MOTIVATION AND DEMOTIVATION 'CAUSE FACTORS' FOR ENGINEERS IN CONSTRUCTION ORGANISATIONS

R. Venkatesan, Koshy Varghese and K. Ananthanarayanan
Department of Civil Engineering, Indian Institute of Technology Madras, India

Motivation is one of the factors that influence the productivity of people. Engineers play a vital role in the management of projects in a construction organisation. The success of these projects relies heavily on their active involvement and effective performance. Hence it is important to assess the impact of motivation on the performance of these engineers. The broad objective of this work is to assess the impact of motivation on the performance of these engineers. The specific objective of this paper is identifying the key factors that cause motivation and de-motivation in engineers. Literature survey, expert opinion and semi-structured interviews were conducted to find these factors. A structured principal questionnaire survey was carried out among 100 engineers from the Central Public Works Department (CPWD). Analytical Hierarchy Process (AHP) was used to find the weightages for the key factors. Using these factors to conduct specific motivational programmes will help in improving the productivity of people on a project.

Keywords: human resource management, measurement, motivation, organisation, productivity.

INTRODUCTION

People play an important role in the effective utilisation of all other resources on a construction project. Hence, improving the productivity of the personnel on a project can have a significant improvement on the project outcome (Zakari, *et al.*, 1997; Bajaj, 2006; Kazaz, *et al.*, 2008). Past studies have shown that motivation is one of the factors that influence the productivity of people (Maslow, 1954; Herzberg, 1968; Vroom, 1964). Studies on motivation in the construction industry have been done since the early 1970s (Schrader, 1972; Hazeltine, 1976; Borcherding 1977; Laufer and Jenkins, 1983; Maloney and McFillen, 1983, 1986, 1987; Olomolaiye and Price, 1989; Moilwa and Longford, 1990; Zakari, *et al.*,1997; Kaming, *et al.*,1998; Cox, *et al.*,; Uwakweh, 2006; Doloi 2007; Kazaz *et al.*,2008). Nearly all of these studies have focused on workers and supervisors. Although, Engineers play a vital role in the management of public sector projects and their influence on the project is very high, there have been only a few studies focusing on the motivation of engineers and its impact on their performance (Shoura and Singh, 1998; Ruthankoon and Ogunlana, 2003; Jiliang, 2005).

The broad objective of this research is to assess the impact of motivation on the performance of engineers in public sector organisations. The objective of the study presented in this paper is to identify the factors influencing motivation and de-motivation, and assess their relative weightages. The scope of this study was limited to the Central Public Works Department, Government of India.

Venkatesan, R. , Varghese, K. and Ananthanarayanan, R. (2009) Motivation and demotivation 'cause factors' for engineers in construction organisations. *In:* Dainty, A.R.J. (Ed) *Procs 25th Annual ARCOM Conference,* 7-9 September 2009, Nottingham, UK, Association of Researchers in Construction Management, 145-53.

This paper is organised into the following five sections: i) review of past work on motivation in construction ii) the methodology adopted iii) results highlighting the factors identified and their corresponding weightages, iv) discussion on the findings, and (v) conclusions from the study and future work.

MOTIVATION STUDIES IN THE CONSTRUCTION

Table 1 summarises the important studies on the application of motivational theories to the construction domain. This section categorises these studies based on the motivational theory used and discusses them.

Maslow's Theory

Maslow states that the human desire to satisfy one's needs acts as a motivator influencing their performance positively. He represents these needs as a hierarchy of five categories: physiological, safety, love / social, self esteem, and self-actualisation. Based on Maslow's theory, Schrader (1972) proposed a needs of construction workers and identified appropriate techniques which could be included as a part of a motivational program. Hazeltine (1976) suggested that the lower level needs are mostly fulfilled and the higher level needs requires attention. He advocated that motivational potential inherent in construction work can be used to fulfil the higher level needs of workers. Shoura and Singh (1998) emphasised the importance of total self development to fulfil the self-actualisation need for the engineering managers.

Herzberg's Theory

Herzberg's two factors theory suggests that the absence of hygiene factors cause job dissatisfaction and the presence of motivation factors result in job satisfaction.

Borcherding (1977) presented matrix techniques to improve motivation and reduce de-motivation of foremen and craftsmen. Moilwa and Langford (1990) and Ruthankoon and Ogunlana, (2003) investigated the applicability of Herzberg theory's for Botswana construction supervisors and Thai engineers respectively. Based on Herzberg's theory, Olomolaiye and Ogunlana (1988) quantified the motivation and de-motivation levels by measuring and multiplying the importance and gratification levels of workers. They applied this concept in the construction domain with the workers at Nigeria. Olomolaiye also studied motivation of Iranian construction operatives with Zakari, *et al.* (1997) and motivation of Indonesian workers with Kaming, *et al.* (1998) and showed the applicability of motivational study in developing countries.

Expectancy Theory

The Expectancy theory was developed by Vroom (1964) and improved by Porter and Lawler (1968). This states that a person is motivated by the outcome of his performance. The theory estimates a numerical level of motivation based on expectancy, valance and instrumentality. Laufer and Jenkins (1983) illustrated the application of this theory in the construction industry and argued to link desired outcome to desired performance. Maloney and McFillen (1986) presented the "Expectancy Model of worker performance" and recommended for performance definition and performance encouragement be used to improve motivation levels.

Table 1: Literature Review Summary

Sl. No	First author (Year of publication)	Title	Motivation theories considered	Study Group	Suggestions for enhancement of motivation
1	Schrader, C.R (1972)	Motivating construction craftsmen	Maslow's need theory	Workers	Involvement, Information, improved methods, praise and motivational programs to fit the idiosyncrasies of their situation
2	Hazeltine, C.S (1976)	Motivation of construction workers	Maslow's need theory and Herzberg's two-factor theory	Workers	Appreciation, healthy worker attitude, satisfaction of their self- fulfilment needs - motivators. Also suggested for willingness of all management personal to learn and applies appropriate motivation basics.
3	Borcherding, J.D (1977)	Motivating the lower level supervisory staff and work force on super projects	Herzberg's two-factor theory	Workers & Supervisors	Achievement, growth, challenge suggested as motivators. Avoiding delays and changes by preplanning and methods improvement, Craftsmen and foremen participation in job policy making - techniques to reduce de-motivation.
4	Laufer,A. (1983)	Motivating construction workers	Vroom's expectancy theory	Workers	Active and continuous role played by managers in managing workers motivation, identifying the outcomes valued by employees, developing performance measurement techniques and set reachable goals.
5	Maloney,W. F (1986)	Motivation in unionised construction	Vroom's expectancy theory	Workers	Suggested for performance definition, facilitation for achieving goals and measurement of performance along with continuous encouragement as motivators.
6	Moilwa, T (1990)	The motivation of construction supervisors in Botswana	Herzberg's two-factor theory	Supervisors	Motivation is subjected to culture and will influence methods and techniques used to motivate their subordinates.
7	Zakeri, M (1997)	Factors affecting the motivation of Iranian construction operatives	Maslow's need theory and Herzberg's two-factor theory	Workers	Top five motivating factors for Iranian construction operatives are: Fairness of pay, incentive and financial rewards, on time payment, good working facilities, safety at work. But these are poorly gratified.
8	Shoura M.M (1998)	Motivation parameters for engineering managers using Maslow's theory	Maslow's need theory	Engineers and Project Managers	Meaningfulness of tasks, self-sufficiency in doing job through continuous training - motivating factors. Also suggested that motivational programs galvanise the work interest of individuals and stimulate harmony within the organisation.
9	Kaming P.F (1998)	What motivates construction craftsmen in developing countries? A case study of Indonesia	Maslow's need theory and Herzberg's two-factor theory	Workers	For Indonesian workers five most motivating variables are: Fair pay, good work relationship, overtime payment, bonus and good safety program and five most de-motivating factors are disrespect, little accomplishment, lack of co-operation, discontinuity of work and unsafe work condition.
10	Ruthankoon, R (2003)	Testing Herzberg's two – factor theory in Thai Construction Industry	Herzberg's two-factor theory	Engineers, and Foremen	Achievement, growth, responsibility and advancement are considered as job content factors, Salary, relationship with supervisors are considered as important job context factors by Thai engineers and foremen.
11	Uwakweh B.O (2006)	Motivational climate for construction apprentice	Vroom's expectancy theory	Work apprentice	Providing challenging, clear and achievable tasks suggested as motivators. It is also suggested that praises for jobs done well, involvement and providing required equipment can help to improve the motivational score.

Uwakweh (2006) applied the theory to evaluate motivation of construction apprentices. As it can be seen from the above survey, studies on motivation in the construction industry has focused primarily on workers and supervisors. There have been only a few studies focusing on engineers. Further, no research study on motivation of engineers has been done in the Indian construction industry. Thus the findings of this study will contribute to understanding the motivational needs of engineers in the Indian construction industry.

RESEARCH METHODS

This research is carried out in two phases: a) Investigation phase and b) Survey phase

The details of both these phases are explained below:

Investigation Phase

Figure – 1 illustrates the details of the investigation phase. Based on the literature survey and expert opinion, a list of factors influencing motivation and de-motivation was prepared. Expert opinions were sought from the senior engineers with 25 years of field and administrative experience as well as the faculty guiding research studies in human resource management. Subsequently, semi-structured interviews were conducted among twelve field engineers to narrow down the list and identify the key motivating and de-motivating factors.

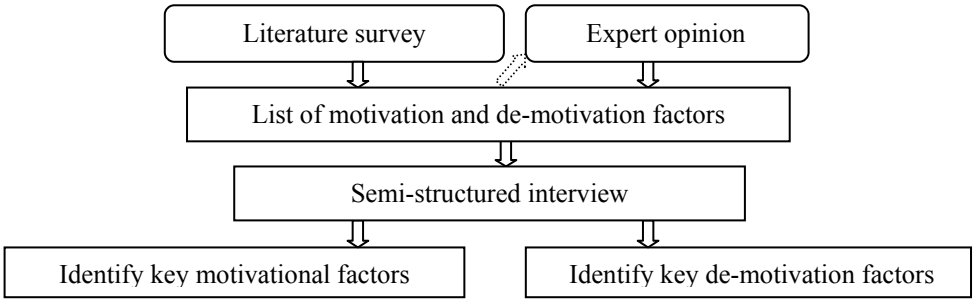

Figure 1: Investigative phase

Survey Phase

Figure – 2 presents the details of the survey phase. First, a principal survey questionnaire was constructed. A pilot study was conducted to fine tune the principal questionnaire. The principal questionnaire survey was administered to 100 engineers from the Central Public Works Department (CPWD). A face-to-face (one-to-one) contact technique was used in order to assure the validity and reliability of the principal survey (Kazaz, 2008).

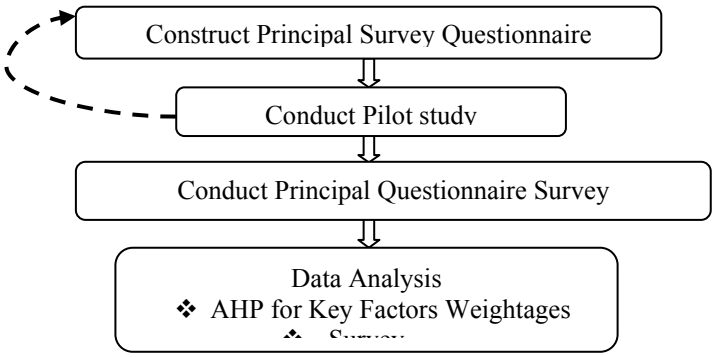

Figure 2: Model formulation

Responses to the Analytical Hierarchy Process (AHP) based pair-wise comparison questions were used to determine the weights of each key factor (Saaty, 1980). The software Expert Choice was used to analyse the AHP responses (Forman *et al.*, 1983).

The resulting key factor importance level weightage-coefficients for motivation and demotivation were normalised between 0 to 1. As a general rule, AHP responses with inconsistency ratios greater than 0.15 were not considered in the analysis (Saisana, 2005).

Key Motivational Factors (KMF)

The investigation phase identified six key motivational factors. Out of these, the four factors 'achievement', 'interesting work' 'proper recognition and awards' and 'advancement' were selected from the Herzberg's two factor theory (1968). According to the experts' suggestions, 'growth', 'responsibility' and 'advancement' were combined as a single factor 'advancement'. The other two factors are 'participation in decision making' and 'adequate training and development' were taken from literature (Borcherding, 1977; Soura and Singh, 1998; Ruthankoon and Ogunlana, 2003) and ratified by the experts and field engineers.

In the survey phase, these factors were presented to 30 junior engineers, 39 assistant engineers and 31 executive engineers of the CPWD. As outlined in the methodology, the respondents were met individually and were asked to make pair-wise comparison for importance between each set of key factors through structured AHP questionnaires. 'Mean' values for these three categories of engineering managers were calculated separately and the results are presented vide Table 2.

Table-2: Key Motivating Factors and their Weightages

Item No.	Key Motivating Factors	Weightages		
		JEs	AEs	EEs
1	Achievement	0.213	0.209	0.215
2	Proper recognition and awards	0.158	0.183	0.216
3	Interesting work	0.211	0.240	0.191
4	Participation in decision making	0.170	0.149	0.186
5	Advancement	0.116	0.116	0.107
6	Adequate training and development	0.132	0.103	0.085

Table 2 presents the weightages of the key motivating factors derived using AHP analysis. It can be seen from the table that the Junior Engineers selected 'achievement' and 'interesting work' as their prime motivators. The Assistant Engineers selected 'Interesting work' as a strong motivating factor and 'achievement' as the next important one. 'Proper recognition and awards' and 'achievement' were the prime motivators for the Executive Engineers.

Key De-motivational Factors (KDMF)

Six key de-motivational factors were identified in the investigation phase. Factors such as 'Poor work condition', 'poor administrative policy' and 'Poor work relationship' were selected from the Herzberg's two factor theory (1968). The factor 'My colleague gets more benefit than me in spite of his/her lower performance' was obtained from Adam's equity theory (1965). 'Lack of communication' and 'lack of appreciation' were derived from other established studies (Borcherding, 1977; U.S business roundtable proceedings, 1982). The experts' feedback and the field engineers' semi-structured interviews also endorsed the factors selected.

The survey and analysis of these factors were carried as explained for the key motivating factors and the results are presented in Table 3.

Table 3: Key De-motivating Factors and their Weightages

Item No.	Key Demotivating Factors	Weightages		
		JEs	AEs	EEs
1	Poor work conditions	0.187	0.218	0.223
2	Poor administrative policy	0.196	0.247	0.237
3	Poor work relationship	0.166	0.163	0.153
4	Lack of communication	0.119	0.092	0.128
5	Lack of appreciation	0.201	0.192	0.168
6	My colleague gets more benefit than me in spite of his/her lower performance	0.131	0.088	0.091

Table 3 presents the weightages of the key de-motivating factors derived using AHP analysis. The Junior Engineers selected 'lack of appreciation' as their prime de-motivator and followed it with 'poor administrative policy'. The Assistant Engineers and the Executive Engineers selected 'poor administrative policy' as their strongest de-motivator and 'poor work condition' as their next important de-motivator.

DISCUSSION

The results show that the Assistant Engineers and the Junior Engineers selected the key factor' interesting work' as their prime motivator. The reason is the nature of work in the construction industry which is a built-in motivating factor (Herzberg, 1968; Hazeltine, 1976; Borcherding, 1977). The Junior and the Assistant Engineers are involved directly with the day-to-day progress of work which makes them feel that their work is interesting. The weightage for the factor 'interesting work' was comparatively lower for the Executive engineers because they visit the work sites less frequently and primarily deal with accounting and administration along with technical work. Interestingly, the Executive Engineers selected both 'proper recognition and awards', (an extrinsic motivator) and 'achievement' (an intrinsic motivator) as strong motivators. This shows that the Executive Engineers possess a high level of esteem needs. 'Achievement' was selected as one of the most important motivating factors by all the engineers as expressed in the earlier studies (Herzberg, 1968; Ruthankoon and Ogunlana, 2003). The top management of an organisation can utilise these findings to design programs which can address these motivational needs of their engineers.

The factor 'Poor administrative policy' was selected as a prime de-motivating factor by all the three groups of engineers. This factor was also identified as the strongest de-motivator in Herzberg's (1968) hygiene factors. Hence, the present administrative policy has to be reframed by the organisation to reduce the level of de-motivation. 'Poor work condition' was also expressed as a prime de-motivating factor by the Assistant Engineers and the Executive Engineers. The organisation must improve the working conditions in order to reduce the de-motivation levels due to this factor. 'Lack of appreciation' was selected by the Junior Engineers, who expect external stimulation, as they are lower in the hierarchical level. The superiors should be instructed to appreciate their good performance to reduce this de-motivating factor.

In addition to specific programs and initiatives to increase motivation and reduce de-motivation, the weightages obtained from this work can be used to implement a periodic systems approach to assess the motivational/de-motivational levels. Figure 3 shows the various components of the proposed systems approach.

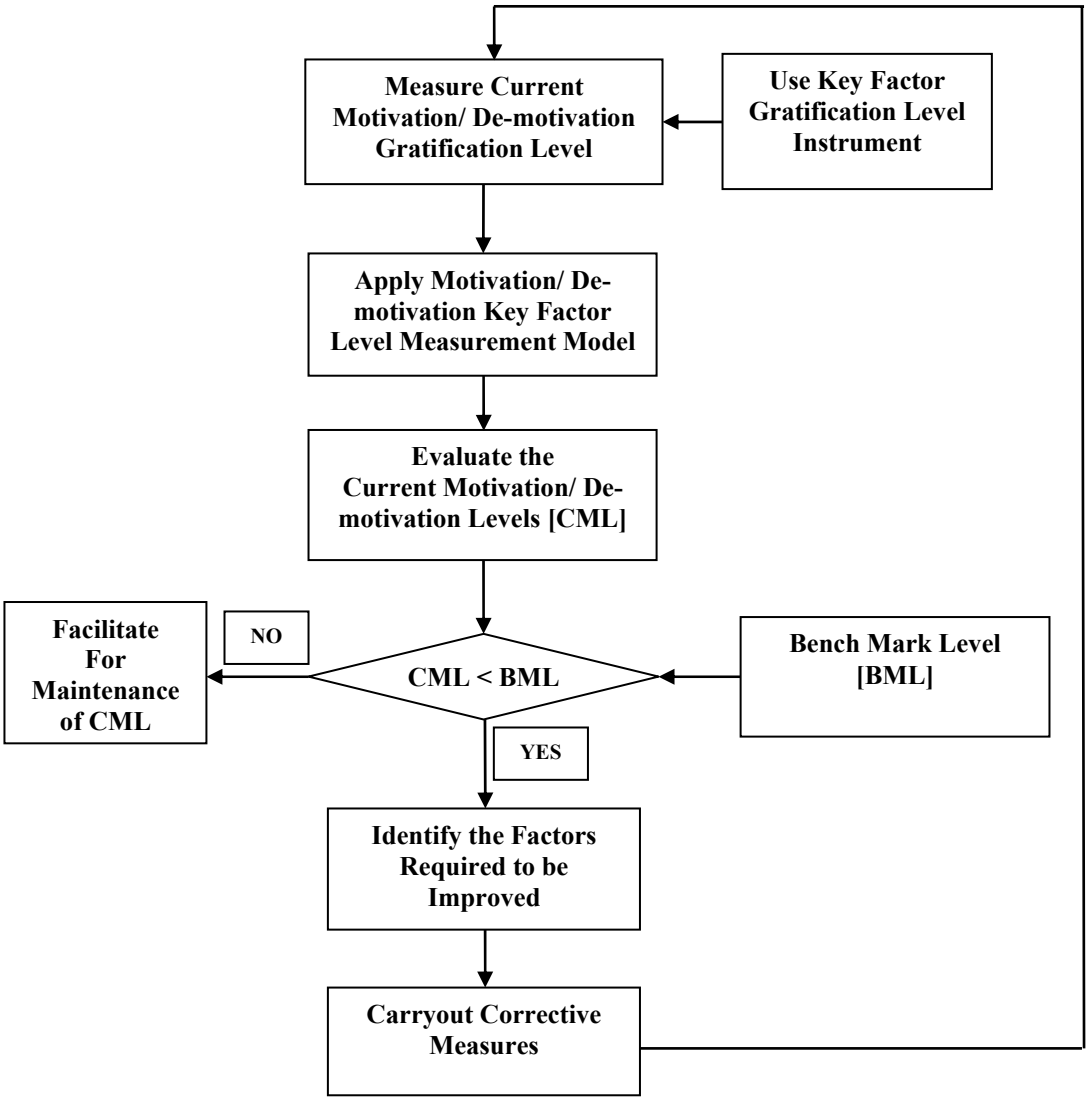

Figure-:3 Flow Diagram for Periodic Assessment and Development of Motivation Level

First, the organisation has to bench mark the required motivation and de-motivation level. Current motivation and de-motivation gratification level of each key factor can be measured using an appropriate gratification level questionnire. The gratifaction levels obtained should be multiplied with the respective weights obtained (Table 1 and Table 2) for each key factor to calculate the current motivation and demotivation levels. Based on the comparision of the current levels of motivation and demotivation with the benchmark levels, the need for corrective action can be determined. The corrective action can be in the form of motivational development programs or changes in organisational policy etc.

CONCLUSIONS

This study identified the key factors that motivate and de-motivate the junior and middle level engineers in CPWD, India. AHP questionnaire and analysis were used to measure the importance score and calculate the relative weightages of the factors. The study shows the findings of Herzberg's theory to be relevant to the engineers in the Indian construction organisations. Intrinsic motivators comparatively play a vital role for many engineers. Equity factor has least influence for the middle level engineers. The junior level engineers expect external stimulation and support from their superiors. The interesting nature of the construction work has to be properly utilised by the organisation along with providing achievable goals to improve the motivation level. Similarly the organisation has to address the poor administrative policies and the poor work conditions to reduce de-motivation.

Further study about the key factors will help in identifying the sub factors under them for more detailed analysis. This can be used to evaluate the total level of motivation and de-motivation along with identifying the root cause of the problem. Thus, the organisation can plan their motivational programs based on these details with periodical assessment to induce motivation and reduce de-motivation.

REFERENCES

Adams, J.S (1965) *Inequity in social exchanges, Advances in Experimental Social Psychology* (New York: Academic Press) 267-300.

Bajaj, S. K (2006) Human resource management in building industry, *Journal of Indian Building Congress*, **13**(2) 37-42.

Borcherding, J. D (1977) Motivating the lower level supervisory staff and work force on super projects, *Project management Institute Proceedings*, Ninth annual seminar/ symposium, 237-248.

Cox, R. F., Issa, R. R. A and Frey, A (2006) Proposed subcontractor-based employee motivational model, *Journal of Construction Engineering and Management*, **132**(2) 152-163.

Doloi, H (2007) Twinning Motivation, Productivity and Management Strategy in Construction Projects, *Journal of Engineering Management*, **19**(3) 30-40.

Foreman, E. H., Saaty, T.L., Selly, M.A and Waldron, R (1983) Expert Choice; Decision support software, Mc Lean VA.

Hazeltine, C. S (1976) Motivation of construction workers, *Journal of the Construction Division*, 102(CO3) 497-509.

Herzberg, F (1968) One more time: How do we motivate employees?, *Harvard Business Review*, **6**(1) 53-62.

Jiliang D (2005) *Motivation of construction engineers in Yunnan, China*, Thesis (M. Eng.) Asian Institute of Technology, 2005.

Kaming, P. F., Olomolaiye, P. O., Holt, G. D. and Harris, F. C (1998a) What motivates construction craftsmen in developing countries? A case study of Indonesia, *Building and Environment*, **33**(2-3) 131-141.

Kazaz, A., Manisali, E and Ulubeyli, S (2008) Effect of basic motivational factors on construction workforce productivity in Turkey, *Journal of Civil Engineering and Management*, **14**(2) 95-106.

Laufer, A and Jenkins, G. D (1983) Motivating construction workers, *Journal of the Construction Division*, **108**(CO4) 531-545.

Maloney, W. F and McFillen, J. M (1983) Research needs in construction worker performance, *Journal of Construction Engineering and Management*, **109**(2) 245-254.

Maloney, W. F and McFillen, J. M (1986) Motivation in unionised construction, *Journal of Construction Engineering and Management*, **112**(1) 122-135.

Maloney, W F and McFillen. J M (1987) Motivational impact of work crews, *Journal of Construction Engineering and Management*, **113**(2) 208-221.

Maslow, A. H (1954) A theory of human motivation, *Psychological Review*, **50**, 370-396.

Moilwa, T and Langford, D. A (1990) The motivation of construction supervisors in Botswana, *Journal of Habitat International*, **14**(2/3) 193-204.

Olomolaiye, P. O and Ogunlana, S. O (1988) A survey of construction operative motivation on selected sites in Nigeria, *Building and Environment*, **22**(3) 179-185.

Olomolaiye, P. O and Price, A. D (1989) A review of construction operative motivation, *Building Environment*, **24**(3) 279-287.

Porter, L. W and Lawler, E. E (1968) *Managerial attitudes of performance*, Irwin- Dorsey, Homewood, III.

Ruthankoon, R and Ogunlana S. O (2003) Testing Herzberg's two - factor theory in Thai Construction Industry, **10**(5) 333-341.

Saaty, T. L (1980) *The Analytic Hierarchy Process*, McGraw Hill Book Company, New York.

Saisana, M (2005) WP5, Composite Indicators of Knowledge Economy Indicators Project; Program on Integrating and Strengthening the European Research Area funded by 6th Framework Program of the European Commission.

Schrader, C. R (1972) Motivating construction craftsmen, *Journal of the Construction Division*, **98**(CO2) 257-273.

Shoura, M. M and Singh, A (1998) Motivation parameters for engineering managers using Maslow's theory, *Journal of Management and Engineering*, **15**(5) 44-55.

The Business Roundtable proceedings (U.S) (1982) *Construction Labour Motivation - A Construction Industry Cost Effectiveness Project Report*

Uwakweh, B. O (1987) Effect of foremen on construction apprentice, *Journal of Construction Engineering and Management*, **131**(12) 1320-1327

Uwakweh, B. O (2006) Motivational climate of construction apprentice, *Journal of Construction Engineering and Management*, **132**(5) 525-532.

Vroom, V. H (1964) *Work and motivation*, John Wiley and sons, Inc., New York.

Zakeri, M., Olomolaiye, P., Holt, G.D. and Harris, F.C. (1997) Factors Affecting the Motivation of Iranian Construction Operatives, *Building and Environment*, **32**(3) 161-6.