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Research Article

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Construction Cost and Time Analysis for Building Projects in Akure South, Ondo State

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Abstract Understanding the impact of construction time on cost is a critical mechanism for developing a project completion timeline. The trend predicted that Ondo Road (ONR) would have yearly construction costs of ₦14,725 on average from 1995 to 2021, compared to rises of ₦12,244, N473, 325, and ₦15,226 for Ijapo Estate (IjaE), Alagbaka (Alagba), and Oba-ile (Obs), respectively, and the cost of construction is not significant at P 0.05. It is therefore imperative for the project planners and engineers to effectively prepare and review both the structural and work plans to minimize time delays and optimize the construction processes. It is therefore recommended that the Federal Mortgage Bank and other agencies saddled with the responsibility of providing affordable housing units step up their activities in ensuring adequate fund allocation for the developers through the commercial banks.

Keywords Construction time, Construction cost, Construction processes, Project planner, Akure-South, Ondo State

Introduction

Ondo State's expanding population has put significant strain on the availability of housing for a variety of purposes, including habitation, agriculture, industrialisation, and other economic activities. Building construction is continuing as a result of this development to accommodate the rising need for building infrastructure. However, both the public and private sectors have taken a proactive role in Ondo State and Nigeria's general housing situation. Large-scale projects constructed by the public and private sectors are indicative of Indonesia's rapid expansion in the global construction services industry, as demonstrated by Abma [1] and Ervianto and Manajemen [2]. Inflation, which has a significant impact on construction costs and schedule, is one of the obstacles to construction. Construction schedule changes might affect costs and could result in low, moderate, or high inflation. Cost and time are the two main implementation factors for building projects, according to Sriana and Hayati's [3] research. They also have a strong correlation with one another. The research also revealed that contractors typically base their time and cost estimates on prior experience.

There is a strong correlation between building time and cost, according to numerous studies. Time is a very important factor in the successful completion and management of projects, according to Fortune and White's [4] findings. Additionally, Siegel and Castellan [5] found a significant correlation between construction cost and schedule. Additionally, it was discovered that one parameter had a direct impact on another. Rework cost, original contract amount, and duration were found to be strongly correlated in Ajayi and Oyeyipo's [6] study on the effects of rework on the performance of the Lagos State Project. In Korea, the cost-time relationship of a project worth KRW 1 billion was explained using the Bromillow equation [7]. The results showed that the

commercial and public sectors in Korea took around 220 days and 359 days, respectively, to complete the project.

Generally, there is limitation in forms of labour, construction cost and equipment in any building project. However, before a building project is embarked on; a comprehensive feasibility study would have been conducted to determine a wide range of factors such as the estimated construction cost, type-model of equipment to be used at various construction stages, and the number of skilled and unskilled labour required for different phases. The study of Abma [1] and Ervianto and Manajemon [2] revealed that construction project is limited in term of resources either in form of equipment, cost materials and methods. Therefore, building construction management has targets that must be met such as the time and cost, durability, and quality. Hence, the study's main objective is to evaluate the effects of time and cost on the building construction in Ondo State in response to accelerated inflation and project quality delivery.

Methodology

The study describes the time and costs involved in building construction in Akure, Ondo State, Nigeria, in relation to rising inflation and project delivery quality. For this study, both public and private structures were chosen at the city's key areas (Oba-Ile, Alagbaka, Ijapo Estate, Oba Adesida Road, and Ondo Road). Ten (10) sets of retail centers in each zone and ten (10) privately owned buildings of various sorts were among the commercial structures taken into consideration (duplex, set of 2-3-room apartments e.t.c). When visited, these construction projects were at varying levels of completion. From the engineering BEME that the developers provided, structurally-based questionnaires were created and utilized to extract factors linked to construction time and cost. The questionnaire was simply designed and created for the respondents to select appropriate answer for the directed questions. Likert scale was used to scale the answer in ratio.

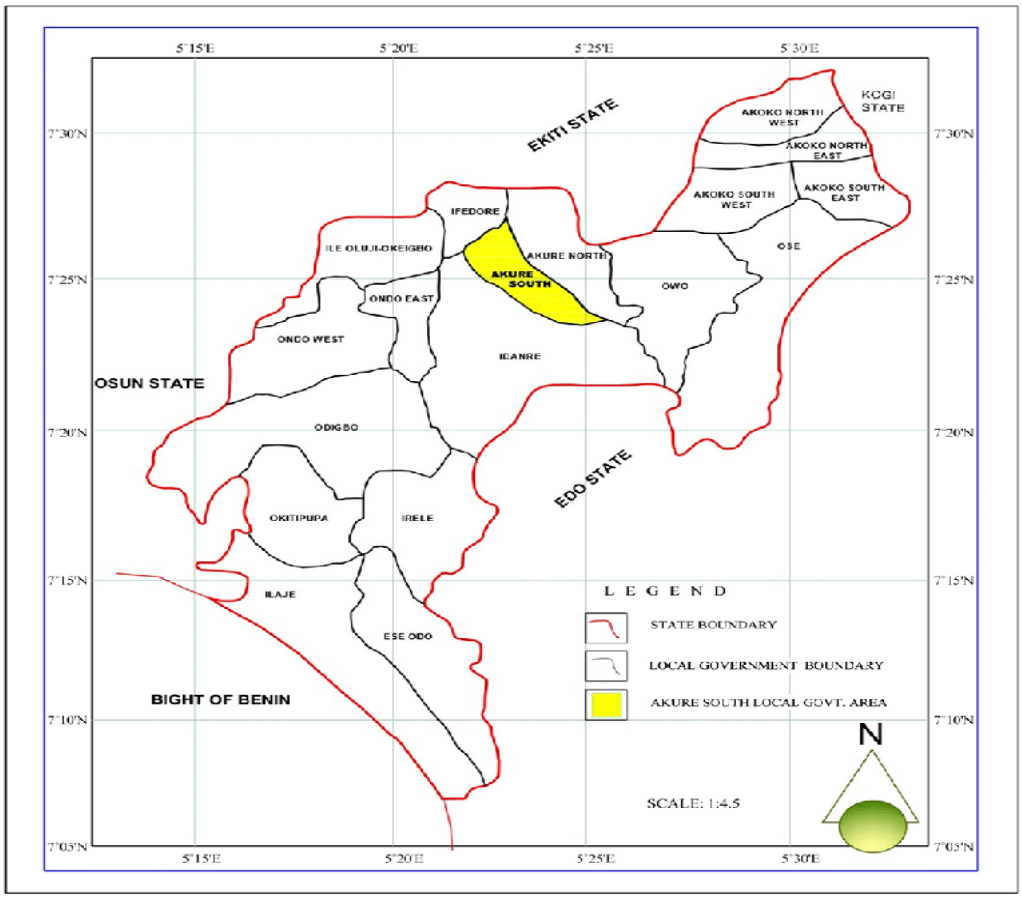

Figure 1: Map of the study area

With a Likert scale configuration of 1 = very ineffective, 2 = ineffective, 3 = average, 4 = effective, and 5 = very effective, the survey was delivered to about 20 developers and a total of 200 questionnaires that covered around

200 building properties both completed and ongoing. 175 replies in total (87.5%) were gathered and recorded. As a result, 10.5% (5.7%) of the responses were disregarded for having insufficient data. The information on project cost and timing was gathered using a pro forma approach. The following link between construction time and cost was found using the Bromillow approach:

$$T = KCB^{B} \quad (1)$$

$$\log T_p = \log (KCB) \quad (2)$$

$$\log T_p = \log K_{c+} \, B \log_p C \quad (3)$$

Where;

T is construction time

C is construction cost

K and B are constants

The regression analysis was used in determining the relationships between the project construction time and cost. Fig. 1 indicates the study area (Akure South) within the map of Ondo State.

Results and Discussion

In Figure 2a, the link between construction time and cost in each of the chosen districts in Akure, Ondo State, is depicted. All locations showed that the building period was shorter the greater the construction cost (CC). The distance of the district from the supplier of building raw materials had an impact on construction time as well. From 1995 to 2021, construction time (days) significantly decreased as construction time (₦) rose across districts. According to the trend study, Ondo Road (ONR) was predicted to have had yearly construction costs of ₦14,725 on average from 1995 to 2021, compared to rises of ₦12,244, N473, 325, and ₦15,226 for Ijapo Estate (IjaE), Alagbaka (Alagba), and Oba-ile (Obs), as shown in Figure 2b. However, the astronomically large increase in Alagbaka Zone could be ascribed to the highest building construction influx because the area is a hub for many corporate organizations as well as being a district for commercial operations. The results support a study by Ajayi and Oyeyipo (2015) that found a connection between the cost of rework and the time it took to complete a contract. The increased cost of labour and building supplies, however, may be a result of the increased construction time.

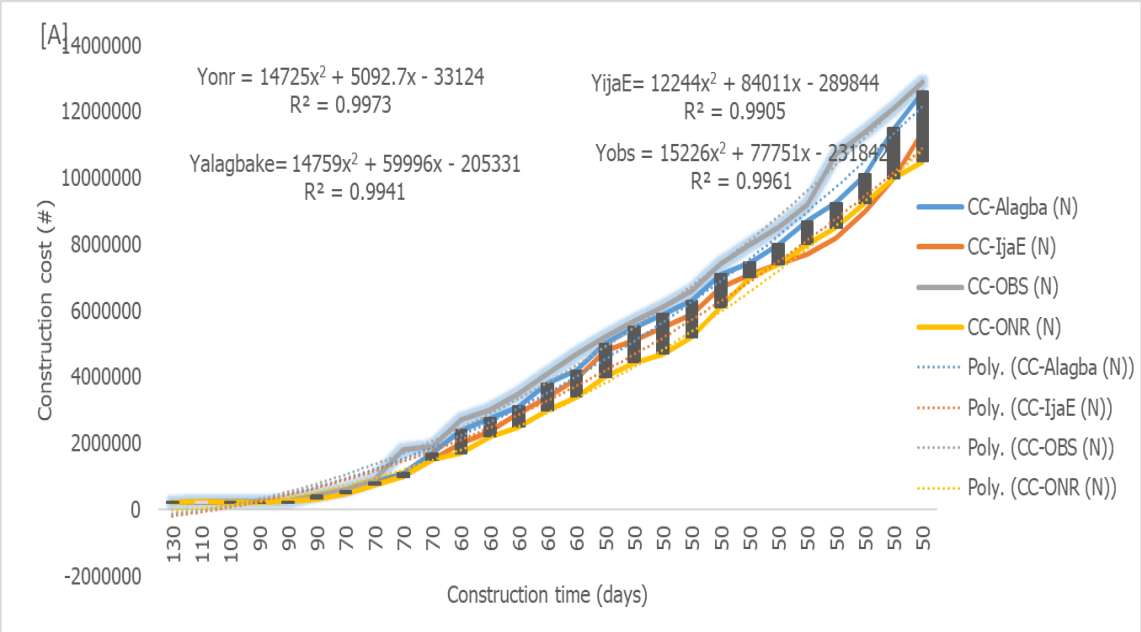

Figure 2a: Relationship of construction time and cost

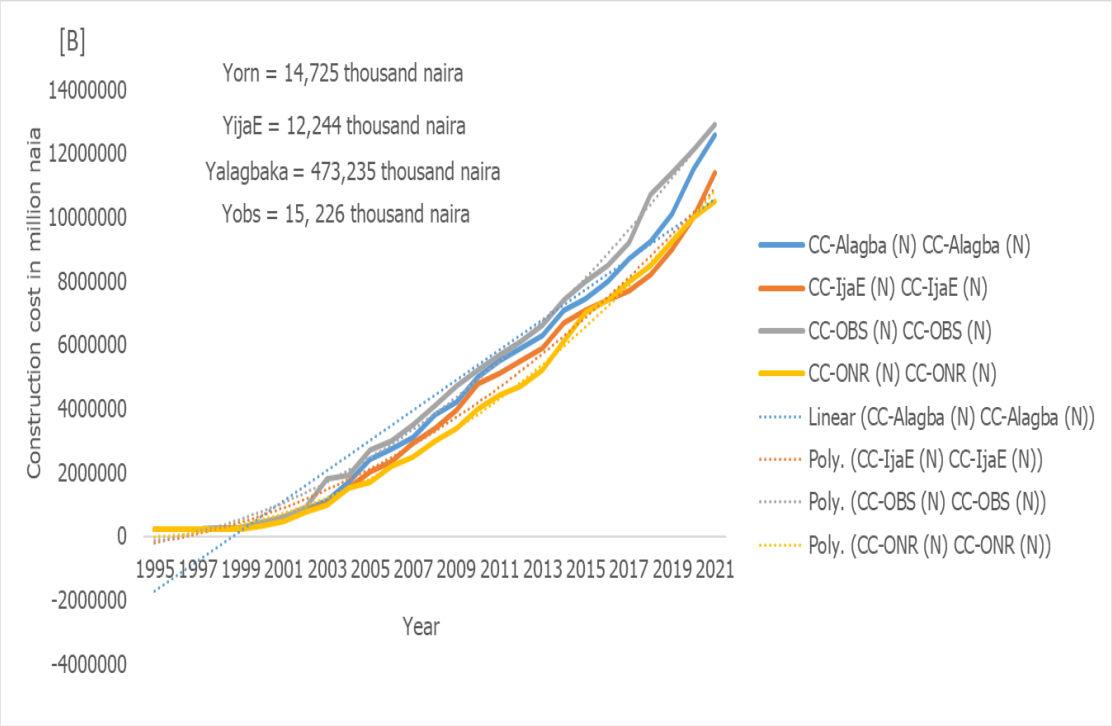

Figure 2b: Calibration of construction cost

A unit increase in the USD changes the local currency (Naira), and some of the building materials are imported because foreign currency fluctuations, particularly those involving the United States dollar (USD), have a significant impact on the price of construction materials. As a result, reinforcing the current economic realities demands regular assessments and analyses of ongoing construction projects in order to handle this continuous predicament. A further element to take into account is the accessibility of building supplies. The ratio or link between the USD and Naira, which is steadily rising, remains the determining factor. The importation of building supplies, such as iron rod, cement-making inputs, iron sheet, etc., is negatively impacted when the USD is too high, which prolongs the time it takes for a project to be completed. The outcome is in line with the findings of the Musarat *et al.* [8] study, which indicated that construction expenses are unstable, varying due to the cost of building materials and other related factors, leading to unprecedented volatility in economic development. Musarat *et al.* [8] also noted that labour and material costs have an impact on inflation; however, significant changes are brought on by the margins of suppliers and contractors. The result in Table 1 presents the statistical outcome of the significance of construction cost. The result shows that the cost of construction is not significant at $P < 0.05$.

Table 1: Data Summary

Groups	N	Mean	Std. Dev.	Std. Error
CC-Alagbaka	27	4422637.0	3854857.3	741867.6
CC-IjaE	27	4029038.9	3471258.6	668044.0
CC-OBS	27	4704566.7	4152772.9	799201.5
CC-ONR	27	3817464.4	3415634.5	657339.2

ANOVA Summary

Source	DF	SS	MS	F-Stat	P-Value
Between Groups	3	1.27487E+13	4.25E+12	0.3045	0.8221
Within Groups	104	1.45136E+15	1.396E+13		
Total:	107	1.46411E+15			

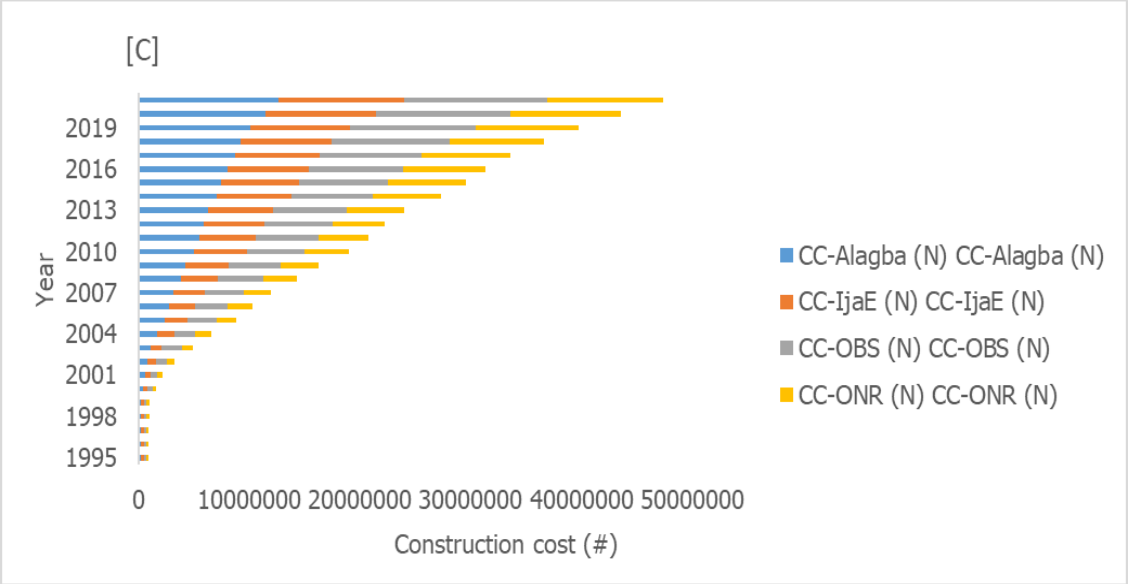

Figure 2b: Calibration of construction cost

The project's abandonment owing to financial constraints, bad weather, an architectural redesign, and a general project assessment in light of current technical advances and economic realities, on the other hand, has been shown to have significantly contributed to the protracted building duration. The prepared BEME was valid for a set amount of time at the start of the construction project. However, if there is a delay in the supply of building materials at any stage of construction owing to logistical issues, the duration of the project will be automatically extended. As a result, the construction system's failure as a result of this could cause a number of problems, including an increase in material costs and, in some situations, the availability of low-quality building materials. This would have had a negative impact on the projects' allocated funding. As a result, this condition has become a regular occurrence in all of the chosen districts, but it is more prevalent in Oba-Ile and Ondo Road. Construction projects in Alagbaka and Ijapo Estate, on the other hand, displayed a faster construction phase and shorter construction period. The link between construction cost and construction period is shown in Figure 2c for the period 1995 to 2020. The results are consistent with the research by Akali and Sakaja [9], which demonstrated the need to determine the ideal level of financial capacity required for a project in order to ensure that the level of financial capacity is maintained and that there is a sufficient supply of funds to finance current assets to facilitate project completion within budget and time constraints.

Depending on the locations of the buildings, the health of the site's infrastructure, and the businesses that produce the building materials, weather can have a considerable impact on construction time and cost. The majority of the roads are obviously inaccessible, and during the rainy season, their condition deteriorates more. The dry season is sometimes chosen as the time to complete construction projects, but this usually results in a sharp increase in demand and, consequently, a rise in material costs. The construction process may also necessitate some architectural designs and approvals. A series of disagreements between the client and the project engineer could start at this point. As a result, productive time was lost before this could be technically fixed, which results in a longer construction period and more construction overall.

Conclusion

The study covers four districts in Akure South (Alagbaka, Ijapo Estate, Oba-ile, and Ondo Road) in Ondo State. Based on the results of hindcast datasets using various statistical metrics, it is clear that a lengthy period of construction execution is the primary cause of construction cost. Hence, a range of factors, such as bad weather (during the wet season), inflation, and an overall review of architectural design, contribute to the delay in project delivery time. Once there is a delay in a construction project, inflation easily sets in due to the increasing prices of both construction materials and labour costs. The majority of the roads are obviously inaccessible, and during the rainy season, their condition deteriorates more. The dry season is sometimes chosen as the time to complete

construction projects, but this usually results in a sharp increase in demand and, consequently, a rise in material costs.

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