Impact of design errors on variation cost of selected building project in Nigeria

Oluwaseun Sunday, Dosumu* c, and Clinton O, Aigbavboa b

*Department of Construction Management and Quantity Surveying, University of Johannesburg, South Africa; oluwaseundosumu97@gmail.com
bDepartment of Construction Management and Quantity Surveying, University of Johannesburg, South Africa; calgbavboa@uj.ac.za
cDepartment of Building, University of Lagos, Nigeria; osdosumu@unilag.edu.ng

Abstract

Design error has been adjudged to be the main source of variation. However, empirical studies of the cost impact of design errors on variation are scarce. Therefore, this study aims to determine the impact of design errors on variation cost by investigating the prominent design errors that lead to variation, causes of variation in construction projects and impact of design errors on variation cost. The study was conducted on selected building projects in Nigeria. The mixed method (interview and case study) of research was adopted in the collection of necessary data. Interview was conducted among construction experts to obtain information on causes of variation on building projects. Thirty documents which include valuation breakdowns and variation/change order documents were obtained by convenience sampling technique and used for the extraction of design errors leading to variations and their associated costs. The data were analyzed with frequencies, sums and percentages. The study found that poor working drawing and lack of coordination among documents are the major causes of variation. Omission of details on structural drawing and wrong description in specifications of architectural drawings among others are prominent design errors that lead to variation. The study indicates that design error account for up to 36% of variation cost. The study concludes that variation costs can be minimized to a large extent if government policies to ensure proper contract documentation are put in place and professionals are restricted from doing the works of others professionals.

© 2017 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
Peer-review under responsibility of the scientific committee of the Creative Construction Conference 2017

Keywords: Building projects; Cost of error; Design error; Lagos state; Variation;

1. Introduction
Construction is complex and uncertain in nature; and unlike manufacturing and other sectors of the economy, the design and production functions in construction process are usually separated. That is, the design and construction of a building are two separate functions performed by different parties working independently [14]. However, these parties (contractors and consultants) have different interests in building projects. These interests normally lead to design error which is a major source of variation [5].

Variation is any deviation from an agreed well-defined scope and schedule of construction projects after issuance of variation order [28, 3]. Furthermore, while [17] defined error as unintended deviations from correct and acceptable practice that are avoidable, [9] noted that error entails different meanings and usages depending on how it is conceptualized. With these notions, design error may be defined as preventable deviations from acceptable standards of practice during the design of construction projects.

[30] stated that many projects in developing countries suffer from slipped milestone, cost and time overrun due to variation in construction projects. [25] also revealed that variation occurs in all type of project. [25] noted that the three prominent sources of variation are design error and omission which account for 65% of variation, design changes contributing to 30% of variation and other reasons have only 5% of variation. This position was supported by [8] who stated that variation has a 65% chance of being caused by design error. From the foregoing, it can be established that there is a strong connection between design error and variation in terms of cost, time and quality. However, for the purpose of specificity, this study will be limited to the impact of design error on variation cost of construction projects.

Many studies [21, 23, 16, 18] have been conducted on causes, effects and remedies of error in construction documents. Also, many studies have been conducted on variation and variation orders [4, 7]. In the same vein, some other studies [1, 2, 31] went further to confirm that design error is the major source of variation on construction projects. However, studies that have determined the extent to which design error affect variation on construction projects are scarce. Without identifying the design errors that have large contributions to variation cost, it may be difficult to reduce total cost of variation and invariably cost overrun of construction projects. It is on this basis, that this study would investigate the causes of variation, design errors that lead to variation, their associated cost and impact of design errors on total variation costs of building projects.

2. Literature review

Variation is a change or any modification to the contractual guidance provided to the contractor by the owner or consultants [12]. These changes occur after the award of the initial contract or after work might have commenced and they include changes to plans, specifications or any other contract documents. The changes may be due to various reasons such as inadequate design, change in design and misinterpretation of drawings leading to construction error [22]. Similar to variation is variation order which is a formal document that is used to modify an original contractual agreement and becomes part of project’s documents [3].

[28] classified variation according to their causes as design errors and omission (65%), design changes (30%) and unforeseen conditions (5%). [10] stated that the two basic types of variation are directed and constructive changes. Direct changes occur when client instructs the contractor to perform works that are not specified in the contract document or makes additions to the original scope of work. Constructive changes are informal acts or modifications to a contract due to an act or failure to act.

Variation has been an immanent part of construction projects and it usually arises as a result of the causes attributed to different stakeholders that are involved in project execution [3]. Variation is usually regularized by the issuance of variation order. Various causes of variation have been identified in construction projects and the enormity of these causes indicates that variation is part of construction projects and it cuts across various stakeholders [29]. [11] revealed that consultants are mostly responsible for variation order. The study of [26] on the significance of variation as a cause of cost and time overruns revealed that changes in specification and scope initiated by client and consultants are the most frequent causes of variation. Other causes of variation are inadequate details of working drawings, change in schedule [22], change in scope [6], poor workmanship, client’s financial
دریافت فوری
متن کامل مقاله

امکان دانلود نسخه تمام متن مقالات انگلیسی
امکان دانلود نسخه ترجمه شده مقالات
پذیرش سفارش ترجمه تخصصی
امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
امکان دانلود رایگان ۲ صفحه اول هر مقاله
امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
دانلود فوری مقاله پس از پرداخت آنلاین
پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات