Sixth International Conference on Construction in the 21st Century (CITC-VI)
"Construction Challenges in the New Decade"
July 5-7 2011, Kuala Lumpur, Malaysia

Effectiveness of Worker Motivational Techniques on Construction Project Safety, Productivity and Quality Performance

Raza Ali Khan
Associate Professor,Department of Civil Engineering, NED University of Engg. & Technology, alikhan.raza@gmail.com

Farhan Saleem
Assistant Professor,Department of Civil Engineering, NED University of Engg. & Technology, farhansaleem@neduet.edu.pk

Muhammad Umer
Lecturer,Department of Urban & InfrastructureEngineering, NED University of Engg. & Technology, emumer@neduet.edu.pk

Abstract
Construction labor can be motivated. This is important because dwindling productivity is a major problem confronting construction today. Productivity has decreased every year for the past decade, in part because of increasing design complexity, more rigorous federal and state regulations, and socio-economic changes affecting the work force. Construction is a relatively hazardous undertaking. If top level management expresses strong concern for project safety, this can be a motivator for workmen. Quality of construction projects, as well as project success, can be regarded as the fulfillment of expectations (i.e. the satisfaction) of the project participants. The client would require the main contractor to only select subcontractors who have demonstrated quality attitude and work performance on previous jobs, and so on. The research undertaken identified several motivational techniques that can be used to improve performance on construction project productivity, safety and quality performance through frequency analysis of the responses obtained. Motivational techniques such as "A letter of praise from a customer shared directly with the employee who delivered the service", "Provide training to employees. Offer them opportunities to improve themselves", "Job Security", "Provide better job descriptions so that employees will know exactly what is expected of them", "Having good equipment to work with. Good working conditions" are found to be varyingly effective in improving performance on construction project safety, quality and productivity performance. The study is concluded with the quantification of the effectiveness of each motivational technique through a relative ranking analysis in a consolidated table which proposes techniques, that are firstly majority of times used in the industry in the present scenario and at the same time can be used to achieve improved performance on construction project, safety, and quality in relative order.

Keywords
Motivational techniques, TQM, Productivity performance, Quality performance, Safety performance

1. Introduction

The changing work force in the construction industry is particularly significant. We have a very bright, well-educated and independent work force. This new work force demands reforms in the traditional

rigidities of construction organization, and changes in levels of responsibility and authority, supervisory roles, communication networks, interpersonal relationships and reward systems. Effective first-level supervision by foremen is generally considered to be prerequisite to efficient performance by any work group. They control, influence or have the greatest impact on most of the ingredients of productivity. The relationship between motivation and productivity can be summarized as: productivity is directly linked to motivation, and motivation is, in turn, dependent on productivity. Suitable motivation of labor can be hypothesized as a key contributor to maximizing workers' productivity, Kazaz et al. (2008). Workers need motivation just as equipments need fuel and operators. Motivation is a process which in result activates productivity. If top level management expresses strong concern for project safety, this can be a motivator for workmen. Potential savings on insurance rates should reinforce a moral obligation by management to provide a safe work environment. Well-kept, safe areas and a display of management concern for the well being of their employees may move craftsmen and foremen to perform more productively. Conversely, unsafe conditions and unnecessary injuries can result in decreased worker morale and high absenteeism and turnover, Chris Hendrickson (2000). Quality is one of the critical factors in the success of construction projects. Quality of construction projects, as well as project success, can be regarded as the fulfillment of expectations (i.e. the satisfaction) of the project participants. Total quality management (TQM) is a human resource driven quality philosophy. TQM is often termed a journey, not a destination, Burati Jr and James L. (1993). The client would require the main contractor to only select subcontractors who have demonstrated quality attitude and work performance on previous jobs, and so on. All successful TQM initiatives come from the top management i.e. the project client. Brah, S. A. *et.al*. (2002).

1.1. Scope

Identification and development of a set of effective worker motivational techniques for the clients, contractors, consultants and project managers in the construction industry of Pakistan so that they may be able to achieve improved performance on construction project safety, productivity and quality.

1.2. Objectives

Improvement and strengthening of construction management practices in Pakistan by standardizing the construction sector practices through the development of a set of worker motivational techniques so that the overall efficiency and productivity could be improved. This is aimed in two phases:

1. Identification of worker motivational techniques that forms the basis for improved performance on construction project safety, productivity and quality performance.
2. Proposal of a set of techniques for validation and implementation to achieve optimum performance in the stated areas.

1.4. Significance

International construction industry though has continuous process for construction management practices are in progressive phase. Pakistan construction industry needs to rectify the practices of local construction sector by identifying improvement measures based on local primary data. Therefore, a set of worker motivational techniques have to be evaluated based on their effectiveness in order to be recommended for the improvement of local construction sector.

2. Literature Review

At the broadest level, work motivation is a psychological process that influences how personal effort and resources are allocated to actions pertaining to work, including the direction, intensity, and persistence of these actions. Motivation refers to the individual forces that account for the direction, level, and

persistence of a person's effort expended at work. Direction refers to an individual's choice when presented with a number of possible alternatives. Level refers to the amount of effort a person puts forth. Persistence refers to the length of time a person sticks with a given action. John R. Schermerhorn, *et al.* (*200*1). The basic requirements of a construction worker motivation program should be:

- A competent administrator to organize, plan, control and carry out the program
- Activities that are fully understood and acceptable to all participants
- Financial commitment by the owners and a willingness to recognize workers The Business Roundtable (1989)

Construction labor can be motivated. This is important because dwindling productivity is a major problem confronting construction today. Productivity has decreased every year for the past decade, in part because of increasing design complexity, more rigorous federal and state regulations, and socio-economic changes affecting the work force. The organization should not be so rigid as to prohibit communication that may skip intermediate links in the chain. Supervisors must be allowed, through personal contact, to help create attitudes among the construction workers that will make them want to become members of a construction team and not just nameless numbers, The Business Roundtable (1989).

Effective first-level supervision by foremen is generally considered to be prerequisite to efficient performance by any work group. They control, influence, or have the greatest impact on most of the ingredients of productivity. When the potential for productivity improvement is examined, the need for more highly motivated, cost conscious and responsible foremen crops up repeatedly. The Business Roundtable (1989). Many items contribute to falling productivity, i.e., ineffective management and supervision that leaves material unavailable when it is needed, incompetence in staff personnel, delays in transmitting engineering information, communication breakdowns, rework, the unavailability of tools and equipment, lack of recognition and little participation in decision making by foremen and their crews. The Business Roundtable (1989). According to Thieblot (2002), the reason for this situation is that the industry has rarely been able to have what would be considered normal labor relations and policies. Furthermore, managers may not always consider the factors that can affect the productivity of manpower. The productivity risk factor has also a strong impact on the project duration. Namely, poor labor productivity probably causes time overruns in construction projects Kazaz and Ulubeyli (2004). And it is widely known that construction is a relatively hazardous undertaking according to Chris Hendrickson and Tung Au (2000). Various measures are available to improve jobsite safety in construction. Several of the most important occur before construction is undertaken. These include design, choice of technology, education and motivation. During the construction process itself, the most important safety related measures are to insure vigilance and cooperation on the part of managers, inspectors, and workers which all can be motivated to use. I. Hard Hats on Site. II. Eye Protection on Site. III. Hearing Protection near Loud Equipment. IV. Safety Shoes for Workers. V. Providing First-Aid Supplies and Trained Personnel on Site. Chris Hendrickson and Tung Au. (2000). Sawacha, Edwin et al determined that the top five important issues found to be associated with site safety were: I. Management Talk on Safety. II. Provision of Safety Booklets. III. Provision of Safety Equipment; IV. Providing Safety Environment and V. Appointing A Trained Safety Representative on Site. Sawacha et al. (1999). If top level management expresses strong concern for project safety, this can be a motivator for workmen. Potential savings on insurance rates should reinforce a moral obligation by management to provide a safe work environment. Well-kept, safe areas and a display of management concern for the well being of their employees may move craftsmen and foremen to perform more productively. Conversely, unsafe conditions and unnecessary injuries can result in decreased worker morale and high absenteeism and turnover, The Business Roundtable (1989). Significant motivators include proper orientation of new workers, job safety meetings, and a show of awareness by the superintendent of potential problems that may result in an accident. Safety instruction and safety equipment such as steel-toed boots, gloves, or safety glasses reduce the likelihood of injuries. All of these, too, can be motivators, The Business Roundtable (1989).

3. Research Questions

The study is undertaken with the following questions in mind

1. What are the main motivational techniques that contribute to improve performance on construction project productivity, safety and quality performance?
2. How much each proposed motivational technique is effective in achieving the optimum performance in the stated areas?

4. Methodology Description

To achieve a goal there is a need to have strong technical knowledge and awareness of international construction industry management practices. Therefore, research was initiated by literature study. For literature study, relevant research papers were collected, classified them to skim out more specific and relevant papers. A questionnaire was then developed comprising of worker motivational techniques that are used or that could be used to achieve improved performance on construction project safety, productivity and quality performance, the motivational techniques will then be evaluated on the basis of their effectiveness on a Likert Scale through a survey. The results obtained from these surveys will then be analyzed to propose a set of worker motivational techniques solely applicable to Pakistan construction sector. A simple survey methodology is adopted to have more responses by targeted audience. The target is to approach contractors, clients, consultants, project managers. Questionnaires were dropped and then collected after giving them ample time to fill it. Survey was conducted to the best of knowledge and approach to have maximum output and response from the target audience which would help in analysis of questionnaires.

4.1. Questionnaire Design

Questionnaire for this survey consisted of four main sections. These are:

1. Respondent Information.
2. Identification of Motivational Techniques.
3. Judgment of the Effectiveness of Motivational Techniques.
4. Suggestions.

The questionnaire suggests workers motivational techniques in construction projects as described above and respondents are required to identify those techniques which implemented by them in their projects and in addition to this they also required to rate the effectiveness of the respective statements on a scale of 1 to 3 where 1 refers to “Most Effective” and 3 refers to “Least Effective” in order to implement the suggested techniques.

4.2 Survey Analysis

A total of Forty (40) questionnaires were distributed among the target audience and thirty (30) valid responses were obtained making response rate to be approximately 75% .The analysis of the questionnaire included determining effectiveness index of each motivational technique on the basis of Likert scale ranging from 1 to 3 (1 = Most Effective 2 = Moderately Effective 3 = Least Effective). By using weighted average technique, statistical analysis is done. The effectiveness index (EI) of each statement is calculated to determine the level of effectiveness of the particular motivational technique. Effectiveness index (EI) is determined by using the formula.

$$EI = \frac{\sum (W \times n_w)}{\sum n} x100$$

Where,

W = Weight of responses,

n_w = No of responses for that weight

n = Responses

5. Analysis

This section includes the conclusion, based on the analysis of survey results and feedback.

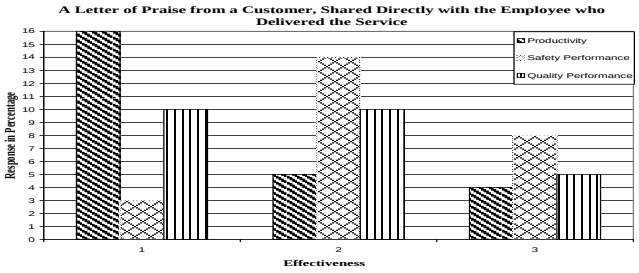

Figure 1: A Letter of Praise Shared Directly With the Employee

When asked the respondents to rate the motivational technique that a letter of praise from a customer, shared directly with employee who delivered the service, almost all of the respondents were of the view that it can prove to be most effective in achieving improved performance on construction project productivity, but it will not be as much effective to improve the safety performance, however it can moderately improve the safety performance on the project. In order to improve the quality performance this particular motivational technique is found to be most to moderately effective.

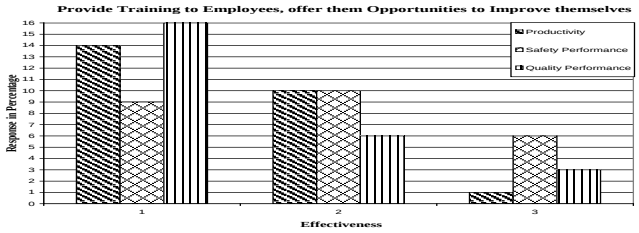

Figure 2: Provide Training to Employees; Offer Them Opportunities to Improve Them

The analysis of responses against the motivational technique, provide training to employees, offer them opportunities to improve themselves shows that the stated technique is most effective to achieve improved performance on quality performance of the project as it asserted by majority of the respondents, it is also found that majority of the respondents were of the view that it is most effective to achieve improved performance on construction project productivity, however the stated technique is moderately effective in order to achieve improved performance on safety performance.

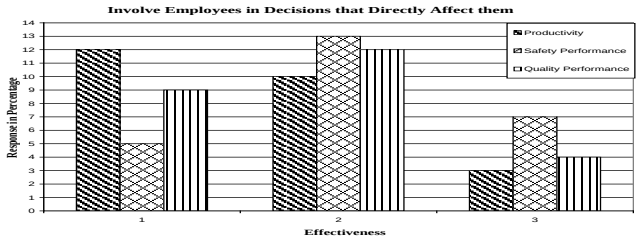

Figure 3: Involve Employees in Decisions That Directly Affect Them

From the responses on the motivational technique, involve employees in decisions that directly affect them, it can be concluded that the stated motivational is best suited to improve performance on construction project productivity then it is moderately suitable to improved performance on safety performance and quality performance of the project as asserted by majority of the respondents.

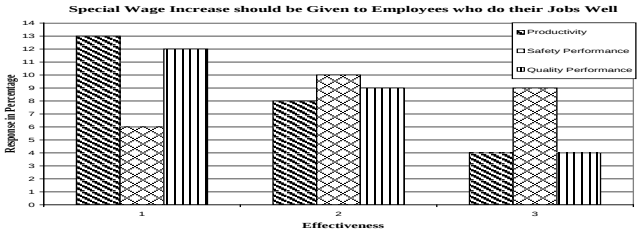

Figure 4: Special Wage Increase Should Be Given to Employees Who Do Their Jobs Well

The analysis of the responses shows that the motivational technique, special wage increase should be given to employees who do their jobs well is best suited to improve the construction project productivity and quality performance, however majority of the respondents were of the view that it is moderately effective in achieving improved performance on construction project safety performance.

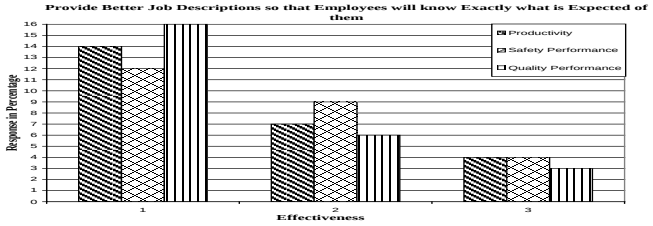

Figure 5: Providing Better Job Descriptions to the Employees

The analysis of the responses indicates that by providing better job descriptions to the employees it is expected by majority of the respondents think that by using this technique one can mostly improve quality performance, however a lesser number of respondents perceive the same fact to achieve improved performance on productivity performance and safety performance but still the number of respondents in this most effective category is greater than that of in moderate and least category of effectiveness.

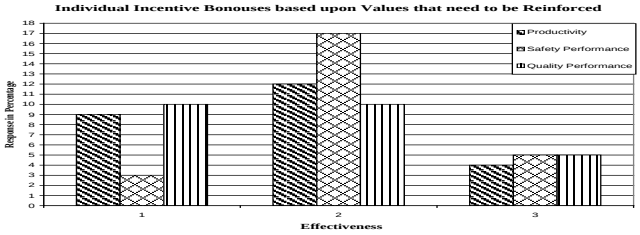

Figure 6: Individual Incentive Bonuses Based Upon Values That Need to be Reinforced

When respondents were asked to rate the effectiveness of the motivational technique, individual incentive bonuses based upon values that need to be reinforced. The analysis shows that majority of the respondents think that it is moderately effective in achieving improved performance on safety and productivity performance, however it is most to moderately effective upon achieving improved performance on quality performance.

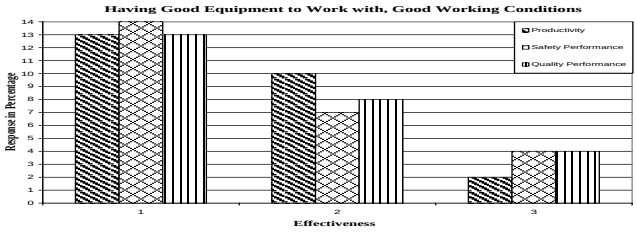

Figure 7: Having Good Equipment to Work With

The analysis of the responses against the motivational technique, having good equipment to work with indicates that according to majority of the respondents it is most effective in achieving improved performance on construction project productivity, safety and quality performance.

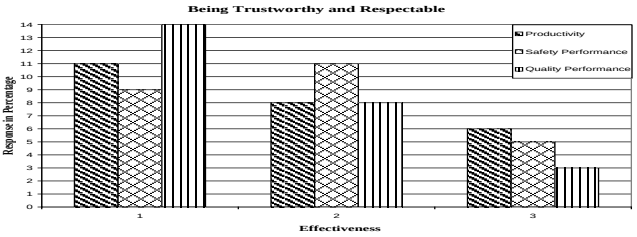

Figure 8: Being Trust Worthy and Respectable

When asked the respondents to rate the effectiveness of motivational technique, being trust worthy and respectable, they suggested that the stated motivational technique is most effective in achieving improved performance on construction project productivity and quality but it is moderately effective in order to achieve improved performance on safety.

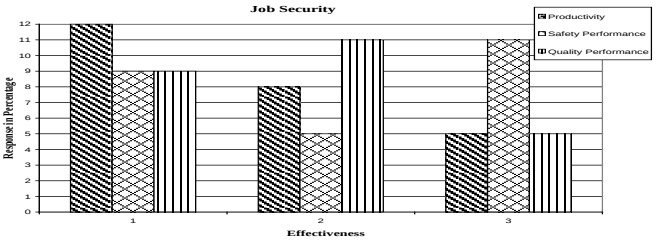

Figure 9: Job Security

The analysis of the responses indicates that job security is best suited to improve the project productivity most effectively and majority of the respondents think that by using this technique one can moderately improve quality performance, however a lesser number of respondents perceive that to achieve improved performance on safety performance and quality performance this technique can be utilized.

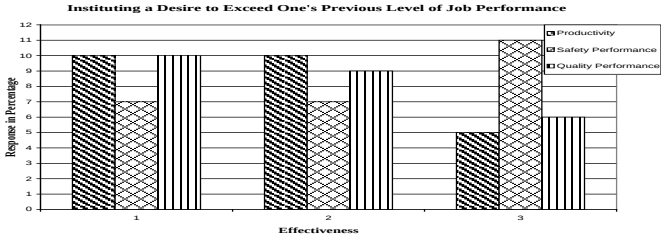

Figure 10: Instituting a Desire to Exceed One's Previous Level of Job Performance

From the responses on the motivational technique, instituting a desire to exceed one's previous level of job performance, it can be concluded that the stated motivational is best suited to improve performance on construction project productivity and project quality performance, however it is slightly suitable to improved performance on safety performance of the project.

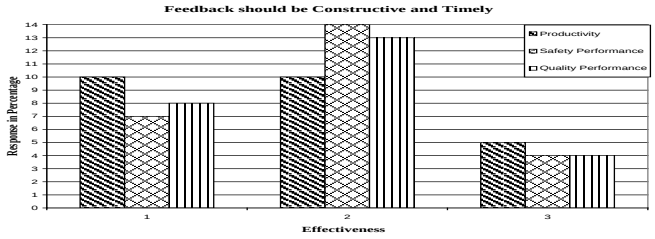

Figure 11: Feedback should be Constructive and Timely

When respondents were asked to rate the effectiveness of the motivational technique, feedback should be constructive and timely. The analysis shows that majority of the respondents think that it is moderately effective in achieving improved performance on safety and quality performance, however it is most to moderately effective upon achieving improved performance on project productivity.

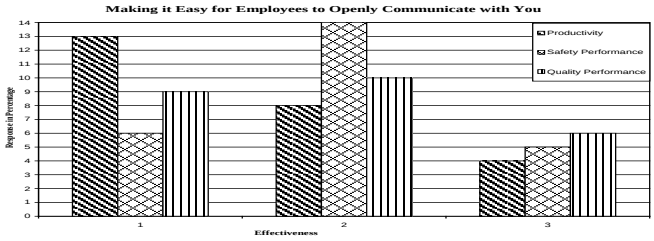

Figure 12: Making Easy For Employees to Openly Communicate

From the responses on the motivational technique, making easy for employees to openly communicate, it can be concluded that the stated motivational is best suited to improve performance on construction project productivity then it is moderately suitable to improved performance on safety performance and quality performance of the project as asserted by majority of the respondents.

6. Conclusion

Table 1 given below represents a form of the recommended worker motivational techniques for the construction sector of Pakistan. The final motivational techniques are recommended by considering the frequency of usage and effectiveness to achieve improved performance on construction project safety, productivity and quality performance. Any particular motivational technique must rank within top ten in all parameters i.e. frequency of usage, potential to improve performance on construction project safety, productivity and quality performance. Based on this firstly, the techniques that are predominantly used in the industry followed by effective motivational techniques to improve performance on construction project productivity, safety, and quality performance are summarized. Table 1 represents the summary of the research effort which was intended to determine.

6.2 Identification of worker motivational techniques that forms the basis for improved construction project safety, productivity and quality performance.

6.3 Proposal of a set of techniques for validation and implementation to achieve optimum performance in the stated areas.

Table 1: Final Recommended Motivational Techniques

Motivational technique	Frequency of Usage		Productivity Performance		Safety Performance		Quality Performance	
	Freq. Of usage Index	Rating	*Prod. Perf. E.I	Rating	**Safety Perf. E.I	Rating	***Quality Perf. E.I	Rating
A letter of praise from a customer shared directly with the employee who delivered the service.	56	4	82.58	2	59.90	10	73.00	7
Provide training to employees. Offer them opportunities to improve themselves.	56	4	83.92	1	70.60	4	84.00	1
Involve employees in decisions that directly affect them.	60	3	78.59	5	63.90	7	73.00	7
Special Wage increase should be given to employees who do their jobs well.	52	5	78.59	5	62.60	8	77.00	5
Provide better job descriptions so that employees will know exactly what is expected of them.	44	7	79.92	4	77.30	2	84.00	1
Individual incentive bonuses based upon values that need to be reinforced.	52	5	73.26	10	63.90	7	73.00	7
Having good equipment to work with. Good working conditions.	60	3	81.25	3	79.90	1	79.00	4
Being trustworthy and respectable.	56	4	73.26	10	71.90	3	81.00	2
Job security	44	7	75.92	7	63.90	7	72.00	8
Feedback should be constructive and timely.	32	10	73.26	10	70.60	4	72.00	8
Making it easy for employees to openly communicate with you.	48	6	78.59	5	67.90	5	71.00	9

*Prod. Perf. E.I= Productivity Performance Effective Index, **Safety Perf. E.I= Safety Performance Effective Index, ***Quality Perf. E.I= Quality Performance Effective Index.

From the above table it can be concluded that:

The motivational technique, *"A letter of praise from a customer shared directly with the employee who delivered the service"*, has a 4th ranking in terms of frequency of usage in the present scenario but in order to improve the productivity performance it ranks at 2nd and similarly it is not found to be much effective in improving the safety performance of workers as it ranks at 10th in the respective area but on the other hand it can to some extent improve the Quality performance of workers as it ranks at 7th.

The motivational technique, *"Provide training to employees. Offer them opportunities to improve themselves"*, has been found most effective to improve Productivity and Quality Performance of workers whereas its effectiveness to improve safety performance has been found to be at medium level, whereas it can also be concluded that it is being implemented to some scale in the present local industry as it ranks at 4th.

Providing *"Job Security"*, it was found that it is not effective in improving performances in either productivity, safety and quality and nor it is being used to much extent in the present scenario of the local construction sector.

"Provide better job descriptions so that employees will know exactly what is expected of them", has the potential to make workers to do better quality work according to the analysis of the responses *"Having good equipment to work with. Good working conditions"*, is found according to the respondents to improve safety performance of the workers the most (rank 1st) followed by productivity performance and quality performance, and it is used majority of the respondents (rank 3rd) to achieve the above stated results.

References

1. John R. Schermerhorn, Jr. James G. Hunt, Richard N. Osborn, (2001), "*Organizational Behavior, Seventh Edition."* Wiley Publisher, *ISBN: 978-0-471-14800-5.*
2. The Business Roundtable, (1989), "Construction Labor Motivation- A Construction Industry Cost Effectiveness Project Report"- http://www.curt.org/pdf/117.pdf
3. Chris Hendrickson and Tung Au, (2000), "*Project Management for Construction-Fundamental Concepts for Owners, Engineers, Architects, and Builders*." Prentice Hall
4. Sawacham, Edwin; Naoum, Shamil and Daniel Fong; (1999), "Factors affecting safety performance on construction sites", International Journal of Project Management, Volume 17, Number 5, October 1999 , pp. 309-315(7)
5. Burati Jr., James L., (1993). "Implementing TQM in Engineering and Construction"
6. Brah, S. A., Tee S.L, Rao, M. (2002), "Relationship between TQM and Performance of Singapore Companies", (By International Journal of Quality and Reliability Management, Vol. 19, No. 4, Pp. 356-379.
7. Thieblot, A. J. 2002. "Technology And Labor Relations In The Construction Industry", Journal of Labor Research 23(4): 559–573.
8. Aynur Kazaz, Ekrem Manisali, Serdar Ulubeyli., 2008, "Effect of basic motivational factors on construction workforce productivity in Turkey", Journal of Civil engineering and Management 14(2): 95–106