Proposed Subcontractor-Based Employee Motivational Model

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Abstract: The intent of this research was to identify the factors that promote positive motivational behavior in construction subcontractor crews. The factors affecting *motivation*, *goal-setting*, *workforce needs*, and *incentives* were investigated to determine the attributes for a subcontractor employee motivational model. A survey addressing these four categories was distributed to subcontractor foremen and supervisors to establish a list of motivational factors. The statistical analysis of the survey results aided in the final development of the proposed subcontractor based employee motivational model, which includes such components as confidence and competence as being reinforced by quality of work, incentives, safe performance, praise, and a sense of belonging. The proposed model provides industry practitioners with another level of understanding of the motivation sequence of the subcontractor's labor force. Perhaps the most interesting finding was related to the attributes found in relation to *workforce needs*. A common link "feeling of being a member of the team/crew" was discovered between "praise" and "job security." It was surmised that essentially a worker must first receive praise before they feel as if they are a member of the team/crew and once they feel like a member of the team, they then begin to acquire feelings of job security. The results of this study further reinforce the findings of several previous behavioral studies. Future research should attempt to validate the model using a larger sample size incorporating multiple general contractors.

Introduction

It is generally accepted that construction workers can be motivated. Various techniques such as goal setting and incentives/rewards systems have been shown to motivate the construction labor force when administered effectively. Almost all of the studies conducted in this area have focused on motivational programs at the general contractor (GC) or construction management level. Such programs at the management level have proven to be beneficial to a project by increasing productivity and by reducing a project's overall budget and/or duration. Incentives, if used correctly, can be powerful tools for motivating workers. Incentives have been observed to vary from a simple "pat on the back," to rewards, to lunches, clothing (shirts, caps, jackets), and cash bonuses. Successful incentive programs must be based on clear, challenging, yet attainable goals, in order to increase productivity (Sanders and Thompson 1999).

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Once a motivational program is begun, certain conditions (i.e., time, performance criteria, goals, and rewards) need to be considered and implemented if the program is to be beneficial to both parties involved (management and worker). With these guidelines in mind the industry needs to consider moving beyond the level of project management to the subcontractor/worker level. When viewing the construction process as a chain, one finds three major links: (1) the owner, (2) the general contractor/construction manager, and (3) the subcontractors. If these motivational techniques were expanded to the subcontractor level it is hypothesized that a project would further benefit from the positive effects created by a well-developed motivational program. Perhaps, subcontractors should more seriously be looked at as an important link within the chain of the construction process.

Once subcontractors/workers are more generously introduced to motivational programs on a regular basis, a company team image emerges instead of there being a visible division between the GC's management and the subcontracted workforce. The lines of communication begin to open allowing regular feedback two-way communications and feedback.

The objective of this research was to collect and analyze data that support the development of a subcontractor based motivational model. It is intended for subcontractors to use the proposed model to develop their own motivational program to meet their organization's specific needs. Data obtained through an industry survey of foremen and supervisors were used to establish a motivational model based on the factors of motivation, goal setting, workforce needs, and incentives.

Relevance to Researchers and Practitioners

The subcontractor based motivational model that was created as a result of this study provides industry practitioners another level of

152 / JOURNAL OF CONSTRUCTION ENGINEERING AND MANAGEMENT © ASCE / FEBRUARY 2006

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understanding of the motivation sequence of subcontracted labor. Perhaps the most interesting finding was related to the attributes found in relation to *workforce needs*. A common link "feeling of being a member of the team/crew" was discovered between "praise" and "job security." It was surmised that essentially a worker must first receive praise before they feel as if they are a member of the team/crew and once they feel like a member of the team, they then begin to acquire feelings of job security. Such a discovery will aid practitioners in their personnel management procedures.

With respect to researchers, the statistical results of this study go to further reinforce the findings from previous behavioral studies and provide further areas for investigation. The model developed as a result of this study provides an excellent starting point for future studies.

Limitations

Due to the sample size of this research, it should be noted that the results of this study are not intended to be generalized, but reflect the motivational views captured from the subcontractor respondents. These respondents worked primarily in north central Florida and were surveyed on multiple projects of only one major general contractor from the same area, in order to minimize the impact of variability among multiple general contractors. The subcontractors reported a good, log term working relationship with the general contractor. The proposed model developed as a result of this study should be considered to have applicability limited to the responding subcontractors until further studies are conducted for potential validation.

Background

This literature review is divided into five sections, each addressing one of the following concepts: *motivation*, *motivation through goal setting*, *employee needs*, *employee rewards/incentives*, and *application of motivation in construction*. These concepts are defined, in each section with a review of related classical theories and past research done in each area. Research findings have been published on employee motivation for more than 50 years (Maslow 1954) with specific studies in the construction industry dating back over 30 years by such people as Schrader (1972), Hazeltine (1976), Borcherding, Samelson, and Sebastian (1980), Maloney (1986, 1991), Thomas (1990) and Cox (1994). Due to the nature of this study and the publication limitations, the literature review will only discuss some highlights supporting this study. Many classical studies have focused on motivation, employee needs, and incentives in the construction industry. Schrader (1972) linked construction worker needs to motivation, it was subsequently concluded by Thomas et al. (1990) that there is evidence supporting the existence of a linkage between an employee's motivational level and their individual performance.

Motivation

Construction labor *can* be motivated. A definition of motivation is "the set of processes that determine the choices people make about their behaviors." According to McClelland (1961) individu-

als tend to develop certain motivational drives based on the cultural environment in which they live and these drives affect the way people view their jobs. McClelland suggests that achievement, affiliation, competence and power are four types of motivational drives that are found in individuals that are self-motivated. Not all individuals are self-motivated and this may be the case for many construction workers. Lack of motivation in return affects productivity.

Construction Performance and Motivation

Many factors influence construction site productivity. One way that construction management influences productivity is by determining how smoothly the work will flow and how much work can be accomplished. Another, more important way that construction management influences productivity is by how it influences workers' attitudes, which is a major element in worker motivation and determining how much work will be accomplished. Accordingly, the key to increased construction productivity is a working understanding of how construction workers are motivated (Hazeltine 1976), and (Cox, Issa, and Kobelgard 2005). Finding and understanding just how construction subcontractor workers are motivated is one focus of this study.

Motivation through Goal Setting

As previously discussed, motivation can present itself in many forms, but what causes a person to become motivated in the first place? An employee's motivation begins with their want to satisfy needs. If the person being motivated feels that the goal is not reachable they will normally become frustrated and overwhelmed, and reject the goal; thereby becoming unmotivated. Goal setting can be an effective motivational process when applied correctly because it creates a discrepancy between the current and the expected performance. Researchers have shown that if goal setting is to be successful it must consider the following: goal acceptance by the workers; specificity of the desired outcome and level of quality; the goals must be seen as a challenge; and the system must provide a mechanism for performance monitoring and feedback (Ryan and Sebastianelli 1987). Individual needs are the drivers, or forces, that initiate motivational behaviors; these needs vary both with time and people. Managers must understand the power of establishing clear and measurable objectives for their companies and their employees, because nobody can operate effectively without knowing what they are supposed to do. Objectives can lose much of their force if there are no meaningful incentives behind the objectives. There is an important measure of truth in the catch phrase "management by objectives," but we insist that the process will be more effective if managers understand that they must manage through the power of incentives (McKenzie and Lee 1998).

Employee Needs

Needs are the starting point of all motivated behavior and Maslow's (1954) need-hierarchy model recognizes this. Maslow's postulates that humans have a variety of different needs that can be classified into five specific groups and can be arranged in a hierarchy of importance. Employees must first satisfy lower level needs before higher level needs can be satisfied. To activate a
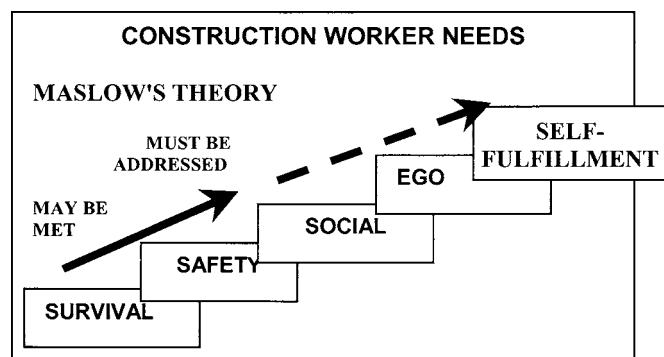
CONSTRUCTION WORKER NEEDS

MASLOW'S THEORY

MUST BE ADDRESSED

MAY BE MET

SELF-FULFILLMENT

EGO

SOCIAL

SAFETY

SURVIVAL

Fig. 1. Construction worker needs (adapted from Schrader 1972)

Table 1. Employee Incentive Program Requirements (Sanders and Thompson 1999)

Employee incentive programs have been implemented to

- Improve job productivity
- Improve job focus
- Improve job satisfaction
- Enhance creativity and innovation
- Reduce absenteeism
- Attract and retain Employees

Employee incentives programs should be designed to

- Improve feedback
- Encourage goal-setting
- Foster teamwork

Employee incentives should be designed to be

- Simple
- Specific
- Attainable
- Measurable
- Equitable

Employee incentive programs should include

- Direct ties to project objectives
- Appropriate funding
- Appropriate participation
- Program safeguards
- Quantifiable results
- Necessary resources
- Incentive desirability

Employee incentive programs are dependent upon

- People
- Processes
- Project environment

need of higher order, needs of a lower order need not be completely satisfied. In actuality, an individual may be striving to satisfy several, or possibly even all, of their basic needs simultaneously. Although it is convenient to think of needs as being clearly stratified as in Maslow's hierarchy, this may never be completely true, as a higher need may occur before a basic one is completely satisfied. An individual's needs will vary slightly with time and the hierarchy of needs may differ from person to person, however, all individuals are motivated more by unmet needs than already satisfied needs. Based on Maslow's hierarchy and the above-stated theory of the construction workforce, an analysis and summary of the motivational factors relevant to construction workers was derived. According to Schrader (1972), as shown in Fig. 1, the lower level needs of the construction workforce may have already been met therefore management should focus on higher level needs as a basis for motivation.

Each of the classical need based theories have suggested a hierarchy of needs, as lower level needs are met, they no longer serve as a motivating factor and the employee turns their attention to addressing a higher level need. A common thread running throughout the generally accepted employee needs-based motivational models is that satisfaction and esteem-based needs are valued extremely high (Maslow 1954; Herzberg et al. 1959; Alderfer 1969; McClelland 1961). According to Warren (1989) self-satisfaction brought about by achievement is a rich experience, and it induces the person who experiences it to seek out other goals, accomplishments and satisfaction. Warren goes on to state that even more satisfying to most crafts workers than self-satisfaction is the esteem created by the recognition of their accomplishments by others, including supervisors, fellow workers, their subordinates and possibly most importantly their family.

Recognition and praise are a form of giving positive reinforcement or in other terms giving praise when a desired task is accomplished and withholding it when it is not accomplished. The need-based models discussed emphasize the needs of the employee, with the higher level, and perhaps the most important needs of today, addressing individual satisfaction and esteem.

Employee Incentives/Rewards

In order to keep construction workers motivated their needs must be addressed as project goals are reached. Satisfying worker's needs can be viewed as distributing incentives/rewards when certain objectives are achieved. Employees have needs that they want met and employers have goals that they want reached and they can work together as a team to satisfy the wants of both the

employees and their employers. Workers who are motivated to help reach the goal of the employer and do so should be recognized with an incentive/reward. When considering what type of incentive/rewards to use there are two types to be aware of, extrinsic and intrinsic. *Extrinsic rewards* are external rewards that occur apart from work, such as money and other material things. On the other hand, intrinsic rewards are internal rewards that a person feels when performing a job, so that there is a direct and immediate connection between work and reward. The power of incentives is immense and pervasive, which is all the more reason they require careful management (McKenzie and Lee 1998). Heap (1987) has summarized a list of these advantages and disadvantages associated with financial incentives. For the employee, one clear advantage is increased earning potential. Another advantage is that incentives help to focus employee performance on project goals. One disadvantage of schedule related incentives is the potential for reduced focus on safety while trying to speed up work.

Incentives extend far beyond money into the array of nonmonetary benefits. Fringe benefits would not exist if money were all that mattered to workers. The reality of the business world is that money, fringe benefits, culture, and leadership all make a motivational difference, because workers relate to them. For most workers, a fringe benefit and a good old-fashioned pat on the back can take the place of a few more dollars, which helps explain why effective managers offer workers fringe benefits as well as encouragement. Different incentives matter in different ways and in different degrees to different people. It is management's job to identify and clearly understand what matters to their workers and what motivates them; then incorporate that information into an incentives program that is effective and mutually beneficial.

Many construction companies have already considered that there can be advantages and disadvantages of developing an incentive program. A study by Sanders and Thompson (1999) showed that those companies that keep their program simple with

the main objective of the program in mind (to benefit the project in reference to cost, schedule, customer service, safety, environment and quality) are also deemed successful. Proper planning is the key to the success of any incentive program. A summary of the basic requirements needed to implement a successful, employee-based incentive program are shown in Table 1.

Table 1 shows that employee incentive programs have been implemented for such things as improving productivity, improving satisfaction, and even attract and retain employees. The second row of Table 1 shows the suggestion by Sanders and Thompson (1999) that employee incentives should be designed to improve feedback, encourage goal setting, and foster teamwork. All program designs should also be simple, specific, attainable, measurable, and equitable. In addition, employee incentives should have direct ties to the project objectives utilizing appropriate funding, resource allocation, and appropriate levels of participation. Incentives must be desirable and quantifiable.

Application of Motivation in Construction

The following ideas and concepts have been presented thus far: motivation, goal setting, worker needs and incentives/rewards. Once a manager understands that these are the concepts that need to be considered in order to motivate the construction labor force, the manager must determine how to most effectively apply them to their workforce. The Business Roundtable (1982) not only listed motivators and demotivators of the construction industry but also laid out a detailed plan for applying motivational techniques to workers in the construction industry. According to this study the majority of motivational programs can be grouped under five categories: goal-setting, incentives, positive reinforcement, work participation and work facilitation. The report concluded its findings by stating that contractors have the primary responsibility for the execution of the onsite work activities of their crewmembers. Project owners, on the other hand, have an interest in these matters because of the potential direct effect on the overall project cost.

The recommendations for project owners and contractors with respect to increasing effectiveness of motivational programs include items such as eliminating demotivational occurrences like design changes, poor work environments, and unsafe conditions. Recommendations for contractors include training first and second level supervisors, providing open communications, utilizing practices to eliminate demotivational factors (Borcherding and Oglesbly 1974; The Business Roundtable 1982).

Summary

Once good workers have been made part of the team it is important to keep or get them motivated. Some workers are self-motivated, while others are motivated by outside forces. Workers who are self-motivated set their own goals to reach but it is important for those goals to have incentives attached to them if continued motivated behavior is desired. On the other hand, those who are extrinsically motivated need to have very challenging, but attainable, goals set for them. Again these goals must be followed with incentives if motivation is to occur within the worker. It does not matter whether employees are self-motivated, extrinsically motivated, or both; in order for incentives to be most effective they must address the needs of the individual employee.

These needs vary from person to person, location to location

Table 2. Survey Correlation Chart

Term	Survey question number(s)
Motivation	
Achievement motivation	1 and 2
Affiliation motivation	3
Competence motivation	4
Power motivation	5
Self-motivation	6
"Outside" motivation	7 and 8
Goal setting	
Incentives	6
Performance measurement	1, 2, 3, 4, and 5
Workforce needs	
Self-actualization/self-fulfillment	10
Esteem/ego	1, 2, and 3
Social	7
Security/safety	8 and 9
Physiological/survival	4, 5, and 6
Incentives	
Extrinsic	1
Intrinsic	2, 3, 4, 5, and 6

and with time. Sitting down with the workers to obtain information on their needs along with their ideas on how the structure and conditions of the incentive program should be set up can be extremely beneficial to the success of the incentive program. A successful incentive program is one that is well planned, clearly established, properly supported, and does not just benefit one party but provides benefits to all those who are involved.

The literature review has covered approximately 50 years of published works from Maslow's hierarchy of needs (1954) to the study by Sanders and Thompson's (1999) of project-specific employee incentives. Relatively few studies have been conducted in the construction industry on the actual techniques used to motivate subcontracted workers. This study will focus on this need at the subcontractor level and determine the factors that promote/create motivated behaviors in subcontractor crewmembers. The

Table 3. Statistical Results for Motivation

Attributes	Mean	Standard deviation	Accept for chi-square test
Incentives are used	5.84	1.08	X
They feel confidence based on their competence	5.76	1.17	X
When they are primarily self-motivated	5.30	1.28	
We meet the project schedule	5.28	1.41	
They are apart of the team/crew on a social basis	5.28	1.40	
They are empowered	5.14	1.21	
I effectively use my authority	5.00	1.21	
We meet the project budget	4.80	1.71	

Table 4. An $r \times c$ Table for Attributes of Motivation

Attributes	≤4.00	5.00	6.00	7.00
They feel confidence based on their competence	4	16	14	16
Incentives are used	7	9	18	16

proposed outcome of this study is a diagrammatic model that can be used by management in their development of a motivational program for their subcontractor workforce.

Methodology

In order to aid in the development of the subcontractor based motivational model a survey was developed (see the Appendix). The subcontractors targeted for this research were those employed by a commercial contractor based in north central Florida, with no limitations placed on the size or type of subcontractor.

The survey was designed to obtain quantitative data needed for statistical analysis. The survey first acquired demographic information on the respondents and their employer. The survey was divided into four distinctive areas: (1) motivation, (2) goal setting, (3) workforce needs, and (4) incentives, each of which is covered in depth in the literature review. The survey used concepts similar to those found in the literature review but the terminology was changed to reflect the current labor force in the construction industry. Respondents were asked to indicate the extent to which they agreed or disagreed with the statements made in the survey using a 7-point Likert scale. A response of a "1" on the scale reflected a strong disagreement, whereas a response of a "7" reflected a strong agreement with the statement.

The survey distribution process involved: (1) obtaining a list of subcontractors from a local (north central Florida) general contractor; (2) site visits to four construction jobsites to hand out the surveys; and (3) eight project managers from the participating general contracting firm were also asked to distribute surveys to the subcontractor foremen/superintendents on their other projects not personally visited by the researcher. The survey questionnaire was distributed to approximately 70 laborers, foremen, and superintendents on subcontractor's crews. It should be reiterated that the subcontractors reported having a well established working relationship with the general contractor.

A survey correlation chart, as shown in Table 2, was developed to relate each individual survey statement to a concept or idea that has been discussed in the literature review. This chart, like the survey, is divided into the four focal sections; motivation, goal

Table 5. Statistical Results for Goal Setting

Attributes	Mean	Standard deviation	Accept for chi-square test
Quality of work	6.16	0.84	X
Safety performance	5.86	1.20	X
When goals are reached incentives must be awarded in order for goal-setting to be effective.	5.70	1.34	
Time saved	5.64	1.10	
Dollars saved	5.54	1.37	
Work in place	5.52	1.11	

Table 6. An $r \times c$ Table for Factors of Goal Setting

Attributes	≤4.00	5.00	6.00	7.00
Quality of work	1	11	17	21
Safety performance	5	14	11	20

setting, workforce needs and incentives for both the purposes of reference and analysis. General findings are determined under each section and then related back to classical or published theories/findings discussed in the literature. Table 2 primarily aids in the interpretation of the statistical data used to develop the proposed subcontractor based employee motivational model.

Data Analysis and Results

The surveys were designed to obtain quantitative data needed for statistical analysis and were distributed through project managers to the foremen on their jobsites. These project managers were then asked to report the number of surveys they distributed resulting in a total of approximately 70 surveys being reported to be distributed, of which 50 surveys were returned. This resulted in a response rate of approximately 71%. The data collected from these surveys were then analyzed using the computed mean value of responses to determine which attributes to consider for the model. Subsequently, using chi-square tests, these attributes were analyzed to see if they were part of a common set. A mean response rate of 5.75 for an attribute was used as the minimum criteria for inclusion in the proposed model for additional analysis using a chi-square test. A mean value of 5.75 was selected because of its higher level of indication of agreement with the survey statements than choosing a 5.00 value out of the possible 7.00 scale.

Motivation

Table 3 shows the survey response results for the key factor worker *motivation*. The mean scores for the attributes are shown in descending order. The motivational attributes meeting the selection criteria of a mean response of 5.75 or greater were selected for the chi-square test. These selected attributes, as shown

Table 7. Satistical Results for Workforce Needs

Attributes	Mean	Standard deviation	Accept for chi-square test
A feeling of being a member of the team/crew	6.14	0.97	X
Praise	6.12	0.69	X
Job security	5.98	1.17	X
Protection against danger	5.70	1.37	
Helping your worker achieve their life long goals in relationship to work	5.42	1.40	
Status	5.02	1.06	
Rest	4.92	1.56	
Shelter	4.72	1.43	
Nourishment	4.64	1.31	
Competition	4.58	1.36	

156 / JOURNAL OF CONSTRUCTION ENGINEERING AND MANAGEMENT © ASCE / FEBRUARY 2006

Table 8. An $r \times c$ Table for Factors of Workforce Needs

Attributes	≤4.00	5.00	6.00	7.00
Praise	0	9	26	15
A feeling of being a part of the team/crew	3	8	17	22
Job security	8	7	12	23

in Table 3, are: "they feel confidence based on their competence" (5.76) and "incentives are used" (5.84). All other factors had mean values less than 5.75. The next step was to generate, as shown in Table 4, an "$r \times c$ table" of the responses for the selected statements. The data generated from Table 4 was then used to run the chi-square test. The chi-square test determines whether or not there are statistically significant differences among the motivational attributes selected. The null hypothesis (H_0) is that the attributes are the same. In other words, if they are the "same," then they become a common set of attributes for that factor (motivation, goal-setting, workforce needs, and incentives). The alternative hypothesis (H_a) is that the behaviors are not the same and do not represent a common set of attributes for that model factor.

The chi-square test generates a value for X^2, which will be referred to as X^2 calculated. The calculated X^2 is a measure of the distance of the observed counts from the expected counts. This value is always either zero or positive. It is zero only when the observed counts are exactly equal to the expected counts. Large values of X^2 are evidence against the null hypothesis because they say that the observed counts are far from what we would expect if the null hypothesis were true (Brase 1995).

The chi-square test for the factors of motivation resulted in an X^2 value of 3.28. In order to test the null hypothesis using the chi-square test results, X^2 calculated is compared to a standard table value found in most statistical textbooks, which will be referred to as the X^2 table. The following criteria were used to test the null hypothesis: If X^2 calculated was $>X^2$ table, then the null hypothesis (H_0) that they are the same is rejected and the alternate hypothesis (H_a) that they are not the same is accepted. If X^2 calculated was $<X^2$ table then the null hypothesis that they are the same is accepted, and the factor should be included as part of a set of attributes for the proposed motivational model (Brase 1995).

In order to use the chi-square table, a confidence interval had to be established and the degrees of freedom had to be determined. A confidence interval of 95% was used and therefore the table entry for p, which is defined as the probability of rejecting the null hypothesis if it is in fact true, was equal to 0.05 or (1.00-0.95). The level of $p=0.05$ is commonly used for the chi-square test. The degrees of freedom are calculated from the $r \times c$ table by multiplying the number of rows minus one by the number of columns minus one, $(r-1)(c-1)=df$. The table value for X^2 with $p=0.05$ and $df=3$ is equal to 7.81. The calculated value for X^2, as mentioned previously, was equal to 3.28. Therefore, since $3.28 < 7.81$ (X^2 calculated $<X^2$ table), the null hypothesis (H_0) that they are the same is accepted. This suggests that

Table 9. An $r \times c$ Table for Praise and A Feeling of Being a Member of the Team/Crew

Attributes	≤4.00	5.00	6.00	7.00
Praise	0	9	26	15
A feeling of being a part of the team/crew	3	8	17	22

Table 10. An $r \times c$ Table for Praise and Job Security

Attributes	≤4.00	5.00	6.00	7.00
Praise	0	9	26	15
Job security	8	7	12	23

based on the responses "confidence based on competence" and "incentives are used" are a common set of attributes for the factor *motivation* and are candidates for inclusion in the subcontractor motivational model under development.

Goal Setting

Table 5 shows the survey results for the key factor *goal setting*. Following the same procedure previously detailed, it was determined that two behaviors met the selection criteria of having a mean response value of 5.75 or greater. These behaviors are: "quality of work" (6.16) and "safety performance" (5.86). An $r \times c$ table was generated as shown in Table 6. The chi-square test for the attributes of *goal setting* resulted in an X^2 value of 4.34. The table value for X^2 with $p=0.05$ and $df=3$ is equal to 7.81. Therefore, since 4.34 is <7.81 (X^2 calculated $<X^2$ table), the null hypothesis (H_0) that they are the same is accepted. This suggests that quality of work and safety performance are a common set of attributes for the category *goal setting* and are candidates for inclusion in the motivational model under development.

Workforce Needs

Table 7 shows the survey results for the key factor *workforce needs*. Again, using the procedures previously discussed, three attributes of workforce needs met the selection criteria of a mean response of 5.75 or greater. These attributes are as follows: praise (6.12), a feeling of being a part of the team/crew (6.14), and job security (5.98). Table 8 shows the $r \times c$ table that was generated for the three attributes. The chi-square test for the attributes of *workforce needs* resulted in an X^2 value of 16.55. The table value for X^2 with $p=0.05$ and $df=6$ is equal to 12.59. Therefore, since $16.55 > 12.58$ (X^2 calculated $>X^2$ table), the null hypothesis (H_0) that they are the same is rejected and the alternative hypothesis (H_a) that they are different is accepted.

These three attributes of *workforce needs* were regrouped to determine if there was a common set of any of the two factors among the three. The three attribute groups were as follows: Praise and a feeling of being a member of the team/crew, praise, and job security, and a feeling of being a member of the team/crew and job security. Using the same procedures, praise and a feeling of being a member of the team/crew were tested and their $r \times c$ table (see Table 9). The chi-square test for praise and a feeling of being a member of the team/crew resulted in an X^2 value of 6.27. The table value for X^2 with $p=0.05$ and $df=3$ is

Table 11. An $r \times c$ Table for A Feeling of Being a Member of the Team/Crew and Job Security

Statement	≤4.00	5.00	6.00	7.00
A feeling of being a member of the team/crew	3	8	17	22
Job security	8	7	12	23

Table 12. Statistical Results for Incentives

Attributes	Mean	Standard deviation	Accept for chi-square test
Money	6.48	0.81	X
Paid time off	5.70	1.07	
Insurance	5.34	1.27	
A 401K plan	5.22	1.36	
Leadership	5.16	1.27	
Paid training	4.90	1.47	

equal to 7.81. Therefore, since 6.27 is <7.81 (X^2 calculated $<X^2$ table), the null hypothesis (H_0) that they are the same is accepted. This suggests that they are a common set of attributes for the category *workforce needs* and are candidates for inclusion in the motivational model under development.

Subsequently praise and job security were tested as shown in Table 10. The chi-square test for praise and job security resulted in an X^2 value of 15.09. The table value for X^2 with $p=0.05$ and $df=3$ is equal to 7.81. Therefore, since 15.09 is >7.81 (X^2 calculated $>X^2$ table), we must reject the null hypothesis that they (H_0) are the same and accept the alternate hypothesis (H_a) that they are different.

Finally, a feeling of being a member of the team/crew and job security were tested as shown in Table 11. The chi-square test for a feeling of being a member of the team/crew and job security resulted in an X^2 value of 3.22. The table value for X^2 with $p=0.05$ and $df=3$ is equal to 7.81. Therefore, since 3.22 is <7.81 (X^2 calculated $<X^2$ table), we can accept the null hypothesis (H_0) that they are the same. This suggests that they are a common set of attributes for the category "workforce needs" and are candidates for the motivational model under development.

By regrouping the attributes of workforce needs it is determined that there are two separate common sets of attributes. The first being praise and a feeling of being a member of the team/crew and the second being a feeling of being a member of the team/crew and job security.

Incentives

Table 12 shows the survey results on the considered attributes for the key factor *incentives*. One attribute, "Money" (6.48) met the selection criteria of a mean response of 5.75 or greater and since
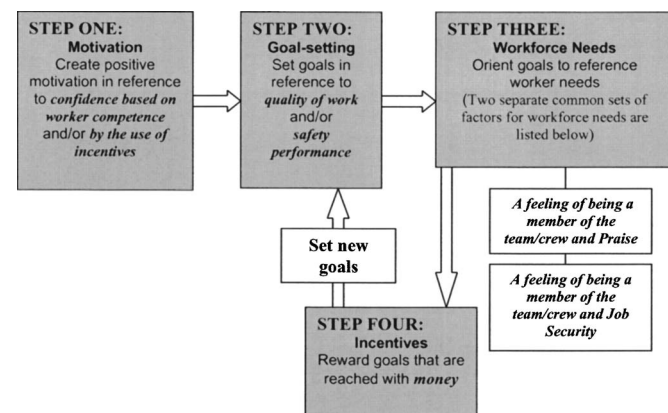
Fig. 2. A subcontractor based motivational model
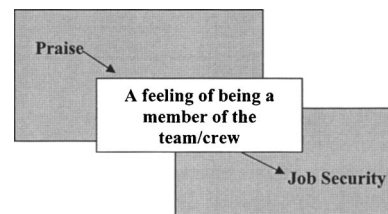
Fig. 3. Attributes of workforce needs

it was the only factor accepted the chi-square test could not be performed on this set of data.

Proposed Motivational Model

The objective of the research was to collect and analyze data to aid in the development of a subcontractor based motivational model. This model may be used by the construction industry to help create positive motivational behavior at the subcontractor level. Utilizing statistical analyses, a subcontractor based motivational model for the construction industry, as shown in Fig. 2, was developed. The model shows that a supervisor should first create positive motivation based on confidence, which originates from worker competence and/or by the use of incentives. Next the supervisor should set goals in reference to quality of work and or safety performance and also the needs of the worker. Finally, once goals are reached the worker should be rewarded with an incentive. Based on this analysis, money was suggested to be the incentive of choice.

Two separate common sets of attributes for *workforce needs* made the criteria for being potential model candidates. These two sets are: A feeling of being a member of the team/crew and praise and a feeling of being a member of the team/crew and job security. The researchers propose that a feeling of being a member of the team/crew is the common link between the three factors. This essentially means that a worker must first receive

Table 13. Proposed Motivational Model as Referenced to Literature Review

Model components	Result	Citation
A feeling of confidence based on their competence	Competence motivation	McClelland (1961); Thomas et al. (1990)
Incentives are used	Extrinsic motivation— not self-motivated	Hazeltine (1976)
Quality of work	Performance measurement	Thomas et al. (1990)
Safety performance	Performance measurement	Newstrom and Davis (1997)
Praise	Esteem/ego need	Maslow (1954)/ Schrader (1972)
A feeling of being a member of the team/crew	Social need	Maslow (1954)/ Schrader (1972)
Job security	Security/safety need	Maslow (1954)/ Schrader (1972)
Money	Extrinsic rewards	Sanders and Thompson (1999)

Table 14. Motivational Factors Distributed by Respondent Demographics

	Motivation				Goal setting					
	We meet the project schedule	They are a part of the team/crew on a social basis	They feel confidence based on their competence	Incentives are used	Work in place	Quality of work	Time saved	Dollars saved	Safety	When goals are reached, incentives must be given
Years of experience										
≥26						0=6.33 σ=0.78				
21–25			0=6.00 σ=0.94	0=6.10 σ=0.99		0=5.90 σ=1.10			0=5.80 σ=1.14	
16–20						0=5.93 σ=0.73				**0=6.07 σ=1.14**
11–15	**0=5.88 σ=1.21**		0=5.86 σ=1.46	0=6.43 σ=0.53	**0=5.86 σ=1.07**	0=6.71 σ=0.49	**0=6.29 σ=1.25**	**0=6.29 σ=1.25**	0=6.57 σ=0.79	0=6.71 σ=0.49
≤10					**0=6.00 σ=0.71**	0=6.60 σ=0.55		**0=6.60 σ=0.89**	0=6.20 σ=0.84	
Crew size										
≥16				0=6.09 σ=0.83		0=6.27 σ=0.90	**0=5.91 σ=0.94**		0=6.00 σ=1.00	
11–15				0=6.00 σ=0.67	**0=5.80 σ=0.79**	**0=6.00 σ=0.67**				
6–10	**0=5.80 σ=1.03**	**0=6.00 σ=1.25**	0=6.10 σ=0.88			0=6.30 σ=0.95	**0=5.80 σ=1.14**	**0=6.00 σ=1.33**	0=6.30 σ=0.95	**0=5.90 σ=1.10**
≤5			0=6.13 σ=1.09	0=6.00 σ=1.32		0=6.06 σ=0.85				**0=6.00 σ=1.32**
Number of projects supervised										
≥7			0=6.25 σ=0.87	0=6.17 σ=1.40	**0=6.00 σ=0.74**	0=6.08 σ=0.90			0=5.75 σ=1.48	
4–6			0=5.82 σ=1.29			0=6.18 σ=0.88		**0=5.94 σ=1.14**	0=5.94 σ=1.09	
≤3				0=6.00 σ=0.79		0=6.18 σ=0.81			0=5.82 σ=1.19	**0=5.76 σ=0.90**
Number of employees directly supervised										
>20			0=5.75 σ=1.48	0=6.00 σ=1.13	**0=5.75 σ=0.87**	0=6.17 σ=0.72			0=5.83 σ=1.27	
10–20			0=6.07 σ=1.14	0=6.00 σ=1.24	**0=5.86 σ=0.86**	0=6.29 σ=0.91	**0=5.79 σ=1.05**		0=6.14 σ=1.35	
<10						0=6.20 σ=0.83			0=5.75 σ=1.12	

Note: 0=mean; and σ=standard deviation.

praise before they begin to feel as if they are a member of the team/crew. As illustrated in Fig. 3, once the person has a feeling of belonging they begin to feel that they have acquired job security.

Comparisons Made to Literature Review

In order to compare the survey results back to the literature review the Survey Correlation Chart shown in Table 2 was used to generate Table 13. Table 13 shows that subcontracted crew members are motivated both by competence and outside factors. The respondents expressed preference that the goals be measured on a performance-based scale. Construction crews also have a strong desire to relate to others on a social basis and to be praised when praise is deserved. Finally, workers also want the feeling of job security and want to be rewarded with extrinsic rewards, i.e., money.

Additional Observations

The data generated by this research led to an additional observation outside the scope of this study. Breaking the data up by demographics (years of experience, average size of crew, number of projects supervised, and total number of employees directly supervised) reveals another level of information. The demographic data in Table 14 suggests that the importance of various model attributes actually varied among supervisory demographic profiles. Table 14 shows all mean responses of 5.75 or more. The bold attributes were already considered as attributes for the proposed model. The other attributes indicate that more attributes could be associated with various secondary demographics. For example, the type of incentives perceived to be desired in relationship to the number of years of experience of the individual supervisors filling out the survey indicated that money is an important incentive (having a mean of 5.75 or greater) for all subcategories within "years of experience." However, for those who are categorized as 20 years and less "paid time off" is also perceived to be important. One explanation may be that individuals with more experience are of higher seniority and have acquired paid vacation, personal and sick time and therefore they do not view paid time off as an incentive versus someone with less experience/seniority who has not acquired these benefits.

Table 14 shows four sets of additional attributes: years of experience; average size of crew; number of projects currently supervised; and the total number of employees directly supervised. The number of motivational factors that are perceived to be important to the construction industry by "level" of job supervisor, i.e., years of experience, etc. of an individual job foreman are shown in bold. These are additional motivational factors perceived to be important by that category of supervisor, which are not included among the factors that were accepted for the proposed original model.

Crew foremen, as shown in Table 14, with 11–15 years of experience perceive more (eight additional) attributes to be important motivators to their workers than any other level. These motivational attributes are: "we meet the project schedule," "work in place," "time saved," and "dollars saved," when goals are reached incentives must be given in order for goal setting to be effective," "protection against danger," "helping your worker achieve their life long goals in relationship to work," and paid time off.

As shown in Table 14, crew foremen with 6–10 crew workers perceive more (seven additional) factors to be important motivators to their workers than any other level. These motivational factors are: We meet the project schedule, they are a part of the team/crew on a social basis, time saved, and dollars saved, when goals are reached incentives must be given in order for goal-setting to be effective, "protection against danger," and "insurance."

Table 14 also shows that crew foremen with seven or more projects supervised perceive more (three additional) factors to be important motivators to their workers than any other level. These motivational factors are: Work in place, protection against danger, and paid time off.

Crew foremen with 10–20 employees supervised perceive more (four additional) factors to be important motivators to their workers than any other level. These motivational factors are: Work in place, time saved, paid time off, and leadership.

Based on the preceding analysis it can be concluded that different levels of job supervision perceive different amounts and types of motivational attributes to be important. Further research in the area of demographic breakdown would need to be conducted in order to draw more accurate conclusions. Similar findings were reported concerning key performance indicators for construction among supervisors, project managers, and executives (Cox, Issa, and Ahrens 2003).

Conclusions and Recommendations

Several conclusions can be drawn from this research based on the attributes determined to be common among the factors within the proposed motivational model. With respect to *motivation*, the common attributes are worker confidence based on competence and effective use of incentives. The incentive that was found to rate the highest among respondents was money. For goal setting, the respondents indicated that safety and quality were the most effective attributes. These same attributes should also be considered as the measurement objectives for the incentive program. Two sets of attributes affecting workforce needs were determined. The first set was praise and feeling like being a member of the group. In addition, feeling like being a member of the group was also found to be a common attribute with job security. This suggests that workers need praise before they get the feeling of being accepted by the group or crew. This acceptance into the group then leads to a feeling of job security. The overall findings of this study are supported by literature from previous works. It should be noted that when the data was analyzed in separate demographic profiles of supervisors, including age, years of experience, number in crews and number of crews, different sets of common attributes were found in the chi-square test. Such differences further reinforce the generally accepted belief that motivation is based on situational specific personal needs and experiences. The proposed model is the starting point for future research in these areas. Additional studies should also focus on other types of construction such as, residential, industrial and heavy/highway and they should also be extended to allow for the development of a performance-based scale.

Further studies should be undertaken to which increase the sample size across multiple general contractors in an effort to validate the proposed model. In addition, it is recommended that further studies include contractors that do not have established long term working relationships. There is a great potential for the use of subcontractor focus groups for increasing our understanding of the proposed subcontractor based motivational model.

Appendix. Subcontractor-Based Motivational Model

COMPANY NAME: —————————————

NAME: —————————————

TILE: —————————————

YEARS OF EXPERIENCE: —————————————

AVERAGE SIZE OF CREW: —————————————

NUMBER OF PROJECTS
YOU CURRENTLY SUPERVISE: —————————————

TOTAL NUMBER OF
EMPLOYEES YOU DIRECTLY SUPERVISE: —————————————

CIRCLE THE NUMBER THAT BEST REFLECTS YOUR WORKFORCE

	1	2	3	4	5	6	7
	Strongly Disagree		Disagree		Agree		Strongly Agree

MOTIVATION

My workforce is best motivated when .....

		1	2	3	4	5	6	7
1.	we meet the project schedule.	1	2	3	4	5	6	7
2.	we meet the project budget.	1	2	3	4	5	6	7
3.	they are apart of the team/crew on a social basis.	1	2	3	4	5	6	7
4.	they feel confidence based on their competence.	1	2	3	4	5	6	7
5.	they are empowered.	1	2	3	4	5	6	7
6.	when they are primarily self-motivated.	1	2	3	4	5	6	7
7.	I effectively use my authority.	1	2	3	4	5	6	7
8.	incentives are used.	1	2	3	4	5	6	7

CIRCLE THE NUMBER THAT BEST REFLECTS YOUR WORKFORCE

	1	2	3	4	5	6	7
	Strongly Disagree		Disagree		Agree		Strongly Agree

GOAL SETTING

An effective method for measuring your workforce's performance when utilizing goal setting is .....

		1	2	3	4	5	6	7
1.	work in place.	1	2	3	4	5	6	7
2.	quality of work.	1	2	3	4	5	6	7
3.	timed saved.	1	2	3	4	5	6	7
4.	dollars saved.	1	2	3	4	5	6	7
5.	safety performance.	1	2	3	4	5	6	7
6.	When goals are reached incentives must be awarded in order for goal setting to be effective.	1	2	3	4	5	6	7

CIRCLE THE NUMBER THAT BEST REFLECTS YOUR WORKFORCE

1	2	3	4	5	6	7
Strongly Disagree		Disagree		Agree		Strongly Agree

WORKFORCE NEEDS

In order to motivate your workforce, the most important
worker needs are those in reference to .....

		1	2	3	4	5	6	7
1.	competition.	1	2	3	4	5	6	7
2.	praise.	1	2	3	4	5	6	7
3.	status.	1	2	3	4	5	6	7
4.	nourishment.	1	2	3	4	5	6	7
5.	rest.	1	2	3	4	5	6	7
6.	shelter.	1	2	3	4	5	6	7
7.	a feeling of being a member of the team/crew.	1	2	3	4	5	6	7
8.	protection against danger.	1	2	3	4	5	6	7
9.	job security.	1	2	3	4	5	6	7
10.	helping your worker achieve their life long goals in relationship to work.	1	2	3	4	5	6	7

CIRCLE THE NUMBER THAT BEST REFLECTS YOUR WORKFORCE

1	2	3	4	5	6	7
Strongly Disagree		Disagree		Agree		Strongly Agree

INCENTIVES

The type of incentive your workforce would
most like to receive is.....

		1	2	3	4	5	6	7
1.	money.	1	2	3	4	5	6	7
2.	paid time off.	1	2	3	4	5	6	7
3.	insurance.	1	2	3	4	5	6	7
4.	a 401K plan.	1	2	3	4	5	6	7
5.	leadership (through added authority and responsibilities).	1	2	3	4	5	6	7
6.	paid training.	1	2	3	4	5	6	7

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J. Constr. Eng. Manage., 2006, 132(2): 152-163