

IMPACT OF SUBCONTRACTORS IN CONSTRUCTION INDUSTRY

(Relationships between Main Contractors and Subcontractors)

Anish.C

Assistant Professor
Bharath Institute of Higher Education and Research, Chennai, India

Abstract: In the past decade, considerable research effort has been devoted to alleviating site productivity problems in construction industry. However, the results generated so far are frustrating. A school of academic debates are raised concerning the elements missing from the research framework adopted. The disregard of the crucial role layed by subcontractors in the construction process is the main missing element. To gain a thorough understanding of the subcontracting practice in construction, an extensive questionnaire survey selected at random, was conducted. Major findings of the survey are reported briefly in this paper. The relationship between subcontracting and site productivity was investigated. A conceptual model for analyzing productivity barriers due to subcontracting was developed and various aspects of this model were also examined. Based on the insights gained from the survey and the follow up interviews, three promising institutional strategies for overcoming the identified productivity barriers are presented and discussed.

Index Terms: factors affecting productivity and measurement of productivity.

I. INTRODUCTION

Construction sector being the largest sector India, there have been a number of studies which have been carried on for the critical analysis of the factors which affect the productivity the most. The studies always concentrated on the impact if resource management and other factors. But there has been a missing link in the study which has a major impact on the modern construction activity

The number of contracting parties involved increase in this case and the productivity depends to a major extent on the performance of the sub contractor and the relations between the both. This study concentrates on the impact of subcontracting on the productivity as a whole. This study clears the missing link which exists whenever a detailed study is being carried on productivity and its improvement. The study gives important conclusions and recommendations which when given due care will help both the contracting parties to carry out the work in an effective and efficient manner which inturn leads in improving the productivity as a whole.

II. METHODOLOGY

Methodology for the completion of the study includes the following aspects:



III. ANALYSIS AND INFERENCES OF QUESTIONNAIRES

The study initiated with preparing the questionnaires for the main contractors and sub-contractors separately. The questionnaires included the factors which are related to the site productivity. The questionnaires analyse the typical relationship between the main contractors and the sub-contractors. The questionnaire has been sent across to forty four main contractors and sub-contractors. Out

of the forty four companies , 33 returned the questionnaires. The questionnaires received were examined properly and the found that only thirty questionnaires were found useful and desirable for the use. The lists of both main contractors and sub-contractors whose questionnaires have been used for the analysis are included in the Appendix for the reference. The responses of the companies are grouped as per the various sub heads in the questionnaire and the analysis of the responses obtained is done. The analysis is done by graphical representation of the data obtained. The graphical representation is done in the form of pie charts. The analysis includes the detailed information provided by the companies in a systematic and orderly manner.

The questionnaire consists of various factors which are considered by both contracting parties for the selection of one another. Separate questionnaires prepared for the main contractors and for the sub-contractors include the questions which reflect the relationship with the other party, selection procedure, payment terms, etc. Each company has their own criterion for some aspects and in some aspects the responses from the maximum number of companies were all same.

Main contractor questionnaire:

This included the questions for main contractors which are helpful in knowing the number of qualified sub-contractors with the company, selection criterion of the sub-contractors, relationship with them, sub-contractor evaluation, assistance given, payment terms, relationship with material supplier, criteria for selection of material supplier, payment terms, assistance given, disputes handling mechanism, payment terms, assistance given, incentives for the labour etc. The questionnaire has been included in the report as Appendix for the reference

Sub-contractor questionnaire:

The questions included helped in understanding the relation maintained by the sub-contractor with the main contractors. The questions included factors such as, workforce with the sub-contractor, assistance provided by main contractors, areas in which they needed assistance from main contractors and clients, disputes handling mechanism, payment terms, contribution taken from the main contractors in project planning and scheduling, details about equipment owned, purchased, hired, details about quality personnel deployed by sub-contractors, main contractors, client, materials procured, provided by client, main contractor, labour terms of appointment, payment terms to labour etc.

The companies which responded for the questionnaires gave answers which are helpful in analysing the total sub-contracting practices which is happening in Indian scenario. There are certain factors which when taken good care the productivity at the site increases drastically. The questionnaire has been included in the report in the Appendix for the reference.

Chi Square Analysis:

Chi-square test – (a) Class of the firm and on Onsite training

Null Hypothesis (H₀): class of the firms is independent towards their opinion on onsite training

class of the firm * On site training Crosstabulation

Count		On site training				Total
		disagree	neutral	agree	strongly agree	
class of the firm	A	3	2	3	1	9
	B	3	6	5	1	15
	C	4	1	1	0	6
Total		10	9	9	2	30

hi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.948 ^a	6	.550
Likelihood Ratio	5.088	6	.533
Linear-by-Linear Association	1.632	1	.201
N of Valid Cases	30		

a. 11 cells (91.7%) have expected count less than 5. The minimum expected count is .40.

Pearson chi-square value = .550
 Level of significance = .05
 Pearson chi-square value = .550 > Level of significance = .05
 Hence Ho accepted
 Inference: class of the firms is independent towards their opinion on onsite training.

Chi-square test – (b) Specialization of the firm and Visit to technical Conference

Null Hypothesis (Ho): Specialization of the firms is independent towards their opinion on visit to technical conference

specialization of the firm * Visit to technical conference Crosstabulation

Count

		Visit to technical conference				Total
		strongly disagree	disagree	neutral	agree	
specialization of the firm	Bridges	0	7	6	3	16
	track	1	2	1	0	4
	buildings	0	3	4	1	8
	others	0	0	1	1	2
Total		1	12	12	5	30

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.094 ^a	9	.343
Likelihood Ratio	8.635	9	.472
Linear-by-Linear Association	.395	1	.530
N of Valid Cases	30		

a. 14 cells (87.5%) have expected count less than 5. The minimum expected count is .07.

Pearson chi-square value = .343
 Level of significance = .05
 Pearson chi-square value = .343 > Level of significance = .05
 Hence Ho accepted

Inference: Specialization of the firms is independent towards their opinion on visit to technical conference

FACTOR ANALYSIS

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.564
Bartlett's Test of Sphericity	Approx. Chi-Square	32.167
	df	36
	Sig.	.652

Component Matrix^a

	Component			
	1	2	3	4
Attention devoted to subcontractor by your site Engineer	.204	.111	.834	.045
Work force with subcontractor	.208	.181	-.477	.683
Based on past experience	.744	.068	.248	.347
Bases on long term relationship	-.710	-.150	-.213	.137
Financial capability	-.100	.765	.030	.104
Labour available	-.168	.659	-.132	-.480
Past work experience	.759	.108	-.264	-.287
Work force with the subcontractors	-.593	.372	.330	.293
Time taken by your firm to release the payment after claim	-.193	-.561	.153	-.048

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

IV. FINDINGS

Findings from Chi Square Analysis

- Class of the firms is independent towards their opinion on onsite training.
- Specialization of the firms is independent towards their opinion on visit to technical conference.

Findings from Factor Analysis

- Kaiser-Meyer-Olkin value of the factor analysis Test is .564, which confirms the suitability of the test.
- Factors were segmented as four components. Selection of New Sub-contractors based on Past work experience (.759), Criteria for selection of sub-contractors (.744), Based on long term relationship (.710) and Work force with the subcontractors (.593) were segmented as contractor evaluation factors.
- Factors such as Financial capability (.765), Labour availability (.659) and Time taken by your firm to release the payment after claim (.561) and an amount of prepayment given to subcontractors (.372) were segmented as financial and human resource evaluation factors
- Factors such as Attention devoted to subcontractor by your site Engineer(.834) was segmented as Productivity factor.
- Work force with subcontractor (.477) was segmented as work management factor.

V. CONCLUSION AND RECOMMENDATIONS

The relationship between sub-contractor and main contractor is the key factor which affects the productivity. The productivity improvement or loss majorly depends on the contractual relations between the parties involved in the contract.

The ultimate responsibility for successful completion of a project lies with the main contractor. The owner or contracting agency demands this of the main contractor by contract, and the main contractor must make this clear to sub-contractor. The majority of sub-contractor do not resent a main contractor who exerts discipline and order in a project, so long as he is consistent and fair in dealings with all parties. Sub-contractors do expect the main contractor's project management to demonstrate a thorough knowledge of the project, how it is to be undertaken, and, in particular, how the sub-contractor's work is to be scheduled and organized. The more the work is planned and scheduled in detail, the less likely it is that conflicts will arise due to misunderstandings between sub-contractor, or between sub-contractor and the main contractor, as to the terms of contracts or the scope and quality of work.

Lastly, it is imperative that the industry strive to establish working relationships through the most ethical means. Unethical practices should be strongly discouraged by associations of sub-contractors and/or main contractors. Practices that are in accord with good ethical standards will contribute favourably to the integrity and public image of the construction industry. This will improve the image of the industry and will lend a greater sense of pride to those involved in the construction process.

As per the responses obtained from the companies, there are certain key issues which need to be concentrated upon, so that productivity is improved at site. Subcontracting as a whole must be the fast, efficient and economical tool for the overall project management. Thus, the required purpose is achieved only when productivity is improved. The key issues on which the company has to concentrate are:

Payment terms and conditions

Assistance given on site

Selection of sub-contractor

The following recommendations could be helpful in improving the productivity at site:

- All the parties involved must maintain a healthy relation with each other so that disputes can be solved easily
- The selection and evaluation of sub-contractor must follow a predetermined procedure which enables the fair selection and better relations
- There must be a proper communication channel between the parties involved
- The main contractor and the sub-contractor has to cooperate with each other in so as to complete the work as on schedule and per the required quality
- The main contractor had to provide proper assistance on the site for the sub-contractor as well as for the material supplier and labour contractors
- Motivation plays a key role in completing the job as per schedule. So the main contractors has to provide some sort of motivation to the workers at site
- Incentives such as festival bonus, cash incentives etc. play a major role in motivating the workers as well the staff. So the main contractors must provide proper incentives to improve labour productivity
- If sub-contractors are selected on the basis of long term relationship with them then, the main contractors must carry on sub-contractor evaluation at regular intervals, so as to check the output of the sub-contractor in various areas of working
- The work to be done by the sub-contractor must be guided and supervised by the main contractors representative regularly
- The main contractor must release the payment after claims within the acceptable delay so that the financial burden on the sub-contractor does not increase; which in turn may delay the work from the schedule
- The main contractors must provide some amount of prepayment to the sub-contractors for the initial preparation of work
- The sub-contractors must deploy efficient staff based on the type of work being executed
- The required amount of resources must be deployed by the sub-contractors for the work
- The sub-contractors are expected to pay the performance bond to assure the quality and quantity of work to be done as per schedule and budgeted cost

REFERENCES

- [1] David ardit and ranon chotibhongs,(2005)“issues in subcontracting practice”, journal of construction engineering and management © asce.
- [2] Dr. luh maan chang, “analytical techniques to improve construction productivity”
- [3] FJ drewin, (1982) “construction productivity”
- [4] Hee-sung park; stephen r. thomas; and richard l. tucker,(2005) “benchmarking of construction productivity”, journal of construction engineering and management, asce
- [5] I. choudhury and tharuna khilathi, “the effect of sub-contracting on construction time for commercial projects in chennai, india”
- [6] James d whiteside ii, “construction productivity”
- [7] Jimmie hinze and andrew tracey, “the contractor-subcontractor relationship: the subcontractor's view”
- [8] Joseph r. proctor, “golden rule for contractor-subcontractor relations”
- [9] [joseph rubin](#).(2008) “Productivity and efficiency within the construction industry” [cost engineering](#). morgantown: [nov 2008](#). vol. 50, iss.11
- [10] Neil n. eldin and stephan egger,(2001) “productivity improvement tool: camcorders”
- [11] Ting-ya hsieh, (1998)“impact of subcontracting on site productivity: lessons learned in Taiwan”, journal of construction engineering and management.