DIFFICULTIES WITH IMPLEMENTATION OF GOAL SETTING FOR CONSTRUCTION

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ABSTRACT: Goal setting has an established record of improving the productivity of the workforce in manufacturing and service industries, and a programmatic use of goal setting and feedback has been shown to increase productivity by up to 20%. In addition, previous studies have shown that specific, difficult goals produce better performance than any of medium, easy, or do-your-best goals; or no goals. However, notwithstanding its potential for productivity improvement, attempts to apply goal setting to construction projects have been limited due to the inherent characteristics of the construction industry and the associated difficulties in implementation. Based on results obtained from two widely different studies, many of the obstacles for successful implementation of goal setting in the construction industry are explicitly identified, suggestions for dealing with them are advanced, and productivity is shown to increase from 10% to more than 20%.

INTRODUCTION

Goal setting is one of the motivational techniques used in manufacturing and service industries to improve the productivity of the workforce, and it has an established record of success for such activities as mass production, loading trucks, sales, and secretarial work. Previous studies have shown that specific, difficult goals produced better performance than any of medium, easy, or do-your-best goals; or no goals, and that a programmatic use of goal setting and feedback can increase productivity by up to 20% (Locke and Latham 1990). Motivation has been defined as “inciting unconscious and subconscious forces in people to achieve particular behavior by them.” Several motivational techniques that have been successful in the manufacturing industry have been considered useful for the construction industry. These are incentive systems, worker participation, goal setting, work facilitation, and positive reinforcement; of these, goal setting is the least used method in construction.

Productivity improvements in the construction industry are among the lowest of all U.S. industries. Despite improvements in technology and scheduling techniques, productivity in the U.S. construction industry has actually declined continuously during the last two decades. Although construction productivity rose at an annual rate of 2.4% from 1949 to 1959 and 0.1% from 1959 to 1969, it fell at a rate of 1.7% per year from 1969 to 1979 (Cremeans 1981) and, according to the U.S. Army Corps of Engineers (News 1988), decreased 16% during the last decade. Meanwhile, other industries, such as manufacturing and service, have experienced annual productivity increases on the order of 2.5–4% (Adrian 1987).

There are many reasons for this situation, but several are associated with specific characteristics of the construction industry; these include the uniqueness of individual projects, the industry’s many nonrepetitive processes, and various managerial issues, such as poor planning, unproductive time due to lack of materials, waiting for one or more subcontractors to finish their assigned tasks, and lack of management skills necessary to coordinate and motivate workers to operate at their full capacity and eventually reduce unproductive time.

Described here is a brief overview of goal setting theory and the mechanism by which goals are useful in modifying behavior; an excellent history of the evolution of goal setting theory has been given by Ryan (1970). Specifically addressed is how goal setting techniques can be used as a management tool in the construction industry to motivate workers to increase productivity and decrease the cost of labor per unit of output.

The construction industry is unique in several aspects. The major reasons for this uniqueness are the following: (1) The diversity in the types, forms, and shapes of construction projects; (2) projects’ production cycle and
lifetime; (3) low research and development expenditures; (4) geographical dispersion; (5) the labor force; and (6) the contractual relationships. Because of these major differences between the construction industry and the manufacturing and service industries, the implementation of goal setting techniques is different. The present paper shows the difficulties encountered and the guidelines developed during the implementation of goal setting on several construction projects.

DEFINITION OF GOAL

Conceptually, a goal is defined as what an individual consciously tries to attain; that is, the aim or end of an action. Other similar concepts include performance standard (a measuring rod for evaluating performance), quota (an assigned goal, a minimum amount of work or production), work norm (a standard of acceptable behavior defined by a work group), task (a piece of work to be accomplished), objective (the ultimate aim of an action or series of actions), deadline (a time limit for completing a task), budget (a spending goal or limit), intention (a psychological state), and purpose (a consciously held goal or a motive underlying a goal) (Locke and Latham 1990).

GOAL THEORY

Goal theory depicts a human as an extremely complex cognitive creature who understands, believes, infers, anticipates, and expects. It assumes that some event, expected or unexpected, from a variety of possible sources in any environment and causing a diversity of possible emotions, impinges on a person and influences his/her behavior; the important thing is that the event is potentially observable. In this case, goal theory asserts that, for the event to exert an impact on the person’s behavior, the person must recognize and understand the event. If this is so, the person can evaluate the event in terms of its relevance and desirability in a particular situation.

Once an observable event has happened and been recognized, understood, and evaluated, the person may establish goals or intentions concerning a reaction to the event. Goal theory assumes that, unless goals or intentions are established, the event has little or no impact on subsequent behavior. Alternatively, when a goal is accepted and understood, it will remain in the background or periphery of consciousness as a reference point for guiding or giving meaning to subsequent mental and physical actions leading to the goal. According to goal theory, events impact behavior through goals and intentions, and there are several dimensions to the goals and the goal setting process that are important to consider in understanding and influencing reactions to goals.

In his summary and review of goal setting theory, Locke (1968) suggested that the relationship between conscious goals (or intentions) and task performance is a “long neglected topic in psychology.” Based on previous research, he concluded the following: (1) Difficult goals produce a higher level of performance (output) than easy goals; (2) specific difficult goals produce a higher level of output than a goal of “do your best”; and (3) behavioral intentions regulate choice behavior. His concept also views goals and intentions as mediators of the effect of incentives on task performance. The basic assumption of goal setting theory is that conscious goals and intentions directly impact human action. However, for a goal to regulate action it does not have to be in conscious awareness at all times during the goal directed action, and indeed it is not assumed that all human action is always under fully conscious control (Locke and Latham 1990).

The two major attributes of goals are content and intensity. The content of a goal is the object or result being sought, and the main dimensions of goal content are specificity or clarity (the degree of quantitative precision with which the aim is specified) and difficulty (a certain level of task proficiency measured against the standard or level of performance sought). The intensity of a goal pertains to the process of setting the goal or determining how to reach it, the degree of goal commitment, and the importance of the goal for the individual; intensity may be measured by such factors as the scope of the cognitive process, the degree of effort required, the importance of the goal, and the context in which it is set.

In the context of these characteristics, organizational behavior scientists introduced the goal setting technique in both manufacturing and service industries and to both white-collar and blue-collar employees. According to Latham and Locke (1979), a programmatic use of goal setting and feedback can increase productivity by 20% or more. In a review of the literature from 1960 to 1989, Locke and Latham (1990) found that 183 out of 201 studies showed that specific, hard goals produced better performance than any of medium, easy, or do-your-best goals; or no goals. This can be explained by the fact that hard goals prompt greater effort and persistence than easy goals, provided there is a goal commitment in the first place. In an analysis of 32 theories within the domain of organizational science, it was concluded that goal setting theory is one of only four that were both useful and valid (Miner 1984).

GOAL SETTING STUDIES IN CONSTRUCTION INDUSTRY

Reluctance to implement goal setting in the construction industry emanates from difficulties in agreeing on (1) Attainable goals with regard to many existing variable elements on typical construction sites; and (2) methods for productivity measurement and performance evaluation. Actually, there is no unified definition for productivity in the construction industry. Therefore, defining productivity and establishing methods for productivity measurement and performance evaluation became one of the priorities of the “construction industry cost effectiveness” project formed by The Business Roundtable, an association composed of...
the chief executive officers of about 200 major corporations, who act on a wide range of public issues. From its inception in 1972, the Business Roundtable studied problems in the construction industry and, based on its findings and recommendations, the Construction Industry Institute (CII) was founded in 1983 to improve the cost-effectiveness of construction projects. The members of CII represent a broad cross section of owners and contractors, and CII activities include identifying research needs, conducting research, and aiding the implementation of research results.

Toward this end a task force under the guidance of the CII was appointed to undertake a study, and the report of the task force is The Manual for Productivity Measurement and Performance Evaluation (Thomas and Kramer 1988). In this manual, productivity is defined as the labor work-hours per unit of work. The use of this manual as a basis for productivity measurement helps engineers, managers, and craftsmen to establish more meaningful comparisons of measurements under different conditions.

Because the precise degree of association between goals and performance is an empirical question, results about the characteristics of goals and the process used in other industries can be helpful in designing a successful goal setting program for the construction industry, even though there are major differences between the construction industry and other industries.

**Pennsylvania Department of Transportation Study**

Only one published study about the application of goal setting in the construction industry was located. This study was done by District 11 and District 4 of the Pennsylvania Department of Transportation (DOT) with the help of Hensey Associates, Cincinnati, Ohio. Although it may be argued that highway maintenance activities should not be considered construction activities because they are performed by workers employed continuously by an organization for this expressed mission, the type of work (for example, earthwork, pipe replacement, and small concrete projects) does have definite similarities, and the comparison is felt to offer some insight.

The basic problem was that district unit costs for 12 major maintenance activities were significantly higher than the state average, and effort was directed toward finding a remedy for this differing record. The two major reasons for the high unit costs were (1) Low productivity of the labor force; and (2) low equipment use. During 1979–1984, the following actions were taken to improve productivity.

1. The use of the Pennsylvania DOT highway maintenance management system (HMMS) was emphasized to report, organize, and track labor and equipment costs for various basic maintenance work operations for each county and for sections within counties.

2. Nonproductive maintenance operations were contracted to private contractors, who could perform more cost-effective work on selected activities.

3. The improvement of employee performance was encouraged through training and coaching in formal classes and on the job.

Despite concentrated efforts to implement these steps, less-than-desirable productivity improvement was attained.

In 1984, District 11, with Hensey Associates as its consultant, started a productivity improvement program that included (1) Training on motivation and productivity; (2) encouraging management teams to do planning and goal setting; (3) placing accountability for producing results with those teams; and (4) reviewing the results and planning for the future based on the attained results. A new quality-level assurance check was incorporated into the current standard HMMS audit form (Carrier et al. 1986).

The goal-setting part of the program required that each management team examine past performance in various standard work operations with the help of several district members. Then, they were to set specific goals to improve each work activity in measurable terms for the next three, nine, and 21 months. The teams were also asked to specify methods, equipment, and crew sizes needed to accomplish the goals. Although the goals, based on previous performance, seemed ambitious to the district engineer, the teams were able to exceed them at the three-month and nine-month mileposts; actually, the teams exceeded the Dec. 31, 1984 goals by Nov. 30, 1984 for most work activities. For some activities they passed the goal set for end of the next year, and, as a result, set higher goals for Dec. 31, 1985. The productivity improved about 24% overall, and the estimated savings were about $1,000,000 per year based on the results up to Nov. 30, 1985. Table 1 summarizes the previous performance, goals, and progress for this endeavor. The participation of senior management, team goal setting, effective measurement of performance, provision of feedback on performance at the crew level, and the involvement of all levels of personnel were considered as major reasons for the success of the program (Carrier et al. 1986).

The success of District 11 encouraged District 4 to implement a similar productivity program with the help of the same consultant in January of 1985. The only differences in the District 4 plan were to include the highway maintenance foreman in the discussion of methods and goals and to communicate the foreman’s needs to management; this gave the foreman a better understanding of management goals and an opportunity for making suggestions to improve job techniques. The program also included a productivity-quality connection, and a new quality-assurance plan in addition to HMMS was developed. At the end of 12 months, the teams exceeded their goals, the productivity improved about 18%, the savings amounted to over $1,000,000 during the year, and the quality had generally improved (Ryan and Sebastianelli 1987).
experiments, the groups with a goal outperformed the expected profits at each experimental site. In all three control groups. This actual cost per unit of work was the basis for productivity comparisons between test and the other was the control site. The crew at the test site had weekly goals, whereas the crew at the control site did not have defined goals. The third experiment, which had a one-group posttest-only design, was performed, one personal and the other job related. As expected, the groups with a goal outperformed the groups without a defined goal; in particular, the results of all three experiments indicate that (1) Goal setting increased the productivity of groups with a goal; and (2) short-term goals resulted in higher productivity than long-term goals. For the first experiment, the productivity of the concrete group with a daily goal was about 29% better than the masonry group that had no goal. In the second experiment the improvement in productivity was about 24%, but, due to a required demolition of some completed masonry walls (dictated by the architect because of aesthetics due to unmatched brick color) and a change order, the job broke even. Although the third experiment involved a labor strike, the productivity improvement was still 4%. Notwithstanding the disruptive circumstances confronted in the latter two experiments, the average improvement in all three experiments was about 10%.

These studies also suggest the definite possibility that attempts to implement a goal-setting program in the construction industry would probably encounter difficulties. Some of these difficulties are the following: (1) Job disruption during construction due to labor issues, lack of material, or interference from precedence tasks; (2) major change orders from the owner and/or designer; (3) possible interference from unions due to some action that may provoke members and lead to a slowdown or stoppage of work (any potential confrontations were scrupulously avoided during the experimentation); and (4) absenteeism. Some of these difficulties were encountered during experiments and disrupted the goal setting process, which, in turn, affected the experimentation. Every effort must be made to minimize these difficulties and mitigate the disruptive role they might play in applying the goal setting technique in the construction industry.

### Chicago Concrete and Masonry Study

In the second study (Hadavi and Krizek 1993), the implementation of goal setting on concrete and masonry work for new buildings in the Chicago area was studied experimentally over a period of 14 months from July 1989 to September 1990. During this time three experiments were performed in the metropolitan Chicago area. The first experiment consisted of comparing the productivity of a concrete crew that had daily work assignments with that of a group of masons whose job was laying blocks and a group of concreting workers, neither of which had any goal. The second experiment was conducted with two different masonry crews at two sites that were close to each other; one was a test site and the other was the control site. The crew at the test site had weekly goals, whereas the crew at the control site did not have defined goals. The third experiment, which had a one-group posttest-only design, was performed to compare management historical data (based on previous performances in the absence of any goals) and the productivity of a masonry crew that had weekly goals.

### Measurements and Findings

Performance measurements were done in two ways: physical progress and cost per unit of work. Physical progress was subject to fluctuations in the daily number of masons, which, in turn, affected goal achievement. Cost per unit of work was the choice for comparison, because it was not dependent on the number of workers, and it was consistent with the recommendation of Thomas and Kramer (1988). The work progress and man-hours were reported weekly by foremen at the sites. The wages for workers were computed based on man-hours worked and wage rates, and the actual cost per unit of work was reported. This actual cost per unit of work was the basis for productivity comparisons between test and control groups.

The increased performance was manifested in higher expected profits at each experimental site. In all three experiments, the groups with a goal outperformed the
pressed by Jackson (1987), “Fieldwork requiring people to study other people at first hand . . . entails much more than merely knowing what to observe and how to record, process, and present it. The fieldworker must explain his or her presence and purpose to others, gain their confidence and cooperation, plus develop and maintain mutually acceptable relationships. These requirements create dilemmas, produce confrontations, demand clarifications and compromises, and evoke reflections and introspection that one can neither fully anticipate nor prepare for in advance. Worthwhile projects may fail. Research strategies frequently must be modified or abandoned as researchers and subjects interact. Unexpected opportunities, fruitful leads, and important insights can blossom as fieldwork develops.”

On the experimental sites that were studied, the workers were not accustomed to seeing someone standing around without doing anything besides taking notes, and such action evoked both their curiosity and suspicion. It had to be explained to them that the observer was not connected to the general contractor and did not work for that company. When told that the observer was from a university doing research, workers sometimes made derogatory comments. It was found that a much longer time than expected would be needed to overcome their suspicion. Even the masonry foreman, who participated in setting the goals and developing the plans to reach them, asked several times if the production rate would be reported to the general contractor.

The personal difficulty experienced was essentially a problem of trust and communication; the construction workers saw the observer as an outsider and it took some time before they accepted his presence and started talking to him. Apart from their suspicions, it was difficult to establish good communication and there were signs of misunderstanding and lack of trust in the relations at the job site.

Next, there were questions about this research. It was clear from the beginning that there would be resistance to change in the status quo, which involved working without any prepared plan. The craftsmen were suspicious about the observations being made, and they did not hesitate to question the real purpose of this research and the effect it would have on their future working conditions. A few of them asked if they would be able to obtain and read the final report.

There were two major changes in company work procedures after a letter describing the preexperiment observations was submitted to the company. First, the masonry manager was asked by top management to prepare a rough plan for performing the masonry work. The plan was to contain such basic data as the amount of work that would be done each week with a forecast of labor at a site. Previously, the masonry manager gave only the estimated start and finish dates for the masonry work at a site without any estimate for weekly productivity. Second, the masonry department in the general contractor's organization became a profit center at the beginning of 1990. Before this change, it was simply a department that provided services to construction projects that involved masonry work, and there was a loose matrix form of organization. When changes took place after the preexperiment observations, the craftsmen became even more concerned.

Whereas site superintendents were mainly responsible for the profit and loss of a job (because the entire project minus the subcontractors was considered a profit center), they did not have much direct authority over the masonry crew; although, as members of the same company, the masons received preferred treatment, and they would, in return, cooperate with the superintendents. However, the superintendents could not formulate the plan for the masons or question their productivity, unlike the manner for dealing with carpentry, concreting, and other trades that came directly under their authority.

Technical Difficulties Encountered

Apart from these issues, there were also various other technical difficulties. On one occasion in the middle of the experiments, the bricklayers went on strike and most of the work at the sites stopped for two weeks. However, the very action of expecting a strike, as well as the strike itself, affected the goal setting process of this research. The foreman did not want to set any goal or commit himself to a goal due to the prevailing uncertainties.

Another issue was that sometimes the sites did not have enough material on hand or did not have the material needed. This occurred at all of the experimental sites, although each site had a different problem. The problems stemmed from delays on the part of material suppliers, delays in transportation, incorrect estimates at the time of issuing purchase orders, and delivery of the wrong materials.

On several occasions, when the foreman was asked to set goals for the next week or when he expected to finish one portion of the job and start another, he would respond in a variety of ways that were difficult to interpret. One example of such a response is that “he expected to receive bricks on the previous day, but had not yet gotten them; however, if they arrive in a couple of days, he would do some specific portion of the job, but, if the bricks did not come he would have to slow down the job by reducing the number of masons or even shut it down.” In short, it was virtually impossible to establish definite dates for any given tasks. Although slowing down a job was a normal procedure, foremen tried not to shut down a job; nevertheless, the jobs were shut down at two experimental sites.

Another difficulty affecting the goal setting process was the unavailability of work sections for bricklayers at the time they were to start their work. On several occasions the previous trade had not finished its work due to lack of material or labor or some other problem, thus causing the bricklayers to either slow down or stop their work until the work section was ready. Therefore, they could not achieve the goal set for that week. The lack of a contingency plan for groups of workers is a major problem in the construction industry. In general,
there are no plans outside the normal flow of work, and, if something goes wrong with one group, no alternative plan is in place for the other trades (in this case, the bricklayers). Improvisations are usually made on the spot, but these are often unsatisfactory because they may interfere with the planned tasks of another trade and thereby slow down the work pace.

Absenteeism was another difficulty. When one or two bricklayers did not show up at the site, achieving the goal for that week was affected. Furthermore, goal setting for the following week was also affected because the foreman would add a condition that "if he had a certain number of bricklayers, he would reach to a certain goal."

Apart from absenteeism, other changes in the number of bricklayers influenced the attainment of goals. For example, if the masonry manager decided to move some bricklayers from one site to another, this transfer affected the accomplishment of the stated goal in the same way as absenteeism. However, the issues of absenteeism and transfer had little effect on the end results in this case because the results of goal setting were measured as a comparison between actual cost per unit of work in two sites or two trades. These actions would increase the total cost of the masonry work by the wages of the foreman and probably one helper for the additional duration of the work beyond that which was estimated at the beginning of the project, since the job would take a few more days to finish.

Another difficulty was that the goals were not transmitted from the foreman to the bricklayers (because of the high probability that the unions would oppose the experiments). Therefore, it can be said that the established goals were those of the foreman and it was his responsibility to arrange the work so as to achieve the goals to which he had committed himself.

Industry Difficulties

One very difficult problem was that the bricklayers were union members and any sort of goal setting that seemed to constitute a quota encountered union objection. One company refused to let its site be used as a control site unless the union gave clearance for the research.

It was observed during the experiment that the masonry manager set a production rate per bricklayer based on his experience with similar jobs; then, he calculated the total number of bricklayers needed and decided on a crew size and the duration of a job. However, these production rates were estimates only and the bricklayers were not bound by them. The figures were not known by the bricklayers and there was no reward for exceeding them or punishment for falling short.

On one occasion during the observations, a job went over budget for several weeks. When it exceeded the budgeted cost by 10%, management decided to look into the situation and the foreman received signals to tighten control. He dismissed a few bricklayers whom he considered slow and told others to work harder.

Some of the major difficulties with research in the construction industry are poor data gathering, incorrect presentation, or lack of data at all. In one case in this study it was observed that some of the items in the printout of the computer cost data were actually not performed on that project, and an explanation different from that which was stated was given for all cost items. Although these numbers may have immediate meaning for the person reporting the state of the job and his supervisors, they are useless for determining the cost to perform the same job at a later date. Hence, using them in a company database would be inappropriate and misleading.

At one construction site where a subcontractor performed masonry work, the subcontractor did not have any figure for its actual cost or even for the use of material. Since the job was a complicated one, the number of broken bricks was more than estimated. However, this was not recognized until there was a shortage of brick and the work had to be stopped for several weeks until additional bricks were delivered.

Construction is performed as a group effort, so cooperation and coordination of crew members are very important. Locke and Latham (1990) mentioned 41 studies that appear to have used group goals in addition to or instead of individual goals, insofar as this could be inferred from the reports; 38 of these studies had positive or contingently positive results. However, the majority of these studies were short-term laboratory experiments or simulations and few were done in a real setting. This may reduce the validity of using the results of experiments in other industries (e.g., manufacturing and service) for the construction industry. However, in terms of general requirements for goals and their influence on the motivation and performance of the labor force, the experience gained from other industries can be valuable, and it is possible to modify the process to suit the construction industry.

Although productivity can be considered a group-based concept that deals with the effectiveness or efficiency with which an organization or part of an organization uses its resources to meet its objective, most researchers have focused only on individual performance. Also, much of the research has been done on fairly simple jobs where (1) Each person does only a few different tasks; (2) individuals in the unit do largely the same work; (3) individuals in the unit work independently of one another; and (4) there is a measure of performance readily available (Latham and Lee 1986).

CONCLUSIONS

Goal setting can be used as an efficient motivational technique to improve the productivity of construction activities. However, there have been only a few attempts to experiment with the goal setting technique in the construction industry. Described in the present paper are studies concerning the applicability of goal setting in the construction industry and the difficulties involved in its implementation. The guidelines suggested by Locke and Latham (1984, 1990) were modified for...
use in the construction industry, and based on those
guidelines and the results of experiments performed in
Pennsylvania and Chicago, the following conclusions
were advanced.

1. For a goal setting program to be successful, it
should have strong organizational support. Both man-
agement and employees should participate in the setting
of goals, and both should understand and be prepared
to undertake the work plan required to accomplish these
goals. Having a workshop to discuss the program, the
methodology for setting goals, and the criteria for evalu-
ating performance helps to reduce friction and avoid
misunderstandings.

2. It is probably not possible to include a large num-
ber of tasks in the program at the initial stage, and only
a limited number of tasks should be selected. This al-
 lows more effort and attention to be concentrated on
a few tasks and limits the disruption or damage that
might occur if a difficulty should arise during imple-
mentations.

3. Specify clearly at the outset the criteria for per-
formance measurement. Without a clear knowledge of
how performance would be measured, setting goals and
its comparision with performance is meaningless.

4. State unambiguously the goal or goals to be reached.
These goals should be challenging, but they should be
realistic and consistent with previous performance. In
the construction industry, the cost per unit of work is
the easiest criterion to specify for both management
and field personnel, provided there is sufficient docu-
mentation of progress and cost. With the involvement
of unionized labor, the proposed program should be
discussed with union officials, and they should be as-
sured that no jobs will be cut and no individual will be
punished or rewarded based on his/her performance.

5. Pay special attention to documentation and data
gathering because these will be the basis for productivity
comparisons and future goal-setting attempts.

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