Second International Conference on Construction in the 21st Century (CITC-II)
"Sustainability and Innovation in Management and Technology"
10-12 December, 2003, Hong Kong

Construction Foremen and their Effect on Productivity Improvement

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Abstract
Foremen fulfill a critical role in the construction process. In this paper we address some aspects regarding construction supervision and its effect on productivity. A company should encourage the development of foreman skills which have a favorable influence on productivity. An attempt was made to summarize the traits of productive foremen. More research and training development programs in the arena of productivity improvement for construction supervisors needs to occur at the international level and made it available to the common constructor.

Keywords
Productivity Improvement, Workforce Management, Construction Foremen

1. Introduction

To be competitive in a global marketplace we must improve productivity. A major challenge in implementing productivity improvement programs in the construction industry is applying its principles on the jobsite. Labor productivity is considered one of the best indicators of production efficiency. Depending upon the project size and type of construction, labor represents between 10 and 50 percent of total project cost. Consequently, labor productivity is a key factor in project success.

Foremen fulfill a critical role in the construction process. They are the first line of supervision on a project and therefore are the immediate supervisors of the craftsmen performing the work. The success of a project often largely depends on how well the supervisor knows and understands his roles and responsibilities and the impact that his roles and responsibilities has on the overall project. After all, once the design, procurement, scheduling, and mobilization have occurred it is the foremen who are responsible to the contractor to direct, guide, and control crew members to achieve quality workmanship, within budget and on schedule. In a sense they have the responsibility of managing the construction of a defined portion of a project.

The purpose of this paper is (1) to identify and discuss some aspects regarding construction supervision and its effect on productivity and (2) to summarize the traits that the foremen of the more productive crews have in common. The objective is to point out the opportunities that exist to improving productivity at the crew level.

2. Roles and Responsibilities

Whether on a small, medium or large project in the residential, commercial, or industrial environment there are certain expectations that are required of the supervisor by management and by the craft. Expectations by management include, but are not limited to:

- To transfer information organized by middle and upper management, engineering, and the owners to the members of his crew;
- To possess a thorough technical knowledge of the discipline they are responsible;
- To execute the work in a timely and cost effective manner;
- To ensure that the work methods utilized are effective and efficient;
- To ensure that the crews work in a safe manner by enforcing OSHA and the company's safety policies;
- To plan and organize material, equipment and tool requirements;
- To coordinate with other foremen and subcontractors as to avoid conflict;
- To ensure that codes, regulations, and quality expectations are met;
- To provide work space for the crew; and
- To supervise the activities being executed.

In addition to these responsibilities, foremen are also expected to perform a myriad of administrative duties such as the hiring, training, discipline and termination of craft, daily time and cost code sheets, and meet human resources and industrial relations requirements such as sexual harassment, grievances, Equal Employment Opportunity (EEO), and so forth.

The supervisor, on the other hand, also plays the role of the leader of the particular crew and is the one the craftsmen relies on for all sorts of information and instruction. They expect the foreman to be experienced, competent, and organized. When the craft show up for work and receive instruction, it is expected that the foreman has done his homework and that everything the craft needs to perform their job is ready and available. The craft look up to the foreman as one that plays the role of a father figure, counselor, and teacher, one that will look after the worker's interest, and stand up for them when confronted by higher management (Oglesby *et al.* 1989).

Construction companies waste up to 50 percent of their labor money on nonproductive work, which means they have an opportunity to increase their productive work by almost as much, hence increased profits. To aid in facilitating this, management can utilize established techniques to identify where opportunities to improve the utilization of the workforce exists, such as, crew balance charts, feedback questionnaires, interviews, and activity sampling. Work activity sampling is increasingly becoming popular as the choice method of identifying "delays" (those restraints that prevent the craft from performing productive work) in the field because of its statistical reliability, ability to identify opportunities to improve, and a means of establishing a baseline for comparison of succeeding studies. There are several methodologies and classifications of activities, many of which are debatable among those that are familiar with the process, however, the main objective is to reduce the percentages of time observed in the "delay" or "idle" category by reducing or eliminating the barriers that are preventing the craft and their foremen from performing effectively. Whichever method or technique is used, findings almost always lead to management, from the foreman level up to the construction/project manager. The foreman is often caught in the middle, on one hand by the craft who have the expectations stated earlier and by management who often fails to recognize and implement work processes that support his needs.

3. Jobsite Communication

Effective communication is vital to maximizing productivity. This means that the lines of both oral and written communication between project management and the supervisor and between the supervisor and craft must be open and clear in order to facilitate the transferring of important information and feedback. Effective oral communication requires that the supervisor be as good a listener as a talker. He should always seek feedback from the craft on the best methodologies of executing tasks. Failure to take advantage of the craftsman's knowledge not only runs the risk of missing out on an improved construction method, but also can adversely affect the craftsman's work attitude and morale.

Another consideration of effective communication is the sharing of information with the craft. When craft are left in the dark about project goals, current performance, and what is expected of them they feel less part of the team and that their efforts frequently go unnoticed. Poor communication not only can affect the morale of the craft but can also lead to additional rework. When and if project management shares performance data such as progress reports, schedules, and budgets with supervision, they in turn should share this information with the craft. When this occurs, positive attitudes can be created thus increasing the likelihood of performance improvement.

Written communication is equally important. Practically all foremen in construction are required to fill out some kind of form, on a daily, weekly, or random basis. These may include daily time sheets, quantities installed reports, or crew delay forms. These data are usually manually input and electronically transferred to the contractor's home office and then back to the site manager. Too often the compiled information is never shared at the foreman level and when it is shared, it often is long after the fact and the information has little value to the foreman. Written communications procedures should be flowcharted and durations of the various steps minimized to ensure that the information gathered and used can be fed back to the field supervisors and the crews in the most effective manner. Without feedback, supervisors and the crew members may never know how inefficiently or how effectively they are performing. Without knowing the inefficiencies, how are they to know what corrective actions to take? Without feedback on their performance the crew may simply assume that their performance is acceptable. Also, if crew's performance is exemplar without them knowing such then how can the crew be recognized and rewarded?

4. Human Skills

When most good craftsmen walk onto the jobsite in the morning, they usually have an idea of what they will be working on that day. They like to stay productive, put in a good day's work, and go home feeling good about themselves and what they have accomplished. It is human nature. They like to take pride in what they do and when craftsmen have pride, they are usually productive. In order for this to happen though, not only does the supervisor have to make sure that all the pieces are in place ahead of time, he must also possess the human skills necessary to ensure the craft are motivated to perform and don't become disgruntled. They have to play the role of the craftsman's advocate. They must keep the craft motivated by constantly informing them of the project's status and their performance, showing concern for their safety, empathizing with them, listening to their concerns, grievances, and ideas, positively reinforcing them for both good and not so good performance, and maintain an environment of having fun while working. Most if not all of foremen were at one time a craftsman themselves and sometimes promoted from within the crew they now supervise. In this case, careful approach must be given as to not alienate and view oneself as the authority and only decision maker of the team.

5. Planning and Scheduling

Planning and scheduling are two different and distinct functions, each with its own special characteristics. Supervision should play a very important role in both, and foremen need to be involved in the process to ensure success. Project management often utilizes a master schedule and a one to three week look ahead or revolving schedule. These schedules are usually developed before mobilization at the site and then updated as the project progresses, usually in the form of a weekly schedule or progress meeting. These meetings typically involve those at the superintendent level and up and seldom include the foremen. The main reason is the mindset of management that foremen need to be out in the field with the crews. Another reason is the superintendent or those above the foreman level tend to keep information a secret and close to their chest as a way of showing their authority or position in the company. Too often foreman are not even aware of what the construction schedule consists of, in terms of start and finish dates for activities. The question becomes one of how can the foreman be held liable for management's expectations of meeting schedule objectives when the foremen themselves are not involved in the scheduling update process or seldom, if ever, receive a copy of the schedule? Those projects with the greatest probability of success are those that involve the foremen and those where the foremen share the schedule information with the craft. Most construction companies require at least a weekly gang box meeting to discuss safety, with more companies requiring it daily. This is an opportune time to share and make available schedule information.

Planning, by definition, is the process of determining the manpower, material, equipment, tool, safety, and workspace requirements for the execution of a task. Detailed planning at the workface is usually the responsibility of the foreman and the degree or level of planning by the foreman determines the effectiveness and efficiency of performance by the crew. The crew whose foreman does a poor job of planning will likely spend most of the shift idle. These types of foremen often leave the craft to fend for themselves, in terms of securing materials, equipment, tools, and information. On the other hand, the proactive foreman who plans the work effectively and provides everything the craft needs to perform the tasks are the ones most likely to help facilitate a successful project. Productivity on the jobsite can be increased significantly if the foreman would plan the next day's work one day ahead of time (Adrian, 2000). The crew foreman should also be at least one week ahead in the task planning and should also have a good mental picture of what activities and the requirements of such activities for two weeks ahead (Warren, 1989). The whole idea and purpose of pre-planning is to ensure that all of the resources that will be required to execute the tasks will be available when the tasks are scheduled and to minimize the amount of time the craft will spend nonproductively. In addition, the foreman should involve the craft in the detailed planning process. They are the ones who are at the work site that have the skills and knowledge of the task at hand and can make decisions on what types of tools, materials, equipment, and supplies are needed.

6. Cost Awareness

Project cost reporting and feedback to field supervision is an important complex issue and is approached in many different ways. Almost all contractors utilize some form of time cards with cost codes or activities the foremen charge their crew's time to, which in turn are electronically processed into a cost report. Many contractors will not distribute the cost data back to the field for a couple of reasons. First, they fear that someone will find out the unit rates used to bid the project and use those rates to under bid them on another project and, second, they believe that once the foremen and/or craft know the estimate they will never try to perform better than the estimate or if they find out they are performing better then they will slack off (Warren, 1989). These are perceptions that can do more harm than good considering the fact that it's difficult for a foreman and his crew to improve performance if they don't know how well or bad that they are performing.

Another aspect of the issue is how many foremen manipulate the time charged to activities. Most foremen are good at figuring out the cost reporting system and using it for their advantage for the sake of making them look good, when in fact improper charging of time does not show a true picture of performance, can misrepresent estimates used in future projects, and can make it difficult to pinpoint opportunities to improve. When time cards are designed to capture lost time by creating cost codes for such, then it is easy for the foreman to charge time accordingly and make their unit rates appear to come out close to the estimate. It is also easy for the foreman to charge actual time expended on activities with exemplar performance to activities that are not making PAR values. This too does more harm than good in terms of identifying opportunities to improve, and, although the numbers will eventually even out towards the end of the project, nothing is gained during the project for improving performance of activity execution.

7. Profile of a Productive Supervisor (Foreman)

Because of the important role played by foremen, company management should consider them as the key individuals on the construction site. A company should encourage the development of the skills which have a favorable influence on productivity. The key question becomes: What exactly are the characteristics and/or skills that make one an effective construction foreman? Despite the fact that workforce supervision has a significant effect on labor efficiency (see for example, Thomas *et al*. 2003), it has received little systematic attention, and limited research is available.

Hinze & Kuechenmeister (1981) studied the leadership styles used by a sample of pipefitter foremen, and found that the foremen of the more productive crews have several traits in common: (1) they have more foreman experience; (2) they have crew members with whom they have had previous work experience; (3) they tend to be informal in relating to the workers; (4) they are firm in dealing with the workers; (5) they are relatively independent; and (6) they are proud of their crew's achievements.

Adrian (2001) has identified the "Ten Commandments" of construction supervision (foremen, project superintendents and project managers). Effective construction supervisor shall: (1) be technically competent; (2) challenge, critique and monitor work; (3) focus on the costs and risks of production; (4) monitor equipment productivity and use; (5) keep timely and accurate recordkeeping; (6) treat individuals with respect and as equals; (7) try new ideas; (8) work as a team member; (9) place equal emphasis on planning and 'putting out fires'; and (10) put a high priority on quality and safety.

Maloney & McFillen (1987) in their study identified five dimensions of foremen behavior that have implications on jobsite performance, as perceived by a sample of unionized construction workers: (1) the degree of participation allowed by the foreman in decision making; (2) the level of support provided by the foreman; (3) the degree of achievement orientation of the foreman; (4) the degree of bias of the foreman; and (5) the level of work facilitation provided by the foreman.

Lemna et al. (1986) attempted to identify characteristics which differentiate productive industrial construction foremen from less productive industrial construction foremen. It was found that: (1) highly productive foremen do more planning than do less productive foremen; (2) highly productive foremen generally order their items sooner than do less productive foremen; (3) they are more honest with their crews with respect to schedule; (4) they are more likely to share good news concerning their crew's construction progress; (5) they take the personal preferences of their workers into account when assigning work tasks; and (6) they tend to place more responsibility on their crews.

Another work that is relevant to our discussion is that of Katz. In his classic work Katz (1974) proposed a three-skill approach to understanding the skills of an effective administrator. These are: (1) technical skill; (2) human skill; and (3) conceptual skill. Technical skill is defined as an understanding of, and proficiency in, a special kind of activity particularly involving methods, processes, procedures, or

techniques. Human skill is an executive ability to a leader to work effectively as a group member and to build cooperative effort within the team he leads. Conceptual skill is the ability to coordinate and integrate all the activities and interests of the organization towards a common objective. He suggested that all managers at all levels require some competence in each of the three skills.

So, what are the characteristics/skills of an effective construction foreman? Based on the limited research that is available and more than 40 years of combined industry experience (site, corporate, and research) of the authors, most of which was in the field of construction productivity and work process improvement, we are presenting a list of attributes, which we believe are necessary for a foreman to be effective and productive. These attributes are listed in Table 1.

Table 1: Profile of a Productive Supervisor (Foreman)

Profile of a Productive Supervisor (Foreman)
• One who develops a mindset of safety among his or her crew • One that plans 5 to 10 days work in advance; the next day's work at a minimum • One that informs all members of the crew what the plan is and shares and discusses the schedule with the crew • One that comes to work early to ensure a planned and productive shift • One that ensures that all materials, equipment, and tools are readily available fro the craft as required; including all logistical support • One that does not leave the craft to search for materials, equipment, and tools • One that keeps the craft informed of project performance • One that coordinates with other disciplines as to avoid interferences and conflicts • One that establishes expectations of the craft • One that spends 70 to 80% of the shift in the field • One that is cost conscious and creates an environment of cost consciousness among the craft • One that forecast potential problems and seeks answers and resolution prior to occurrence • One that focuses on creating and maintaining a high level of morale • One that recognizes and rewards good performance • One that performs as a leader and not as an authoritarian type figure • One that creates competition among the crew • One that solicits feedback from the craft, in terms of "better ways" • One that is "empowered" and one that empowers the crew • One that strives to perform to the best of his or her ability

8. Conclusions

Construction is one of the few industries in which the foreman can make such a big impact and difference in the profitability and success of a company. Project and construction managers who realize this and utilize the tools, resources, and methods available that involve foremen for continuous performance improvement are those with the most likelihood of success. Foremen have immense responsibilities and often make upwards of fifty decisions a day, while their pay is usually just slightly more than a craftsman. Many training programs exist for foreman but they usually revolve around human resources, industrial relations, and safety but seldom do they include productivity improvement. More research and training development programs in the arena of productivity improvement for construction supervisors needs to occur at the international level and made it available to the common constructor. As Maloney and

McFillen (1987) pointed out, the development of good construction foremen can no longer be left to "Darwinian" evolution where each foreman relearns the principles of good supervision through mistakes on the job. The proper selection and training of foremen must become a priority in order for the industry to prosper.

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