Causes of Work Variation: A Case Study in Wolaita Sodo University Construction Sites

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ABSTRACT

Complexity and involvement of different stakeholder in construction industry resulted in change of idea, plan and scope of work from time to time in one project. This change of scope and plan arises variation order which is inevitable in construction project. Variation order is observed as one of the most frequently occurring issues in construction projects of Ethiopia. Like other regions of the country, construction projects in Wolaita Sodo University are suffering from the impact of variation orders. These variations are known to impact various aspects of the projects and stake holder involved in construction works. The objectives of the study were firstly to determine the common causes of variation orders secondly to identify the projects which are exposed to variation orders, thirdly to identify key players of variation orders, and finally forward possible recommendation in order to minimize variation order. The method used to collect data was questionnaire and the responses were analyzed by using the Relative Importance Index method. The results indicated that change in design by the consultant, decision making problems and inadequate working drawing details were the most causes of variation orders. The results also showed that the projects most exposed to variation orders, are student's dormitory, class rooms and halls, and the contractors, client/employer and supervision consultant are more responsible in initiating most of the variation issues. The findings also suggested the most recommended strategies to minimize variation orders.

Keyword: - *Variation order, Cause, and Stakeholders.*

INTRODUCTION

Construction industry in Ethiopia has been on fast growing mode which plays an instrumental role in the country development. However, the industry is associated with significant problems like schedule delay and cost overrun. This is because of, always construction industry has variations, escalation, omission and addition due to uncertainties and changes or variation that are difficult to reasonably predict. Uncertainties and Changes are the two most important issues considered in contract change management. Changes or variations are issues requiring alterations during the implementation of procurement and contract management [1]. Most contracts these days must make provisions for possible variations given the nature of building construction project [2]. An unfortunate aspect of the variation clause is that it tends to encourage clients to change their minds and embark on building projects without having properly thought their project requirements [3]. When Variations are introduced prior, during or after construction work has been executed; the synergistic effects of these changes can dramatically affect project performance and its scheduled time. And also even if problem of delays in the construction industry due to variation is a global phenomenon, failure to achieve targeted time, budgeted cost and specified quality, resulted in various unexpected negative effects on the projects. Most building projects in Wolaita Sodo University were poor performed and delayed with certain amount of variation orders increasing from the original value of the contract sum. According to the team leader of, Wolaita Sodo University construction Supervision and Follow up department, variation is ordered for most of the projects. Due to this reason the projects were delayed, poorly performed and the cost of the projects increased.

Objectives

The overall aims of this study were to assess and identify the causes of work variation in Wolaita Sodo University Construction sites, to identify the projects which are exposed to variation orders, to identify key players of variation orders, and to forward possible recommendation in order to minimize variation order.

Significance

Significance of the study will be to support both private construction Companies and most technical departments of government in assessing and taking remedial measures and public building construction stakeholders, especially, Wolaita Sodo University Construction projects stakeholders to take remedial measures to reduce the occurrence of the problem. The finding of this research, may also have its own contribution in contract administration process in the future in minimizing variations.

LITERATURE REVIEW

Variation

The building contract dictionary defined variations as modifications, additions or omissions in work, materials, working hours, work space, etc. As defined in [4] "variation" is an instruction given by the engineer, which varies the works. According to [5] "variation" means any change to the works, which is instructed or approved as a variation. [6], defined that each standard form of building contract has its own meaning but clearly 'variation', in generic sense, refers to any alteration to the basis upon which the contract was let. This means the term holds not only changes to the work or matters pertaining to the work in accordance with the provisions of contract, but also changes to the contract conditions themselves. Variation order was also defined as the alteration or modification of the design, quality of works, as agreed upon the contract drawings, bill of quantities, and/or specifications [7]. According to [8], change order is a formal vehicle for making a change or modification in the work of previously approved contract. In general, the term 'Variation' usually means a change, modification, alteration, revision or amendment to the original intent of the contract and/or its works. A variation order is the formal document that is used to modify the original contractual agreement and becomes part of project's documents.

Nature of Variation orders

The nature of variation orders can be determined by referring to both the reasons for their occurrence and succeeding effects. [9], distinguished two types of variation orders namely in order to their nature; beneficial and detrimental variation orders. A beneficial variation order is one issued to improve the quality standard, reduce cost, schedule, or degree of difficulty in a project [9]. This type of variation order eliminates unnecessary costs from a project as a result; it optimizes the client's benefits against the resource input by eliminating unnecessary costs. This means beneficial variation orders initiated for value analysis purposes to realize a balance between the cost, functionality and durability aspects of a project to the satisfaction of clients. Value analysis is an organized approach to the identification and elimination of unnecessary costs which are defined as costs which provide neither use, nor life, nor quality, nor appearance, nor customer features [10]. A detrimental variation order is one that negatively impacts the client's value or project performance [9]. Maybe, a detrimental variation order compromises the client's value system.

METHODS AND ANALYSIS

The method used in order to achieve the objective of the study was by distributing a questionnaire to the ongoing construction projects in Wolaita Sodo University. The collected data from the questionnaires were tabulated and analyzed according to their ranking on Relative Importance Index (RII).

Projects exposed to variation order

Table -1: Projects exposed to variation order

Construction Projects	Average(all respondents)	
	RI	Rank
Student's dormitory	0.693	1
Class rooms	0.662	2
Halls	0.637	3
Stadium	0.602	4
Roads	0.587	5
Student's cafeteria	0.558	6
Administration office	0.523	7

Causes of Variation Orders

Table -2: Frequency of causes of variation orders

Causes of Variation Orders	Average(all respondents)	
	RI	Ranking
Change in design by the consultant	0.695	1
Decision making problems	0.684	2
Inadequate working drawing details	0.674	3
Change in specifications	0.674	3
Lack of communication between stakeholder's	0.653	5
Errors and omissions in design	0.642	6
Change of defined scope (Additions or omissions)	0.632	7
Unforeseen problems	0.621	8
Unfamiliarity with local conditions	0.611	9
Lack of a specialized construction manager	0.600	10

As shown in Table, the most raked causes of variation orders by all respondents were change in design by the consultant with the value (RI=0.695), decision making problems came next with value (RI=0.684), inadequate working drawing details followed with the value (RI=0.674), were the least ranked causes of variation orders.

Key players of variation orders

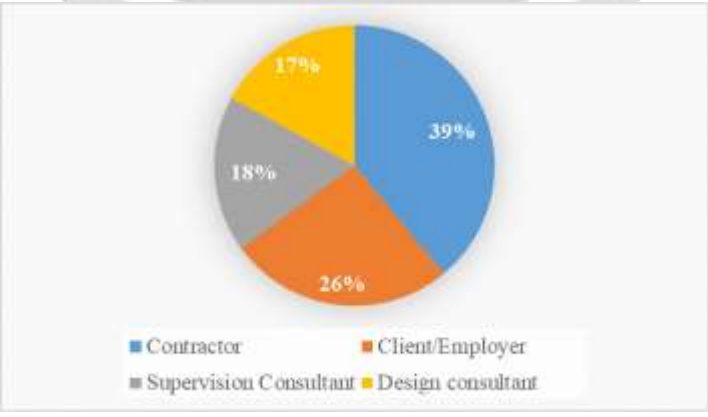

Figure -1: Respondent responses on the more key players of variation orders

Recommendations to Minimize Variation Orders

Table -3: Recommendations to minimize variation orders

Recommendations to Minimize Variation Orders	**Average(all respondents)**	
	RI	**Ranking**
The consultant should produce a concluding design and contract documents	0.756	1
Complete the drawings at tender stage	0.734	2
Supervise the works with an experienced and dedicated supervisor	0.714	3
Improve communication between all parties	0.684	4
Carry out detail site investigation including detail soil investigations and consider it during tendering stage	0.673	5
Clients should provide a clear brief of the scope of works	0.644	6
All parties should forecast unforeseen situations	0.625	7
All involved parties should plan adequately before tendering and works start on site	0.595	8

CONCLUSIONS

According to collected data, the common causes of variation orders are; change in design by the consultant, decision making problems, inadequate working drawing details, change in specifications, errors and omissions in design, lack of communication between stakeholders, and Change of defined scope are the most significant causes of variations in Wolaita Sodo University construction site. The projects exposed to variation orders are, student's dormitory, class rooms, and halls, are the most projects which more exposed to variation order, and the key players of variation orders the respondent responses that more one third said contractors are more responsible in initiating most of the variation issues. And the client/the employer, Design consultant following by rank. Also, it is likely that the incidence of variation orders could be reduced by; the consultant should produce a concluding design and contract documents, complete the drawings at tender stage, supervise the works with an experienced and dedicated supervisor, improve communication between all parties, carry out detail site investigation including detail soil investigations and consider it during tendering stage, clients should provide a clear brief of the scope of works, and all parties should forecast unforeseen situations.

In future studies, a comprehensive analysis on the impact of each the cause of variation order that affects project performance is recommended. This will enable the development of more effective practices to reduce their impact. With more data an evaluation based on various project characteristics would generate valuable information for the industry.

REFERENCES

[1]. Wubshet, J.M. (2004). Performance of Public construction projects in (Least) developing countries, Federal Road and Building Projects in Ethiopia, Doctoral Thesis, NTNU, and Trondheim.

[2]. Finsen, E. (2005). The Building Contract - A Commentary on the JBCC Agreements (2nd Ed.). Kenwyn: Juta & Co, Ltd.

[3]. Andualem, E.Y. (2010). Assessing the impact of variation orders on public building projects in Addis Ababa. Addis Ababa University, Ethiopia.

[4]. PPA. (2006). General Conditions of Contract for Procurement of Works.

[5]. FIDIC. (1999). General Conditions of Contract for Construction.

[6]. Baharuddin, A. (2005). 'Variation Orders in Transmission Projects of Tenaga Nasional.

[7]. Bin-Ali, Z. (2008). Causes and Steps to Minimize Variations in Construction Projects. Thesis. Technology University of Malaysia.

[8]. Fisk, E.R. (2000). Construction Project Administration (5th Ed Ed.). Prentice-Hall, Upper Saddle.

[9]. Arain and Pheng. (2005b). How Design Consultants Perceive Causes of Variation Orders for Institutional Buildings in Singapore (Vols. vol. 1, no. 3). Architectural Engineering and Design.

[10]. Kelly, J. & Male, S. (2002). 'Value Management', Best Value in Construction, RICS Foundation, Oxford: Blackwell Publishing.