with

which the worker's effort is combined with technology and other resources, and the efficiency of the worker's effort. The duration of the worker's effort is the proportion of time the worker is engaged in productive work during a time period. The intensity of a worker's effort is a measure of how hard the worker is working. It may also be considered a measure of the degree to which a worker is utilizing his abilities. The effectiveness with which a worker's effort is combined with technology and other resources is a measure of the degree to which the productive potential of technology and other resources has been utilized. For example, a worker may dig a trench either with a pick and shovel or a trenching machine. In the latter case, the worker's effort has been combined much more effectively with the available technology. It is important to understand that the technology considered is not limited to that possessed by the firm. The final determinant of a worker's productivity the efficiency of his effort, is a measure of the quantity of acceptable quality output produced by a worker with his effort. A worker may expend his effort intensely over a long period of time, but if he produces poor quality work, his efficiency and consequently, productivity will be low. The converse is also true in that a worker may take extreme care to produce high quality products, but may not produce in large quantity because of the time necessary to produce a high quality product. In this instance, efficiency and, therefore,

productivity , is low. The latter example may exist if the quality of the individual's work is superior to that required by the task.

How does a worker's motivation influence his productivity ? Motivation is a physiological and psychological drive to satisfy one's needs , or both , and is manifested by behavior to obtain the means of satisfying those needs . The expenditure of effort by a worker is the physical manifestation of motivation; the greater a worker's motivation, the greater his expenditure of effort . A worker's effort interacts with the resources provided by an organization resulting in performance. If there are no constraints on a worker's performance arising from ineffective management (inadequate equipment , instructions , materials , and tools; crew interference; etc.) an increase in a worker's effort should result in an increase in his productivity .The manner in which the productivity increase is obtained can be seen by examining the influence of motivation on the four determinants of productivity.

Absent any constraints imposed by the organization , the duration of a worker's effort is totally within the control of the worker's . The decision as to what proportions of the work period he will engage in productive work is the worker's. If the worker perceives that his needs will be satisfied by performing and successfully completing a task ,

or both, he will be more motivated to perform the task and, thus, will increase the duration of his effort than if satisfaction of his needs is perceived as unrelated to his performance. In a similar manner, an increase in the worker's motivation should result in an increase in the worker's intensity. A worker's motivation also influences the efficiency of his effort. A motivated worker will less likely be inattentive or negligent, which results in unacceptable work.

The influence of a worker's motivation on the effectiveness with which his effort is combined with technology and other resources is less clear. If a worker perceives that he will be able to satisfy his needs by successfully performing a task, he should be receptive to anything that will improve his ability to complete the task. It is necessary to view this situation from two perspectives. A worker would most likely not oppose the introduction of any method or technology that will allow him to more easily complete the task or complete it in a shorter period of time. However, the loss of his job will frustrate a worker's attempts to satisfy his needs. Therefore, technology or methods seen as decreasing employment opportunities and, thereby, opportunities for need satisfaction will be opposed. This opposition may be informal, e.g. workers lackadaisically use the method or technology and, thus, prevent its full potential from being realized or it may

be formally institutionalized as a collectively bargained limitation on the employment of the method or technology . An example of a formal limitation would be a work rule negotiated by cement masons in some localities that requires wet concrete to be finished by hand in addition to being finished with a power trowel . A worker's motivation to utilize the most productive methods and technology will be increased if the worker perceives himself as having employment security.

It is commonly accepted that a worker's motivation significantly influences the determinants of a worker's performance . Given the importance of motivation the question must be raised as to what do we know about the motivation of construction workers.

2. CONSTRUCTION - RELATED MOTIVATION STUDIES

In recent years , several attempts have been made to examine the applicability of work motivation theories to construction workers. Most of the studies are not based upon empirical evidence , but ,rather, they are analyses of the unique characteristics of construction work in light of motivational theories. The studies limit themselves primarily to Maslow's need theory and to Herzberg's two-factor theory.

The Maslow and Herzberg models attempt to indentify specific factors in the individual (in the case of Maslow)

or in the job environment (in the case of Herzberg) that motivate employees. Maslow argues that man's needs are basically of five types : physiological needs , safety needs , social needs , self esteem needs, and needs for self-actualization , and these needs are arranged hierarchically and become active in the aforementioned order. According to his analysis, man is a wanting creature motivated by a desire to satisfy certain specific types of needs. As soon as the need on a lower level is satisfied, those on the next higher level will emerge as the needs demanding satisfaction . Once satisfied , a need is no longer a motivator of behavior. Herzberg's two-factor theory argues that satisfaction and dissatisfaction do not exist on a continuum running from satisfaction through neutral to dissatisfaction. Rather ,he argues that two independent continua exist : one running from satisfied to neutral and another running from dissatisfied to neutral. His theory stresses that different job faces influence feelings of satisfaction and dissatisfaction. Factors ,such as achievement , recognition , work itself , and responsibility , are seen as connected with satisfying experiences , while working conditions , interpersonnal relations , and supervision are usually connected with dissatisfying experiences. Thus , according to his theory , a person can be satisfied and dissatisfied at the same time . The satisfying factors are labeled as motivators , and the

dissatisfying factors are called hygiene factors. In terms of Maslow's need hierarchy, Herzberg's hygiene factors are roughly equivalent to Maslow's lower needs and the motivators to the higher-level needs.

Borcherding J. D. in his " An explanatory study of Attitudes that Affect Human Resources in Building and Industrial Construction " , refers to Herzberg's theory and concentrated on job satisfaction and dissatisfaction.

Herzberg has argued that job enrichment that has a positive impact on the factors connected with satisfying experiences will lead to an increase in job satisfaction, which lead to an increase in job satisfaction , which will , in turn , result in improved performance. After identifying factors that contributed to job satisfaction and job dissatisfaction among construction workers, Borcherding concluded that among these workers , the opposite of Herzberg's finding held : well -organized construction jobs that permit workers to be productive lead directly to job satisfaction . Borcherding's finding are consistet with a recent study that reviewed research related to the satisfaction-performance controversy and concluded that neither proposition-satisfaction causes performances nor performance causes satisfaction- is supported by empirical evidence . Instead , it is claimed that recent research was more indicative of another proposition , namely , that

satisfaction and performance are covarians of a third variable - the administration of rewards based on current performance and that this variable causes subsequent performance.

Research by Borcharding and other conclude that the higher-order needs for belonging and growth possess the highest motivational potential for construction workers, and, thus, should be promoted in the construction industry.

3. INTRINSIC AND EXTRINSIC MOTIVATION

Intrinsic motivation is that which occurs while a person is performing an activity in which he gains satisfaction from engaging in that activity itself. This is called internal reward and it is directly part of the job content . Extrinsic motivators are the incentives or rewards that a person can enjoy after finishing work . This is related to the job environment or an external reward.

Traditionally work has been riewed as necessary drudgery. Rewards came in the form of pay , which was enjoyed off the job; holidays and vacations , which were enjoyed off the job ; cafeterias and lounges , which were enjoyed away from the job; and pensions , which were received after retirement from work . Modern behavioral research has tended to emphasize that work itself can be satisfying. Managers in

some enlightened corporations have been applying this concept by placing people on jobs for which they are trained and interested, by new concepts of job design and work flow, and by gearing recognition directly to the job.

Although there are those enthusiasts for intrinsic motivation who would substantially downgrade all efforts toward extrinsic motivation, in reality both are necessary. If working conditions, wages, job security, and fringe benefits are inadequate, a company will find it difficult to recruit and retain good people. Turnover, absenteeism and grievances tend to be high where management ignores external forms of reward. Large bureaucracies, in both government and industry, tend to do quite well in meeting people's maintenance needs. What they so often lack is emphasis upon challenging assignments, an encouragement of innovation, and large rewards for achievement. By emphasizing job tenure, loyalty, and conformity, bureaucracies tend to repel those with an enterprising spirit and drive. A sound motivational climate must provide both extrinsic and intrinsic motivators. Motivation is of a dynamic nature and it should be viewed as such. It changes with time and it needs continuing adjustment if it is to be effective. People at different times place different weights upon extrinsic or intrinsic motivators.

4. CREATING AN EFFECTIVE MOTIVATING WORK CLIMATE

Because human needs are very much a personal matter, organizations can do little to change the fundamental on-the-job needs and goals of their employees. They can, however, influence how motivated employees are to perform their jobs effectively - that is, whether or not employees also direct their efforts toward the goals of the organization.

Some organizational climates encourage goal-oriented behaviors while others do not. In the past, most executives were able to create adequately motivating climates by using well-established, standardized approaches to compensation, job design, promotion and selection. But times have changed, and the way people are today suggests that changes are necessary in the motivational approaches taken by most organizations. Though the situation is far from critical, significant changes are taking place, and unless organizations take some decisive actions, they may find themselves without one of their most valuable assets - their ability to influence work climates.

Behavioral scientists have done a large amount of research that defines a motivating climate as a work situation where important rewards are perceived to be tied to performance. Establishing the necessary clear connection

between performance and rewards may appear to be an easily achieved goal , but the task of establishing this objective in an organization can be very complex. With societal conditions changing so rapidly , it is not always evident to managers how performance-reward principles can and should be used in making decisions about things such as the design of information systems and the adoption of new technology . Much is known , however , about job design and reward systems. Work in these two organizational areas has gone a long way toward pointing out how an organization can influence motivation.

Many researchers have show that the way jobs are design^{ed} has a strong impact on the degree of employee motivation. The tasks employees are given , how performance is measured , and how feedback about the results of performance is handled all affect intrinsic or internal motivation. But intrinsic motivation is not based on the traditional rewards-pay , motivation , and approval from a supervisor ; it springs from an internal desire to do the job well in order to experience a sense of accomplishment , personal growth, and satisfaction. It is also clear that not everyone is motivated by desires for accomplishment and growth and that , as a result , their motivation is not influenced by the design of their jobs . It is also evident that many jobs in organizations don't produce this kind of motivation; for jobs

to generate intrinsic motivation a certain set of job characteristics must be present . Job-design researchers maintain that jobs must provide feedback , involve a meaningful piece of work , and allow the employee to control both how the job is done and the pace of which he or she works.

The promotion , status , and pay systems of organizations are probably the most visible reward systems. Though they are frequently maligned as motivators , there is no question they can be very effective ; an enormous amount of research evidence supports their ability to influence behavior. Behavioral research has pointed out , however, that there are problems with pay and promotion as motivators. For example, they cause disfunctional behavior (reporting false data, rigid bureaucratic behavior), and they are difficult to relate to performance in many situations . In addition , extrinsic rewards do not motivate everyone . People have to value rewards in order for them to be an effective motivator and people differ in how much they value even extrinsic rewards , such as pay.

As mentioned earlier there is no evidence that satisfaction lead to high performance . Satisfaction, however, impacts on turnover and absenteeism. Satisfied workers are more likely to remain member of the organization,

to go to work regularly, and to get there on time. It is very important to distinguish membership behavior and its determinants - satisfaction - from job performance and its determinant - the degree to which important rewards are tied to performance. Membership and performance tend to be independent events. Satisfaction, like motivation, can be influenced by rewards, but in a different way; basically, the more employees value their rewards, the more satisfied they are likely to be. Overall, research on satisfaction and motivation suggests that people are not naturally motivated to perform their jobs well or to go to work. The work environment has to be structured properly for them to be motivated and to be satisfied enough to go to work. They not only must find work a rewarding place to be, but also must perceive that important rewards depend on them performing well.

The task of creating a motivating work environment simply requires a different approach than previously. Though some promising new approaches do exist, they don't solve all problems; nonetheless, they appear capable of helping organizations deal with the rapid societal changes now taking place.

Cooperative labor and management projects: A number of major corporations and unions in the United States

have recently undertaken cooperative ventures aimed at making the workplace more satisfying and rewarding . In these ventures, both union and management have decided that in some areas an adversary relationship is not desirable and they have agreed to cooperate in order to design a better workplace . Most of these projects have redesigned jobs to give employees more decision - making responsibility and more challenging jobs. Their sponsors also have explored ways to reward workers for increases in organizational effectiveness. This has not meant the use of devices such as piece - rate plans; rather it has led to the use of gain - sharing programs. Cooperative projects , which have been established in organizations ranging from coal mines to hospitals, are important because they demonstrate that unions and management can relate in a way that leads to improved work environment.

Individualized reward systems: Some organizations are experimenting with reward systems that are designed to fit the particular needs of individuals. Individualized reward systems are a necessity if the reward systems of organizations are to fit the broad diversity of present-day employees. Organization reward systems must recognize that all employees don't want the same things. Cafeteria - style fringe benefit programs and lump-sum salary increase plans recognize this need. In cafeteria-benefit plans employees are offered an opportunity to choose a combination of available

benefits that best fit their needs. This multiple choice opportunity permits employees to design plans that not only accommodate individual lifestyles but also permits employees an opportunity to exercise the kind of choices they are used to making in other areas of their lives. Lump-sum salary increase plans allow individuals a choice of how they receive pay increases. Like the cafeteria-benefit approach, these plans give employees some element of control over pay and an opportunity to meet special needs.

New-technology analysis: The installation of new technologies can have a tremendous impact on employee motivation. Unfortunately, few organizations consider this impact before the technologies are installed, and severe, unanticipated motivational problems often appear. New technologies can and should be reviewed in terms of their motivational impact before they are adopted. This evaluation should consider the nature of the employees who will use the equipment or process, as well as the impact the technology will have on intrinsic and extrinsic rewards. This means full consideration of both the jobs the new equipment will create and how it will impact on the organization's ability to tie extrinsic reward to performance. On the basis of this technological analysis, the organization may decide to reject the new technology, modify it, or accept it because other advantages outweigh its negative motivational impact. A few organizations now do technological analyses and

one of the more interesting approaches to the technique is to have the employees who will utilize the technology do the analysis. Among the obvious advantages of this method are that it helps reduce resistance to whatever technology is finally adopted and assures that the needs of the employees receive serious consideration. It certainly is not the only way to proceed, but it makes sense where employees have knowledge to contribute and where resistance is a potential problem.

Individualized job design:To be motivating, a job must be designed to fit the values and needs of the people performing it, a point frequently overlooked in debates over the advantages and disadvantages of job enrichment and the more scientific management or industrial engineering - oriented approaches to job design. The simple fact is that no one approach to job design is always correct. In some cases the workforce of an organization may be sufficiently homogeneous so that it makes sense to use only one approach to job design; however, situations where this condition exists are probably in the minority. Because of the diversity that exists in workforces of most organizations, any approach to motivation that uses the same approach to job design for all individuals is likely to fail to motivate and satisfy many employees. An interesting example of how this can be done is as follows: In a certain company, miners were given the choice of (1) working in a traditional system where everyone did only one job with a foreman present or (2)

joining an autonomous section where miners switched jobs and "managed" themselves. The miners choice was a split between the two alternatives. To some, this decision may appear to be silly because " obviously " one approach must be best and therefore should be used by all. From a motivational point of view , however, neither approach was best for all , and it made sense to that management to use both. Although few firms have tried similar efforts to fit the job design to employees , it may be the only way that organizations can provide everyone with motivating jobs.

Subunit design: It is particularly important for large organizations to use approaches that will reduce the motivational problems caused by large size . Some interesting approaches to this problem are being tried. All involve dividing the large organizations into relatively free standing parts to allow meaningful measurement of the performance of smaller units of the organization. Such measurement is necessary for both intrinsic and extrinsic motivation since without it , rewards cannot be related to performance. Some organizations have created small , relatively free - standing work teams , which typically make their own production decisions and in some cases even make pay and hiring decisions . The work - team approach has been tried in many organizations with favorable results; it seems to work best in situations where the work requires a great deal of cooperation among team members and where

groups can be relatively free standing within a larger system. Although this exact approach may not work in all situations approaches to organization design that give individuals in a large organization a meaningful subunit to identify with, probably can be found for most situations.

5. IMPORTANT JOB FACTORS FOR CONSTRUCTION WORKERS

The construction industry is a unique and highly fragmented industry. Construction workers as a result are very heterogeneous ranging from plumbers and electricians to masons and labors. As such the construction labor force has its unique characteristics, and construction workers differ in their consideration of important job factors from workers in other industries. A study done by William F. Maloney and James M. Mcfillen indentified the importance that construction workers attach to specific job factors, and their satisfaction with each factor. Their results will be presented and discussed because they represent an excellent source of information on construction workers.

The study was conducted by surveying 2800 construction workers. The workers were asked about the importance they attach to various job related factors and their satisfaction with each factor. The 28 individual factors were reduced to seven which were as follow:

Factor 1 - Intrinsic Rewards

- the opportunity for challenging work
- the chances you have to accomplish something worth-while
- the resources you have to do your work
- the chances you have to learn new things
- the chances you have to do something that makes you feel good about yourself as a person
- the opportunities to develop your skills and abilities
- doing your work in a craftsmanlike manner
- the chances you have to do the things you do best
- the respect you receive from the people you work with

Factor 2 - Opportunity

- your chances for getting ahead
- your chances for getting promotion
- the chances you have to take part in making decisions
- the amount of job security you have

Factor 3 -Interpersonal Rewards

- the friendliness of the people you work with
- the way you are treated by your co-workers
- the respect you receive from the people you work with

Factor 4- Feedback

- seeing the results of your work
- the opportunity to do an entire job

Factor 5- Supervision

- the foreman's understanding of the kind of work you do
- the foreman's ability to manage work
- the particular task assignment you receive

Factor 6 - Performance Level

- high productivity
- the quality of work you do
- doing your work in a craftsmanlike manner

Factor 7 - Extrinsic Rewards

- the amount of pay you get
- the fringe benefits you receive

Importance:After analyzing the responses and ranking the factors it was found that the most important factor was Intrinsic Rewards. This shows that construction workers place high value on such things as : performing challenging work; developing one's skill; working like a craftsman etc. These are functions of job design , i. e. the nature and combination of tasks in a job and the specific job assignment.

The next important factor was that of Performance Level. High productivity and the quantity of work done were relatively important. This indicates that workers care about the level of output and the manner in which the output is obtained.

Feedback and extrinsic Rewards were found to be the third most important factors. Feedback involves the desire of people to know how well they are doing. In construction work,

the physical progress of the work provides a form of feedback. The two important items that had significant loadings on this factor were "seeing the results of your work" and "the opportunity to do an entire job". Seeing the brick rise or the steel go up is important to workers. As the brick rises, the masons receive the feedback that tells them they are doing a good job. The opportunity to do an entire job provides the workers with closure. They can see their work culminating in the completion of their own activity and the facility. Extrinsic Rewards include pay and fringe Benefits. In the union sector, wages and fringe benefit levels are established through collective bargaining agreements, giving the contractors no direction in the establishment of such rewards on their specific jobs. Therefore, extrinsic rewards do not vary with performance level on an assigned task. The inability to vary extrinsic rewards in accordance with individual performance is believed to significantly weaken their ability to influence performance. This is certainly unfortunate given the relative importance of such outcomes to workers.

Supervision which was composed of the foreman's ability to manage the work, to understand the kind of work being done, and to make task assignments was the fifth most important factor. The workers indicated that Supervision was somewhat important to them, but not as much as previous

intrinsic and extrinsic factors.

The sixth most important factor was that of Interpersonal Rewards. Construction work is typically performed by work crews and members of the crews receive interpersonal rewards from the other members of the group. Membership in a group that likes you, treats you fairly, and respect you and your work is much more rewarding than the opposite situation.

The least important factor was Opportunity which is an evidence that workers associated little importance with the opportunities for getting a promotion and for taking part in decision - making.

It is very interesting to note how the different trades considered the importance of these factors. For example Plumbers attached high importance on Intrinsic Rewards whereas Laborers attached low. Carpenters attached high importance on Feedback whereas Electricians attached low. Laborers attached a high importance on Extrinsic Rewards. Furthermore persons who had completed an apprenticeship program reported higher importance for Intrinsic Rewards than did those who had not completed one. Individuals who had enrolled in technical school attached a lower importance to Extrinsic Rewards than did workers who had not. Finally

minority workers attached greater importance to Extrinsic Rewards than did non-minority workers.

Satisfaction: Again after analyzing and ranking the workers' responses Performance Level was found to be the factor with the highest satisfaction. Considering the fact that Performance Level was the second important factor, it can be seen that the level of workers' performance was important to them but they were relatively satisfied with it. Thus, little action by management would appear to be needed to raise the performance level for the purposes of improved satisfaction.

Extrinsic Rewards were found to be the second factor in level of satisfaction. Since this factor was the third most important it shows that workers were relatively satisfied with this factor. From the individual items contribution though it was found that workers were much more satisfied with pay than with fringe benefits. Thus, action focused on changing fringe benefits would contribute more to improving worker satisfaction with Extrinsic Rewards.

The third satisfaction factor was Interpersonal Rewards. However this was the second lowest ranked importance factor. The reported level of satisfaction and the low importance ranking would appear to indicate no need for

managerial action.

Intrinsic Rewards were the fourth satisfaction factor . Given that this factor was top-ranked in terms of importance, contractors need to take action to increase intrinsic rewards. This can be done by changes in job design and job assignments. The receipt of these rewards is the most important factor to the workers , and the relatively low satisfaction reported indicates the need for contractors to act to make jobs more challenging and demanding in order to allow workers to develop and utilize their skills.

Feedback ranked third in terms of importance , but only fifth in terms of satisfaction. This relatively low level of satisfaction indicates that the workers desire more feedback. From the items of this factor " the opportunity to do an entire job " had very low satisfaction. This low satisfaction with the opportunity to do an entire job implies that contractors may be creating too much specialization by breaking the work into small narrow task packages. This apparent reliance on the principal of scientific management may indicate that the construction industry is making the same mistake made in manufacturing . i.e. , excessive dependence upon job simplification as a tool for increasing individual productivity. Simplification tends to reduce the available feedback from the job itself. Thus, it appears that

contractors need to be exploring the use of autonomous work groups and other approaches to job design that have the objective of overcoming excessive specialization.

The second lowest satisfaction factor was that of Supervision. Three satisfaction items composed the Supervision factor : the foreman's understanding of the kind of work you do; the foreman's ability to manage the work; and the particular work assignment received. Of these three , the satisfaction with the foreman's ability to manage the work was significantly lower than the satisfaction with either of the other items . The low levels of satisfaction with these items indicate a need for significant improvement in foreman selection and training , particularly with regard to the ability to plan and organize the work.

Satisfaction with opportunity was the lowest ranked factor. The low satisfaction with opportunity was a result of the lack of satisfaction with job security. Employment opportunities, and thus job security will improve as the economy improves , but contractors can anticipate that this is an important issue to address with workers.

In their study Willian F. Maloney and James M. McFillen concluded that contractors must take action on factors that are important to workers , and for which the

workers report low satisfaction. By taking such actions they say, contractors will reduce disfunctional behaviors, increase worker performance and make the work experience more rewarding and satisfying for their workers.

6. LABOR UNIONS AND THEIR IMPACT ON PRODUCTIVITY

Many of the industrial relations problem areas are the result of the nature of the construction process and, in particular, the market and technical aspects of the industry. Completed construction products (e.g., buildings, roads, dams, etc.) are immobile and removal typically involves complete demolition of the structure; therefore, the complete product cannot be manufactured at one side and then transported to the side of utilization. This immobility has resulted in the development of construction as a local market industry. The local markets tend to be protected from outside competitive pressures and thus the potential for monopolistic arrangements involving contractors or union groups, or both, is created. In the local markets producers are able to resist new techniques and to pass higher costs on the buyers without fear of competitive underbidding from outside producers. Similarly, unions are able to gain control over the labor supply and introduce regulatory policies without fear of outside competition.

Construction projects are extremely complex and the

numerous highly skilled operations required on any construction project have led to craft specialization where a premium is placed on workers skilled in the full range of duties associated with the craft rather than narrow specialties. The local market nature of the industry in conjunction with the complexity factor have fostered the development of the industrial relations system in construction where 18 craft unions operate at the local level with little control by the national or international union. The average employer has approximately 10 employees and tends to be in an uncertain financial position.

The primary consequence of these characteristics is that bargaining power is heavily weighted in favor of the unions, which has allowed the unions to impose their demands upon the weak and, for the most part, disorganized employers. Bargaining is typically conducted between a single union and a loose federation of employers who utilize the craft. There is little, if any, coordination in bargaining among the various unions and employer associations. The scattered contract expiration dates and the impact of the bargaining structure result in constant pressure to maintain traditional wage differentials between crafts despite short-run conditions in the labor market that require changes in those differentials. Granting a large wage increase to a union in an attempt to increase the supply of labor in that craft initiates a wage spiral as other crafts attempt to

maintain the traditional wage differential. The industry has been unable to do this because of the high cost of labor. Of greater consequence to the industry are the ramifications of the operation of the labor market. Demand for construction labor is closely related to the general economic level. There is great variability of demand for construction labor in the aggregate market and in each of the identifiable submarkets, i.e., residential, industrial, commercial, public, and repair and maintenance. Coupled with this variability, demand for specific crafts fluctuates greatly on individual construction projects. As a result of the variability of demand, the unions, with the acquiescence of the employers, have developed a system of work rules and conditions to protect the employment opportunities of the union members. These rules range from specific manning requirements for particular pieces of equipment to the strict enforcement of jurisdictional claims. Contractors allege that these rules inhibit productivity and, when coupled with the high wages that have been negotiated by the trades, render union contractors noncompetitive with open shop contractors.

Beginning in the mid-1960's, construction employers and purchasers of construction services began to express great dissatisfaction with the building and construction trades unions. This dissatisfaction arose because of three fundamental results: (1) Wages; (2) productivity; and (3)

strikes. Wages in the unionized sector of the industry rose rapidly between 1967-1974. Strikes in the industry, relative to other industries, are a significant problem. The percentage of estimated total working time lost because of strikes in construction is twice, and in some years three times, that in manufacturing. It is difficult to assess the problems of productivity in quantitative terms for construction industry. One writer in the Engineering News-Record, has estimated that low productivity wastes from 15%-40% of every construction payroll dollar or, in monetary terms, \$7 billion - \$18 billion in 1972.

The result of this dissatisfaction is the rapid growth of the open shop sector of the construction industry, which provides a source of competition to the unionized firms in their local markets. There is evidence that indicates open shop firms have not only captured a significant share of the various construction markets but that their share is increasing. Construction unions across the country have exhibited a variety of responses to the loss of market share to open shop employers. Some simply ignore the open shop firms and consider their growth a temporary phenomenon. Others resort to violence with physical assaults on open shop employers and job sites. A third reaction is for the unions to meet with the employers to review means of improving the competitive position of the union contractors. In this latter approach, the parties enter into productivity

bargaining , which might be the best way in eliminating the negative impact on productivity by the labor unions.

CHAPTER III

PRODUCTIVITY IMPROVEMENTS

The importance of improvement in productivity does not need to be repeated again. Instead the view of Senator Edward Kennedy that was stated at the Urban Research Corporation Conference in New York in 1973 is repeated here. His view justifies very well the concern with productivity increases in this country:

The direct concern of industry and management in improving the quality of work is all too evident. For the very future of American economic growth depends upon our ability to withstand the intense pressure of foreign competition. And the failure to recognize the debilitating impact of job dissatisfaction could prove to be lethal defect in the effort to increase productivity and to maximize our competitive ability.

Many researchers of the subject of productivity are studying the way Japan deals with the problem. It is doubtful though that they will be able to offer any solutions, that would be applicable, despite the fact that Japan has the highest productivity among all industrialized

Nations. Solutions to this country's productivity problem cannot be found by adopting the Japan's approach. This country needs its own approach to the problem. Nevertheless, it is very interesting to note where Japan's productivity movement was based. Their movement was based on three major premises: (1) productivity increases will increase employment in the long run , (2) labor and management must work together to increase productivity , and (3) profits must be distributed fairly among management , labor, and the consumer. These three major premises can very well be adopted by the United States , because they seem to represent excellent starting points for this country as well.

1. JOB SECURITY

Job security is probably the one most important aspect that needs to be addressed by contractors. It represents an excellent way of improving productivity of construction labor. American executives have traditionally attached little importance to job security of their employees. As soon as there was a downturn of business for their firms they would lay off workers and salaried personnel to cut costs.

Job security has always ranked high on the employee's list of priorities. Spurred by the very deep recession and mass layoffs of the 1980-1983 periods, workers and unions have pressed hard for protection against layoffs . And now

enlightened managers have come to realize that there are heavy costs to the firm of frequent layoffs and real benefits from a program of employment stability. Layoffs are expensive. They entail severance pay, higher unemployment insurance tax rates, and the extra cost of training workers when demand picks up. Fear of layoffs can drive good employees to seek jobs elsewhere. Fear of layoffs depresses productivity because employees resist technological innovation and cost-reduction measures.

Some of the most successful firms in the United States have policies of employment security and no layoffs. Among these are IBM, Texaco, etc. These firms set up programs to seek ways of avoiding layoffs, to retain workers for new technologies, and to transfer employees to other jobs when their jobs must be eliminated. It seems that these programs work very well and there is no obvious reason why they should not be used in construction companies as well.

Long-term job security creates a feeling of togetherness between management and labors. It builds employee trust and loyalty to the company. Workers would readily accept labor-saving technologies because they would not be afraid of losing their jobs. Construction companies, instead of hiring extra people to meet peak production demands, they should subcontract some of their work or hire temporary employees. In order for the long-term job security

to become a reality in this country management thinking must be changed. American executives must change their practices and engage in the fundamental long-range planning necessary for employment security.

2. IMPROVE PRODUCTIVITY BY CONTROLLING ABSENTEEISM

Controlling absenteeism as a means of increasing productivity may appear to be an unusual concept. It seems that not many people believe that this is an effective way to increase productivity. The increased rate of absenteeism, however, adds a dimension that was not present twenty years ago and does affect productivity. The impact of absenteeism upon labor is significant and indisputable. While we know that absenteeism has increased on a national basis, it is difficult to determine the exact amount of the increase. In part, this is due to the lack of record keeping by many firms. A survey by the Bureau of National Affairs in 1974 indicates that only 40 percent of the firms surveyed compute absenteeism on a regular basis.

Theoretically, it can be argued that absenteeism will have no impact upon productivity when productivity is measured by the traditional formula - physical output divided by the hours worked. This argument assumes that a company will have enough extra workers to replace those who are absent. These workers can be obtained from a "pool",

diversion of workers from operations that can be suspended, working "short-handed", or by overtime. While theoretically this argument may have validity, it is not likely to be valid in practice. Common sense indicates that startup time will be greater as supervisors attempt to find replacements for those workers who are absent. In many instances, the replacements will not have the job knowledge or the skill required to perform the operations efficiently; the results may be non-utilization and/or less than full utilization of expensive capital equipment. Incalculable is the cost in supervisory time, not to mention the pressures placed upon supervisors. Many important supervisory functions are likely to be neglected or slighted during the first hour or so as supervisors devote a large portion of their time in getting the work started. In many instances, higher levels of supervision may have to provide assistance to the detriment of their own particular and important responsibilities. Obviously, these problems magnify in periods of high absenteeism.

There can be no doubt concerning the impact of absenteeism upon labor costs. The most obvious cost associated with absenteeism is the need to employ extra workers, either full time or part time, as replacements for those who are absent. Superficially, it may seem that there are no direct labor costs involved because the absent worker will not be paid. This is true for most instances of

unscheduled personal absences ; however, there are exceptions such as absences due to illness when the individual is entitle to sick pay. But this analysis fails to take into account the continuing liability to the company for many benefits which accrue to the individual regardless of whether he is present or not . These benefits include such items as vacations , holiday pay , medical care, and pension credits. In as much as the cost of fringe benefits ranges from 25 to 40 percent of payroll , the cost of increasing the work force to provide replacements can be substantial. Moreover, there can be days when absenteeism is low and difficulty may be experienced in finding productive work for all empolyees. The alternative to hiring extra workers , which is not possible in every case, is to work overtime. But this is also costly not only in terms of wages , but also in terms of negative attitudes and more absenteeism.

Another cost which may be involved is that of turnover. Although it may seem unusual to associate turnover wtih absenteeism, a high rate of absenteeism is often accompanied by a high turnover rate . Turnover costs can be substantial when all of the costs of recruiting , hiring , and training new workers are considered. All these costs should provide an incentive to attempt to seek solutions to the problem. A successful program in reducing absenteeism may be a partial alternative in the effort to increase productivity and to reduce labor costs.

It would be misleading to suggest that controlling absenteeism is a simple matter. For example, many companies have adopted very strict disciplinary systems in the belief that this approach alone will solve the problem. While a strict disciplinary approach often reduces absenteeism for a short period of time, there is ample evidence to suggest that it will not work in the longer term. Indeed, the negative effects created by a strict disciplinary system may produce more harm than good. This is not to say that disciplinary systems should be abandoned; not at all. A disciplinary system is required because it is inevitable that some employees will have to be discharged when other measures fail. It also has other values, but it cannot be the sole approach.

In order to attempt to find a solution to the problem its roots must be determined first. Some of these roots are associated with job satisfaction; that is if the work is not satisfying in terms of interesting work and autonomy, the worker will be absent, he will not be productive on the job, and he will quit at the first opportunity. There is no doubt, therefore, that work dissatisfaction is a cause of absenteeism. There is some indication, however, that other sources of work dissatisfaction, such as physical working conditions and supervisory relations are important as a cause of absenteeism among semi-skilled and unskilled

workers than is uninteresting work.

The problem has other roots too. Many of the reasons for absenteeism originate outside the workplace. These include among others , alcoholism , drug abuse, financial, marital and legal problems. The basic question is whether a company should do anything to help an employee with these problems. The answer is that it should, but not in the sense of direct intervention. The company can install a counseling system ; that is , designating a manager to become the facilitating agent in assisting an employee to find the help he requires. Thus , if a supervisor is aware that an external problem is the primary factor causing the employee's absenteeism , the supervisor can refer the employee to the counselor. One might note that this is the essence of many successful programs to combat alcoholism - a growing problem for industry.

Finally , no program to control absenteeism will be successful without the full commitment of all levels of management. Such a program will require time and money. It should be a subject of review and discussion at management meetings the same as other problems. Companies should not expect immediate success - change is likely to be slow. Moreover they cannot assume that work innovations in themselves will automatically produce the desired results. If companies can control absenteeism , however, the return on doing so

will be worth the effort. A valid measure of performance is essential to the success of any incentive program.

3. PRODUCTIVITY AND FINANCIAL INCENTIVES

A common method used in other industries to improve labor efficiency is the employment of financial incentive programs. Financial incentive programs are systems in which a portion or all of the worker's monetary compensation is tied to one or several criteria of the job performance. There are many examples of companies in which a switch from a fixed-wage payment system to a system in which pay was tied to performance, resulted in productivity gains.

The construction industry in the U. S. has, with negligible exceptions, failed to adopt some form of incentive program to further its productivity. Construction industries in certain foreign countries, on the other hand, have effectively employed financial incentive programs. In England for example, studies made in the construction industry showed that the average level of output achieved after introducing a financial incentive program was 34% above the previous level. The successful examples set by foreign countries justify the question: why not apply incentive programs in the construction industry in the U.S.?

Research has substantiated that for incentive pay programs to work, employees must see a relationship between

pay and performance . A valid measure of performance is, therefore, essential to the success of financial incentive programs. The measured score is usually compared with a predetermined standard. The incentive paid to the worker is based on this comparison. Some performance measurement techniques which can be used in construction are:

1. Measurement of the physical output:

- a. Standard per unit of output.- The work accomplished is measured at regular intervals. The standard is set in manhours per unit of the measured output (e.g. hr per cu yd concrete).
- b. Standard per section of work.- The work is divided into suitable sections and a standard in manhours is set for each section. On completion of the section the actual time is compared with the standard time.

2. Measurement of financial effectiveness:

- c. Financial productivity.- The standard ratio between the value of output to the cost of one or more classes of input used in the production process (e.g. labor cost) is predetermined. This ratio is periodically compared with the actual ratio.
- d. Company profits.- Depending on the profits made by the company , a certain predetermined percentage of this profit is allocated periodically to the workers.

Financial incentive programs can and will improve

productivity on the construction site. The mechanism of improvement might be explained in terms of the determinants of performance. As stated earlier, performance = f (ability x motivation x role perception x facilitating condition not under the control of the individual). The last two variables depend, to a large degree, on the quality of management. There are, therefore, three main factors influencing performance, workers' ability, workers' motivation, and quality of management. It is clear that financial incentive programs could improve both worker motivation and quality of management which, in turn, will improve performance.

It is reasonable to postulate that in the long range financial incentive programs will improve workers' ability as well. Ability is a function of aptitude and skill. If the reward is valued by the workers, which leaders in the industry believe to be the case, the workers will strive to improve their performance. Exerting more effort will be the immediate response, but it is likely that the workers will attempt to upgrade their skills to reduce the effort needed to achieve the same level of performance. In addition, the programs may direct management's attention to training needs because they may bring to light worker deficiencies.

In order for any incentive program to be effective certain guidelines must be followed. It should be emphasized,

though , that no firm should expect to purchase a ready - made incentive program. Each organization must tailor its pay program to the needs of the company and to the individuals therein.

1. The program should be simple in operation and easily understood by workers.
2. Workers' performance should be measured on a group basis.
3. The measures of performance should be specific and as objective as possible.
4. The reward should be tied to several performance criteria.
5. The standard should not be altered in the course of a project , except by mutual consent.
6. Hourly base rate should be guaranteed.
7. There should be enough spread between the guaranteed base rate and the normal bonus-rate (20-30%).
8. The incentive payment should be in direct proportion to the increased output (all direct savings should be allocated to the workers).
9. Workers' performance should be measured over as short a period as possible , preferably on a weekly, or at most monthly basis. The incentive payment should be made as soon as possible after the necessary data is available.
10. The workers and their representatives should participate in the design of the program and in the assessment of its outcomes.
11. Coverage of the program should be extended over as many

workers on the site as possible.

4. COMMUNICATION AND PRODUCTIVITY

Construction productivity is directly related to the amount and quality of the communication that flows between the people who are managing and those that are doing the work. Management has an important role in determining the kinds of communication systems that operate in a project and the quality of information that is available. On a typical project, management levels are joined by a formal management system, but better and more timely information flows through an informal system, and key items of information travel through a hidden information system. They all have significant effects on job morale and productivity.

Communication systems are the nerve systems that make it possible for several hundreds of people to do dozens of tasks on an integrated and orderly way, and to coordinate their efforts and skills towards a common goal at a certain time. Looking at a standard table of organization, communication systems must convey the work plans and instructions from the management levels to the work execution levels along the lines of authority. In turn, the reports of work accomplished and time and materials used from the work levels back along the same routes to

management. These kinds of messages are conveyed by plans, specifications, CPM charts, daily verbal and written instructions, and daily reports. These are called formal communications. These alone, however, are not adequate to make a job run smoothly and effectively. There has to be a great deal of communication that does not follow this table of organization. Much of this is between members of the organization that short circuit the table of organization to reduce interference, to insure coordination, and to make for a smooth flow of work. These are the informal communications. This system is verbal, cooperative and voluntary. It operates only if and when members of the organization are comfortable in their roles and not personally threatened by sharing with others. In addition to these two, there is a third kind of communication that is often more powerful, more controlling, and more convincing, and that is often the system that really controls how well the project functions. This system is the one that contains the hidden message and is called hidden communications. The success of a project is directly related to both how easily the messages flow in the first two of these three systems and what the perceived message is in the third system.

Many papers and manuals have been written about the paper forms on which to send and receive information in an organization. It is assumed, therefore, that the paperwork

of a formal communication system is a part of the operating procedure of most organizations. However, many projects do not have a formal verbal communication system that should be apart of the operating procedure of a project. A verbal system is necessary because it is two-way, it is fast, it can be as explanatory as required and it cannot be filed in an inbasket to be read when time permits. To insure that everyone gets the same message, to make adjacent managers aware of job levels problems, and to permit all participants to be prepared, the formal verbal system should be a system of scheduled group meetings, with submanagers from one meeting in turn holding meetings for their subordinates. The key items of such a system are scheduled, regular meetings in which general project business is conducted. This makes it unnecessary to deal with subordinates on a one-on-one basis on subjects of general concern which would then leave others unaware of job problems.

On small projects, this is often accomplished by a before shift or after shift meeting of key personnel while on larger projects a more structured system is necessary. Mandating an informal system is more difficult because of its nature. It can be developed over time by the use of participative management and by the development of a team relationship. To promote confidence, managers must be willing to use their subordinates' skills and knowledge to

solve problems.

The hidden communication system contains the nonverbal messages that are sent, or received or both, usually without the intent of the sender to convey such a message. This system is not something that can be managed directly because it is one that deals with the perception of many signals. When the messages received from the hidden system are not the same as those of the formal system, managers must either change their actions that are sending the wrong signal or change their priorities.

A manager must, from time to time, examines his behavior or actions to determine if his actions are supporting his priorities. The apparent conflicts of profit, production, time schedule, safety, work quality, ethics, etc., often seem to pull in different directions. Regardless of their assumed or stated order of importance, the real priorities seem to become apparent when observes compare the rewards or reactions of management for achieving or failing to achieve one as compared to the other. When a manager says, e.g., that work quality and safety are top priorities and then condones poor quality work and unsafe methods to expedite production and to meet schedules, the interpretation is often made that safety and quality are of little importance. Productivity is a major priority in today's

projects, but management often seems to obstruct productivity of even the simplest task by failing to provide instructions, materials, tools, or equipment or all of these, on a timely basis, as well as by failing to schedule work in a reasonable way and by appearing to be oblivious to the most elementary changes that could be made to increase productivity. Skilled workmen know what is required to do their job, and when the basic requirements are not furnished they can only assume that productivity is of very low priority.

Communication is the control system of a project, and for a construction project the communication systems can have a major effect on the productivity of the operation. By improving communication between management and labor productivity will inevitably be improved.

5. PRODUCTIVITY BARGAINING

Productivity bargaining could be defined as "a method of negotiation in which changes in wages are tied to changes in work with the objective of reducing or stabilizing unit costs". Any job may be described by its wage-effort bargain. The wage side of the relationship is concerned with the total amount and forms of compensation to be paid to an individual for the performance of a specific job; the effort

side of the relationship is concerned with the individual's input and output , i.e. ,the productivity of the individual. Historically , collective bargaining has focused primarily on the wage side of the relationship. Union leaders have concentrated on increasing the level of total compensation; the employers have attempted to minimize these increases. The effort side of the relationship has generally been ignored with the exceptions of union attempts at negotiating work rules to preserve employment opportunities. Those productivity increases that have been obtained have largely resulted from changes in technology rather than from increases in effort on the part of the worker.

Unlike traditional collective bargaining , which emphasizes the wage side , productivity bargaining emphasizes the effort side of the wage-effort bargain. It attempts to offset past and current increases in compensation with increases in productivity to stabilize or reduce unit labor costs. Productivity bargaining is particularly suited for use in construction because the industry is relatively labor intensive and the utilization of new technology to increase productivity is severely limited. Productivity bargaining concentrates on negotiating changes in work arrangements to increase productivity. It is , therefore , particularly applicable to the consideration of changes in allegedly restrictive work practices ,which contractors claim

inhibit productivity.

It is reasonable to speculate that productivity bargaining in construction will aid labor and management in solving some of the problems confronting the industry. Management can negotiate changes on the effort side such as: the elimination of the positions of journeyman's helper (workers holding these positions can be reassigned to alternate work); relaxation of jurisdictional lines; changes in shift work arrangements; increased freedom for management in its use of supervision; the elimination of unproductive time allowances such as coffee breaks. On the wage side unions can negotiate wage increases for the workers. The increased productivity, however, will reduce the need for overtime work with the result that unit labor costs will be reduced while worker earnings will be increased. If the parties perceive the impact of productivity bargaining to be positive for both of them, they will be more inclined to participate in the process again.

As stated earlier there are two powerful reasons for each party, one for management and one for unions, to participate in productivity bargaining. For management the obvious reason is increase productivity by lowering labor costs. For unions the reason is the loss of work to open shop firms. It seems, therefore, that both sides will have

something to gain by participating in the process.

Although in many cases union officials and union members can be considered as a single entity, i.e. , the union , there can be a difference between the two in some of their perceptions. From the perspective of the union members, the relative growth of the open shop firms is manifested in a reduction in the number of job opportunities available through the union hiring hall. From the perspective of the union officials the real problem is the loss of power . As the relative market share of the open shop firms increases, the power of unions to impose their demands for wages , fringes, and working conditions on the industry is reduced.

To conclude it seems that productivity bargaining can improve the relations between management and unions. This will inevitably improve productivity because improved relations can help create a sense of togetherness between management and labor unions , which is much needed in this country.

SELECTED BIBLIOGRAPHY

- Alexander Laufer , Douglas Jenkins, " Motivating Construction Workers ," ASCE, Journal of Construction Division, vol. 108 ,Dec. 1982, pp. 531-545.
- Alexander Laufer , John D. Borcharding, "Financial Incentives to Raise Productivity ," ASCE , Journal of Construction Division, vol. 107 , Dec. , 1981 , pp. 745-756.
- Arthur J. Fox, "Productivity in the Construction Industry" A S C E , Journmal of Professional Activities, vol.104 Jan., 1978, pp. 49-52.
- Dallas Jones , Horizons of Industrial Productivity.USA: The University of Michigan, 1977.
- Dale S. Beach, Personnel : The Management of People at Work. New York :Macmillan Publishing Company , 1985.
- Daniel W. Halpin, Ronal W. Halpin, Ronald W. Woodhead, Construction Management. New York: John Wiley & Sons, Inc. , 1980.
- David Arditi, " Construction Productivity Improvement, " ASCE , Journal of Construction Engineering and Management, vol. 111, March ,1985, pp. 1-14.
- F. J. Drewin , Construction Productivity. New York : Elsevier Science Publishing Co., Inc., 1982.
- Gordon Mcbeath , Productivity Through People. London : Bussiness Books , 1974.
- Henle P. , " Reverse Collective Bargaining ? A Look at Some Union Concession Situation ," Industrial and Labor Relations Review, vol. 25, Apr., 1973 , pp. 956-968.
- J. R. King , Improving Productivity . New York : American Society of Civil Engineers , 1983.
- James Choromokos , Keith E. Mekee, " Construction Productivity Improvement," A S C E , Journal of Construction Division ,vol.107 , March , 1981, pp. 35-47.
- Jimmie Hinze , Ken Knechenmeister, " Productive Foremen Characteristics," A S C E , Journal of Construction Division, vol. 107, Dec., 1981, pp. 627-639.

- Jimmie Hinze , Maxwell U. , Larry Hubbard, " Absenteeism in Construction Industry, " A S C E , Journal of Construction Engineering and Management, vo.104, Oct., 1985, pp.188-200.
- John D. Borcharding, Douglas F. Garner, "Work Force Motivation and Productivity on Large Jobs, " A S C E , Journal of Construction Division, vol.107, Sept.,1981, pp.443-453.
- John D. Borcharding , C. H.Oglesby, " Construction Productivity and Job Satisfaction, " A S C E , Journal of Construction Division, vol. 100, Sept.,1974, pp. 413-431.
- Joseph C. Kellogg, George E. Howell, " Hierachy Model of Construction Productivity," A S C E , Journal of Construction Division, vol. 107, March , 1981, pp. 137-152.
- R. G. Norman, S.Bahiri, Productivity Measurement and Incentives. London: Butterworths & Co., 1972.
- Robert D. Logcher, William W. Collins, " Management Impacts on Labor Productivity," A S C E , Journal of Construction Division, vol. 104, Dec., 1978, pp.447-461.
- Thomas H. Randolph, Mason P. Holland, " Union Challenges to Methods Improvement Programs," A S C E , Journal of Construction Division, vol. 106, Dec., 1980, pp. 455-468.
- W.E.G.Salter, W.B.Beddaway, Productivity and Technical Change. London: Cambridge University Press, 1966.
- William A. Rush, James C.Harshner, Factors Affecting Worker Productivity. USA: Arizona State University , 1974.
- William F. Maloney, James M. McFillen, " Valence of and Satisfaction With Job Outcomes, " A S C E , Journal of Construction Engineering and Management, " vol. 111, March, 1985, pp. 53-73.