



## Design Changes in Construction Projects – Causes and Impact on the Cost

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### Abstract

Isolation of design phase from construction has made the design changes inevitable in construction projects. Extensive literature appraisal has acknowledged the detrimental effect of design changes on project performances. However, the impact and causes of design changes have been divided up, either separately or project specific. As a result, the relationship between impact and causes of design changes could not be established for general construction. The primary objective of this paper is to examine the impact of design changes on project cost and identifying actions responsible for these changes. The objectives of the study were achieved through a systematic review of past literature published in well-established journals, and contents analyzed. From the extensive literature review, it was established that the design change is one of the predominant factors to cost overrun, and in some cases, may upshot into cost overrun between 5 and 40% of the project cost. Also, many causes of design changes resulting in cost overrun within the perspective of the owner, consultant, and contractors are explored. Some projects experienced closure as a result of owner induced design changes, although these changes may not be significant in number. Design changes as a result of consultants and contractors in some cases might have reduced impact but are frequent. For each consideration, most events leading to design changes can be eliminated by improving on communication and coordination between stakeholders. The main contribution of this research is to bring together the impact and causes of design changes on cost under one platform for effectively managing the design process.

*Keywords:* Design Changes; Impact on Cost; Causes of Design Changes.

### 1. Introduction

The volatility and complex nature of construction have increased the degree of uncertainty involved in the planning and execution stages. Unlike manufacturing, construction has conventionally separated planning and design from construction processes which have resulted in some scope and design related changes during the construction [1]. Separation of design and construction has led to severe problems in which designs are made without concerns for buildability or productive economies thereby impacting the performance of the projects negatively [2, 3]. The effect of these changes has resulted in issues of cost overrun, schedule delays and productivity loss. Combination of aforementioned have a detrimental effect on the overall project cost.

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