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Impact of environmental factors on building project performance in Delta State, Nigeria



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Abstract The concept of construction project development may be impaired without a good knowledge and successful management of the impact of environmental factors influencing the performance of such projects. This study aims to assess the impact of environmental factors on building project performance in the Delta State, Nigeria. The instrument used for the data collection was structured questionnaire and the target population consisted of clients (government and private developers) and four groups of professionals who were architects, builders, quantity surveyors and engineers. The tools employed were Mean Score, Spearman correlation, Kendall's coefficient and Chi-Square. Twenty-nine variables were identified as factors having an impact on building project performance and they were categorized under clusters; political, legal, construction technological and resources, economic and financial, socio-cultural and physical. The result of the Spearman correlation analysis of time and cost overruns with the identified factors affecting project performance revealed that the clusters of Economic and financial and Political had significant relationship with time overrun on *p*-values of 0.004 and 0.011, respectively, while the cluster of Social and cultural had significant relationship with cost overrun with a *p*-value of 0.007. The research recommended that stakeholders should take cognizance of the variables under these three clusters for proper management and prevention of cost and time overruns.

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Introduction

The Nigeria construction industry is a wide range of loosely integrated organizations that collectively construct, alter and repair a wide range of different buildings and civil engineering projects. In a major review of project management theory, Bennett [1] established that the environment interferes with planned progress of construction projects. The less predictable the environment and the greater its potential effects, the more it must be taken into account in managing the development of construction projects.

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The project environment in many developing countries like Nigeria present special challenges for project managers that almost presupposes extensive cost and time overruns even before a project commences. These challenges arise mainly from inherent risks such as political instability, excessive bureaucratic contract procedures, and lack of adequate infrastructure such as transportation networks, electricity supply, and telecommunications systems. In recognition of these unique problems, previous research studies have suggested that there is a need to develop appropriate management tools and techniques specifically tailored to the project environment of developing countries (Faniran et al. [2]). The project environmental factors that have been generally identified include; political, legal, institutional, cultural, sociological technological resource, economic, financial, and physical infrastructure (Walker) [3]. According to Ajayi et al. [4], the four most important external environmental factors in decreasing order include community issues, weather conditions, economic situation (boom or meltdown) and government policy.

Project performance, according to Cheung et al. [5], can be measured and evaluated using a large number of performance indicators that could be related to various dimensions (groups) such as time, cost, quality, client satisfaction, client changes, business performance, health and safety. Generally, performance dimensions may have one or more indicators, and could be influenced by various project characteristics. For example, Iyer and Jha [6] identified many factors as having an influence on project cost performance, these include: project manager's competence, top management support, project manager's coordinating and leadership skills, monitoring and feedback by the participants, decision-making, coordination among project participants, owners' competence, social condition, economic condition, and climatic condition. Coordination among project participants, however, was identified as the most significant of all the factors, having maximum influence on cost performance. The studies of Love et al. [7] examined project time–cost performance relationship, and their results indicated cost as a poor predictor of time performance. The identification of these environmental factors and the measurement of their severity would provide useful information that would greatly reduce cost and time overrun in project execution. The Niger Delta region comprises six states among which the Delta State seems to have some environmental variables that are different from other geo-political regions in Nigeria and therefore became imperative to assess the impact of these variables on project performances.

Literature review

Construction project and performance

Success of construction projects depends mainly on success of performance. Many previous researches had studied the performance of construction projects. Dissanayaka and Kumaraswamy [8] remarked that one of the principle reasons for the construction industry's poor performance has been attributed to the inappropriateness of the chosen procurement system. Thomas et al. [9] identified the main performance criteria of construction projects as financial stability, progress of work, standard of quality, health and safety, resources, relationship with clients, relationship with consultants, claim

and contractual disputes, relationship with subcontractors, reputation and amount of subcontracting. Chan and Kumaraswamy [10] stated that construction time is increasingly important because it often serves as a crucial benchmarking for assessing the performance of a project and the efficiency of the project organization.

Cheung et al. [5] identified project performance categories such as people, cost, time, quality, safety and health, environment, client satisfaction, and communication. It is obtained by Navon [11] that a control system is an important element to identify factors affecting construction project effort. For each of the project goals, one or more Project Performance Indicators (PPI) is needed. As obtained by Stewart [12], human factors played an important role in determining the performance of a project. Ugwu and Haupt [13] remarked that both Early Contractor Involvement (ECI) and Early Supplier Involvement (ESI) would minimize constructability-related performance problems including costs associated with delays, claims, wastages and rework, etc. The most important practices relating to scope management as obtained by Ling et al. [14] are controlling the quality of the contract document, quality of response to perceived variations and extent of changes to the contract.

Performance problem in construction industry

The failure of any construction project is mostly related to the performance problems and there are many reasons and factors which are attributed to such problems. The studies of Ogunlana et al. [15] stated that the construction industry performance problems in developing economies can be classified into three layers as; problems of shortages or inadequacies in industry infrastructure (mainly supply of resources), problems caused by clients and consultants and caused by contractor incompetence/inadequacies. According to Okuwoga [16], the performance problem is related to poor budgetary and time control. Samson and Lama [17] also remarked that performance arises in large construction projects due to many reasons such as: incompetent designers/contractors, poor estimation and change management, social and technological issues, site related issues and improper techniques and tools. Navon [11] stated that the main performance problem can be divided into two groups: (a) unrealistic target settings (i.e., planning) or (b) causes originating from the actual construction (in many cases, the causes for deviation originate from both sources).

Samson and Lama [17] found that the traditional performance measurement systems have problems because of large and complex amounts of information with the absence of approaches to assist the decision maker to understand, organize and use such information to manage organization performance. Navon [11] remarked that traditional project performance control is usually generic (e.g., cost control techniques). It relies on manual data collection, which means that it is done at low frequency (normally once a month) and quite some time after the controlled event occurred (i.e., not in real-time) and moreover, manual data collection normally gives low-quality data. The study of Ling et al. [14] in China revealed that architectural, engineering and construction (AEC) firms may face difficulties managing construction projects performance because they are unfamiliar with this

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