

COST ESTIMATION OF HOUSING ESTATE DEVELOPMENT PROJECT IN NIGERIA

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Abstract

This paper proposes a detailed evaluation of cost estimation of a housing estate development project framework using the result of the findings from an already existing housing estate in Abuja, Nigeria. Visitations and verbal interviews were carried out with various architects, artisans and some laborers' who are presently working on a building project. The cost estimation was made with current market/value prices. The aim/objective of this evaluation is to produce results that can be used in feasibility study by other developers and building project estimators' especially in/about Nigeria. Basic steps, overview of some of the general cost breakdowns of a housing estate project at various times in the development process, common problems, criteria that show unique characteristics of a building site, and more things to consider in the process of a housing estate development and cost estimation were pointed out. The result from this evaluation shows that the total figure or estimated cost is unique to this project. The unit prices of all items are changeable in the open market. The design is a simple one with an aesthetically conscious approach. For more complex designs, the cost will exceed what has been estimated below. This evaluation points to the fact that cost estimation aid housing estate project development by helping the developers in determining the feasibility and profitability of a potential project. It is almost impossible that the estimators' initial estimate will be the same as the project's final cost. However, comprehensive estimates like this one allow developers to make important decisions in this regard when the need arises. One of the implications of this evaluation is that the overall effect of cost estimation of a housing estate development project will help to evaluate cost, complete the project within the stipulated budget and achieve a finished product that will give value for money. In conclusion, this study serves as detailed Information on the cost estimation of a standard 4-bedroom duplex, and that of a standard housing estate in Nigeria. It can serve as a guide to housing estate developers and building project estimators'.

Keywords: Housing Estate, Evaluation, Cost estimation, Housing estate development, Housing Estate developers, Project, Abuja, Nigeria.

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Introduction

Evaluation of cost estimation of a housing estate development project in Nigeria is focused on determining through careful appraisal, the processes and significance of cost estimation of a housing estate development project in Nigeria.

Cost from an economic standpoint is defined as whatever someone has to give up for getting or achieving something else. There are four fundamental types of cost, they are: time, energy, money and lost opportunity. When dealing with cost estimation of a housing estate development project, the type of cost that is estimated is generally **money**.

Cost estimation is the process of predicting the price, quantity and cost of the resources that are needed to complete a job according to design or project scope. As stated by Tim [1], In the field of project management, cost estimation is the process of estimating all of the costs associated with completing a project within scope and according to its timeline. Hence, the need for the evaluation of cost estimation of a Housing Estate Development Project as documented herein.

In Nigeria, the price or cost of materials and labor are not fixed. Hence, being able to accurately predict housing estate project costs is essential to the development of a successful project, as it sets the baseline for the price/resources required to make it viable.

According to Alastair [2] after cost, project timelines come second and then followed by project quality. However, cost is the number one player and determines the success or failure of a construction job. The cost that's detailed on estimation forms a central point for the construction process. Therefore, cost estimation is crucial for the success of any construction project and the Housing Estate Development Project is a building construction project. Hence, the need for this cost estimation.

Cost Categories of Housing Estate Development Project in Nigeria

Housing estate cost breakdown vary depending on the type of building that is being considered – Duplex, bungalow, block of flats, self contain apartments, etc. Below is a quick overview of some of the general cost breakdowns of a housing estate development project in Nigeria, at various times in the development process:

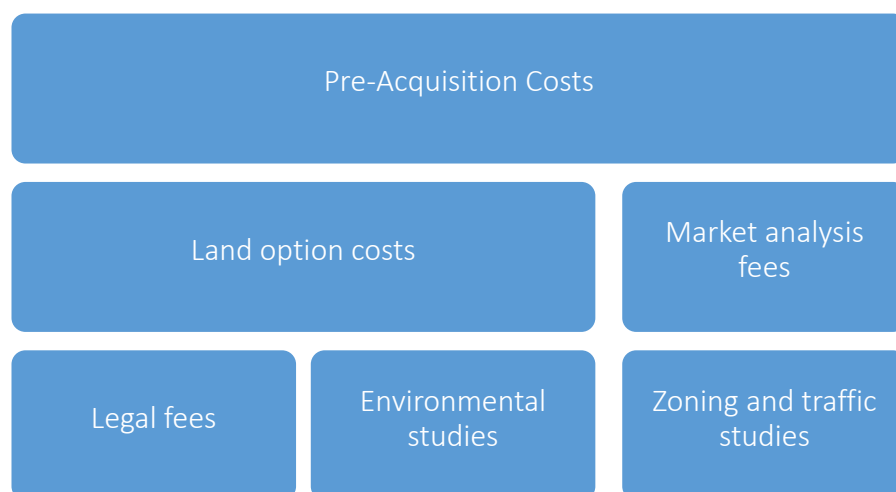


Figure1: Pre-acquisition costs are costs that are obtainable prior to acquiring a property for a housing estate development project in Nigeria.

Land option cost belongs to this category. It is the agreed payment that is made to a landowner by a developer or a purchaser, which grants the developer the first option to purchase the land. The developer must purchase the land within the option period agreed with the landowner. It could be several months or years, depending on the agreement.

According to Owen [3], An Option agreement grants a developer the right to purchase land following a trigger event, in exchange for a non-refundable deposit to the landowner. The trigger event is usually the grant of planning permission. The option must be exercised within an agreed time period. If the developer fails to purchase the land within that time, the option will lapse and the landowner will keep the deposit. Hence, a housing estate developer In Nigeria who decides to use this option must take note of this cost, and put it into consideration while planning or estimating the cost for the development process.

A market analysis fee pertains to a fee or the cost of getting a list of information about similar houses that have recently sold in a particular area. The information will be the statistics that a housing estate developer will utilize to figure out what price to list houses for.

Kate [4], stated that a real estate market analysis is basically an analysis of the current market values of properties, comparable to a property you are looking to buy or sell. It is a helpful tool to determine the market value of your own property, especially if you are trying to decide an accurate selling price prior to listing.

Therefore, this fee is important and must come into consideration as it will help the housing estate developer have an idea of the revenue that the housing estate will generate, and to determine if it is feasible when compared with the cost estimate of the developing process.

Legal fees are fees usually paid to lawyers by a real estate developer for their services and expenses that they may have paid on the developer's behalf. Bethel [5] stated that the benefits of a real estate lawyer when purchasing a property cannot be overemphasized. But they come at a cost and this cost is often not cheap, but they are negotiable. Some lawyers may bill their client on an agreed percentage by both parties for property's transaction. Real estate attorneys in Lagos Nigeria often charge 5 percent of the property sale price (for sale transaction) and 10 percent of 2 years rent for rental property transaction.

Environmental Studies tends to focus on the assessment of potential or known environment liabilities associated with a property which is to be acquired. It is used to assess groundwater or soil contamination of the property, the presence of hazardous materials, and compliance with statutory requirements. According to Kevin [6], an environmental study looks for evidence of any soil, water, or air contamination on a piece of commercial real estate. The environmental study is done by a qualified environmental engineer to determine whether a property is contaminated and to develop a plan to deal with any contamination. This study is important and is done for a fee. Hence, it is expected to be considered and included in the cost estimation of a housing estate development project.

Zoning and traffic studies are means used by governments and communities to direct and organize housing estate development projects. Areas that are zoned for commercial houses do not permit residential houses, and inversely. Some areas may allow both types of houses in the same area in certain situations. If so, the intended use for the commercial houses will be the determining factor. As stated by Pickett [7], zoning laws have a significant impact on the operation of a business or on developers wanting to build in an area. Development within a specific zoned area can be bound by certain restrictions and rules. For this reason, zoning and traffic studies must be done prior to acquiring a property for housing estate development projects in Nigeria, and the cost of this study must be factored into the cost estimate.



Figure 2: Criteria for development cost of housing estate project

Development costs refer to all expenditures incurred by a developer in developing a housing estate project.

Land cost is a crucial part of the development costs. According to Lynn [8], Land cost is the total cost of purchasing a land parcel. Land cost includes the purchase price, closing costs, commissions, and any other financial charges.

It involves all the expenses associated with acquiring a piece of land for housing estate development project.

Architect/Design fee is the cost or fee that is paid to an architect to develop a design for a housing estate development project. This fee is part of the development costs.

Architects play a huge role in the process of developing a housing estate development project by creating designs and developing concepts which are used to create the project plan and other technical documents. As stated by Michael [9], an architect is hired by a client to create a detailed design of a concept or idea that a client wants to bring to life. The design is developed at a cost, which has to be factored in during cost estimation.

Permit fees are fees paid to obtain permission in line with the state and federal laws in Nigeria. Piper [10] stated that the process for obtaining permission for development commences by an application for planning information, to confirm the land use/zoning, building development control and Land status. The application will be processed and approved after final screening and payment of permit processing fees that is required for the grant of a planning permit. Therefore, the permit fee should be factored into the cost estimate, as it is a necessary cost and part of the development process.

Land preparation, demolition, utilities, and grading costs refer to the cost of preparing the land for the housing estate development project. In Nigeria, preparing the land usually involves

clearing the land, uprooting unwanted trees, grading, and in some cases, demolition. According to Erika [11], and preparation involves all of those activities that occur on your land before you can begin construction on your building. While this is pre-building work, it can include construction work, such as the demolition of existing structures; grading, leveling and clearing the land; moving earth; and drainage projects. Done right, site preparation lets you identify site complications upfront and confront them prior to initiating your larger building project. All these things happen at a cost, and it is necessary that the cost is factored into the cost estimate to avoid the problem or risk that comes with underestimating.

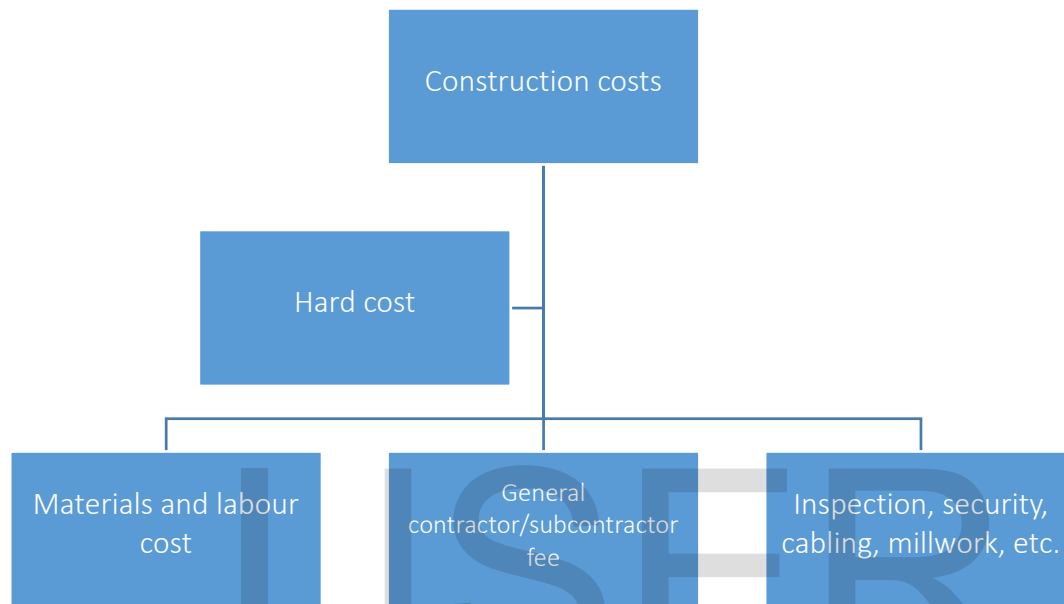


Figure 3: Overall cost criteria for housing estate development Project

Construction costs are the overall costs incurred during the actual construction of the buildings in a housing estate development project.

Hard costs are a major part of construction costs. Barbra [12], stated that hard costs are those expenses which are *directly* related to the physical construction. Consider the hard project costs as the literal nuts and bolts of a construction budget. Hence, the cost estimation of a housing estate development project tends to include more hard costs than other costs.

Material and labor cost are part of hard costs. They are both crucial requirements for any housing estate development project. Hence, having them in the cost estimate for any building project is inevitable.

General contractor/subcontractor fee is the fee which is paid to contractors when they are hired by a housing estate developer to provide the labor, other services, and in some cases, the equipment that are needed to get the project done. And also the fee paid to the subcontractors (ie) other individuals or company that may be hired to assist the contractor to complete a project.

Inspection, security, cabling, and mill work are all important aspects of a housing estate development project. Inspection is necessary at different stages to ensure that the project is

going according to plan to avoid damages, incurring losses by spending on avoidable things which are not included in the budget. Security is important because the materials have to be kept safe. Cabling, mill work, are all necessary in the development process. Hence, the cost for all these things has to be factored into the costs estimate either individually, or in a lump sum.

Common problems with estimating or projecting housing estate development costs

Housing estate project costs vary from city to city and from one moment in time to another. Thus, Adedeji [13] rightly observed that one main barrier to the realization of effective housing in Nigeria as revealed in successive government efforts has been the cost of housing in the country. He argued that in the early periods, shelter in Nigeria was easily affordable as building materials were sourced from the immediate environment at affordable costs. When estimating housing estate costs, some of the most common problems to look out for include the following:

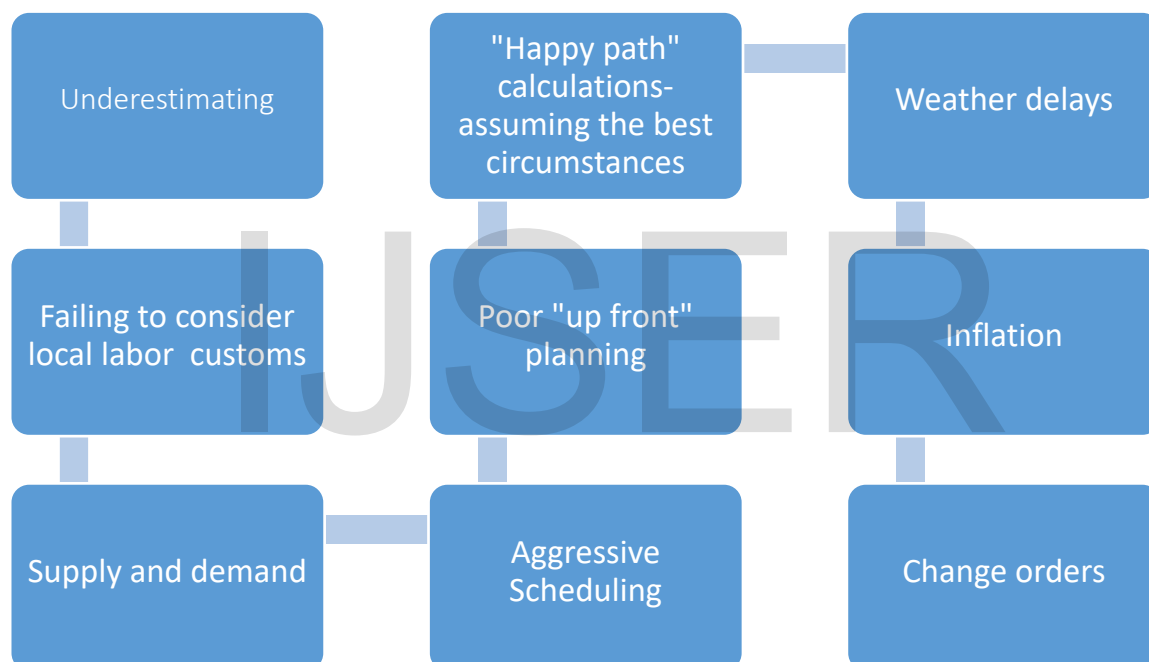


Figure 4: Problems associated with estimating or projecting housing estate development costs

Underestimating: This is when the estimated cost is far less than the actual or final project cost. According to Kendall [14], Estimating is one of the most difficult jobs in construction. It is also one of the most important. Profits are typically won or lost based on how accurate your estimates are and how closely they match up to your final project costs. Hence, it is very important that estimates are made using current and accurate information, with extreme care.

“Happy path” calculations – assuming the best circumstances: This is when an estimate is made with only the best circumstances in mind. The estimator makes the estimate believing that the project final cost will be just the same as the estimated cost without errors or differences. This could be a problem because most times, there could be exceptions or differences due to various reasons, and if no plan was made to handle these things, the project will be affected (delayed or plan changed). As stated by Adrian [15], Whilst it is completely understandable that

organizations focus on the ‘happy path’, as analysts and service designers we should ensure that the alternate paths and ‘unhappy paths’ are considered too. Considering the frequency and the severity will help us prioritize and decide where most effort should be focused. In doing so, we can equip those who will actually be operating the process with the tools that they need to meet the needs of the customer.

Weather delays: This is when delays occur due to major changes in weather. Construction projects involve multiple weather-sensitive activities that frequently cause significant project delays and economic losses for both contractors and project owners, Ballesteros [16]. Hence, weather changes can impact housing estate development projects by causing labour cost overruns, material cost overruns and cash flow due to extended duration of the project. Planning for weather delays is important and helpful for the smooth running of housing estate development projects.

Failing to consider local labour customs; Local labour customs serves as a link between Housing Estate developers, communities, trade unions, and the government. It is expected that estimation is done with those customs in mind. Failing to consider local labour customs may affect Housing Estate development projects.

Poor “up front” planning: This is when the project is not properly planned from the beginning. As stated by Khalid [17], Poor planning and management of the construction projects may lead to several negative effects on the duration and completion of projects. Thus, Poor “up front” planning may cause wasted time, materials, effort and money and that is a problem for the project.

Inflation: Inflation causes increase in material prices and that affects the estimated cost. This can be a problem because housing estate developers may not be able to accurately forecast the changes that may occur due to inflation. As stated by Love [18], A construction project can continue for years before completion. During the construction period, the cost of materials, tools, labour, equipments etc. may vary from time to time. These variations in prices should be considered during cost estimation process. Housing estate developers in Nigeria must plan for these effects and attempt to reduce any differences or problem that could arise from them.

Supply and Demand: Housing prices are subject to the impacts of supply as well as demand. While supply is affected by construction costs, demand is determined by the renting/buying considerations of the public. As a result, the construction cost index (CCI) on the supply side and the rental price index (RPI) on the demand side should be closely related to the house price index (HPI). I-Chun [19].

Aggressive Scheduling: This is when the scheduled timeline for the Housing Estate Project delivery is compressed and the project still considered achievable. However, it can be difficult. Hence, developers must pay attention and follow the schedule carefully to avoid major problems.

Change Orders: This is when a change is made to the original scope or plan of the Housing Estate development project. Work is either added or removed and the change usually affects the project’s estimated cost. Change in contract drawings, design and documents while implementing the construction projects, usually leads to change in projects schedule and have the potential to unnecessarily increase the cost of projects, which may not add any value to the project in case they may be regarded as “a waste”. Waste of time, cost and resources. Staiti

[20]. Hence, Housing Estate developers must make sure that the due processes for ordering change is followed, in order to reduce the effect on the project.

To avoid the pitfalls of poor housing estate cost breakdowns especially in Nigeria, it is recommended that these possible problems are considered and planned for beforehand. Furthermore, better forethought early in the process can save lots of time, energy, and money, later in the project.

Housing is considered a social responsibility by all nations of the world due to how significant it is in the society. The United Nations Organizations such as UNCHS (Habitat) have over the years pursued a variety of programs and policies targeted at resolving the issue of inadequacy and shortfall of housing stock.

In Nigeria, the poor performance and outcome that are associated with housing estate projects include protracted delay in payment for work done, high fluctuations in work load, inadequate resources, low technical expertise, managerial skills etc.

The method with which this theory is developed is the Comparative method. Most developed countries have been able to deal with these issues to a good extent, but it is not exactly so in Nigeria yet.

According to Arayela [21], many completed housing estates had remained unoccupied because of the high rental and sale prices attached to them as against the meager income of the average Nigerian workers. He also added that if government can revitalize our industrial base, the cost of building materials will come down and many more people would be able to build houses. He therefore urged the Federal Government to provide tax relief for local manufacturers and importers of building materials in order to reduce the high cost of accommodation in major cities.

The various studies highlighted suggest that in order to achieve adequate housing estate project delivery in Nigeria, there is a high need for adequate cost estimation.

It will provide the basis for the establishment of the optimum costs of a housing estate project. Effective and efficient cost estimation is therefore a critical success factor in carrying out a housing estate development project in Nigeria.

This paper aims to evaluate and propose a framework for the cost estimation of a housing estate development project, in hope that it will show what it will likely cost to set up more standard Housing Estates, both by the government and individuals, in order to deal with poor housing issue in Nigeria.

Materials and Method

The qualitative and quantitative research methods were used in this research. The major type of qualitative research method that was used is the One-on-one interview method. Visits were made to the site and markets, and interviews carried out with various estate developers, facility managers. 115 questionnaire were distributed, but 108 were retrieved . .

A personal interview was carried out especially with an Abuja based housing estate owner. It was purely conversational and details were gotten in depth from the respondent. Record keeping is another type of qualitative research method that was used. It was complementary to the Personal interview by providing access to already existing reliable documents of information as a data source.

Thus, the results provided by these methods are as follows:

Cost estimation is an integral part of a housing estate development project. According to a respondent, “it is everything!” It is what determines how much is really required for the project. It is also a determining factor for the rental or sale price of the houses in the estate. It will determine the classification of the buildings in the housing estate. Therefore, adequate care is required for clear, accurate estimation and implementation for the desired results to be achieved. The respondents provided useful information that formed the data on the cost estimation of 20 identical 4-bedroom Duplexes which make up a standard, housing estate in Nigeria.

Hypothesis

- i. **H₀**: Cost of estimation does not affect housing estate development project.
- ii. **H₁**: Cost of estimation affects housing estate development project.

Results;

Cost estimation of Building 20 blocks of identical 4 Bedroom Duplexes in a housing estate in Kubwa, Abuja, Nigeria in 2021.

Here is detailed data on the cost estimation of a housing estate development project. Worthy of note is the fact that the cost estimated herein, is unique to the site used for this evaluation.

Each housing estate development project possesses criteria that show unique characteristics some of which are; location of the property, cost of building materials around the site location, nearness of the site to the road/market, quality of materials used, and charges of professionals as they vary. These factors affect the cost of carrying out a housing estate development project. It may cost more or less when building another duplex in another location in Nigeria as a result of the various factors listed above.

Table 1: Moving forward, outlined in the table below are the various areas to be covered in this cost estimation;

| Cost of Foundation | Cost of Construction From Damp Proof Course (D.P.C) To Lintel Level | Materials Required for Lintel Casting | Material Requirements for Roofing |
|--|--|--|---|
| Material Requirements for Setting-out with profiles | Material Requirements for Columns (Ground floor to the First Floor) | Cost of First Floor Decking Stage | Cost of Finishing Stage |
| Material Requirements for trenching. | Material Requirements for Beams (Ground floor to the First Floor) | Cost of Staircase Stage | Material Requirements for Tiling works (Ground – First floor) |
| Material Requirements for Earthwork Support For Strip Foundation | Material Requirements and Labour for Blockwork (Ground Floor to the First Floor) | Cost of Roofing Duplex Stage | Material Requirements for Floor Screeding (Ground – First floor) |
| Material Requirements for Anti termite treatment of wood | | | Material Requirements for Wall Plastering (Ground – First floor) |
| Material Requirements for Damp Proof Membrane | | | Material Requirements for Wall Tiling (Ground – First floor) |
| Material Requirements for Concrete work / Blinding | | | Material Requirements for Screeded Backing (Ground – First floor) |
| Material Requirements for Concrete Columns Base | | | Material Requirements for Ceiling Works (First floor) |
| Material Requirements for Concrete Columns in Foundation | | | Material Requirements for Painting (All floors) |
| Material Requirements for Laying Foundation Blocks | | | |
| Material Requirements for Earthwork / Backfilling | | | |
| Material Requirements for Ground Floor Slab | | | |
| Material Requirements for Setting-out with profiles | | | |

Before the foundation process begins, it is important to ensure that all the required **APPROVED** documents for the housing estate development Project are available. Some of them include: Architectural drawings, structural drawings, mechanical drawings, and electrical drawings.

According to a respondent, it is advisable to breakdown the development process into stages. This is the norm and it is helpful in planning the project.. The development stages can be split into the following:

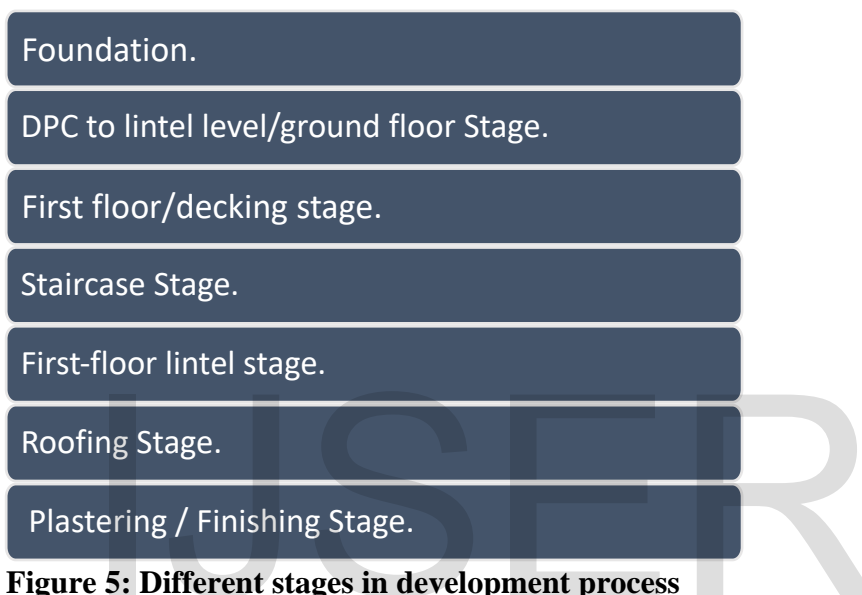


Figure 5: Different stages in development process

Table 2: Cost analysis of different stages of housing development project

| GRAND TOTAL | | | |
|---|--|-------------|----------------------------------|
| Cost of Foundation Stage | | 70,455,540 | |
| Cost of Construction (D.P.C) To Lintel Level (Ground, 1 st , 2 nd Floor | | 158,41,000 | |
| Cost of First Floor Decking Stage | | 69,127,000 | |
| Estimated Cost of Staircase Stage | | 9,110,000 | |
| Cost of Roofing Stage | | 34,940,000 | |
| Cost of Finishing Stage | | 259,881,000 | |
| Add lump sum for Electricals, Plumbing, fittings, Septic tank | | 80,000,000 | |
| | | | Grand total= 681,927,540. |

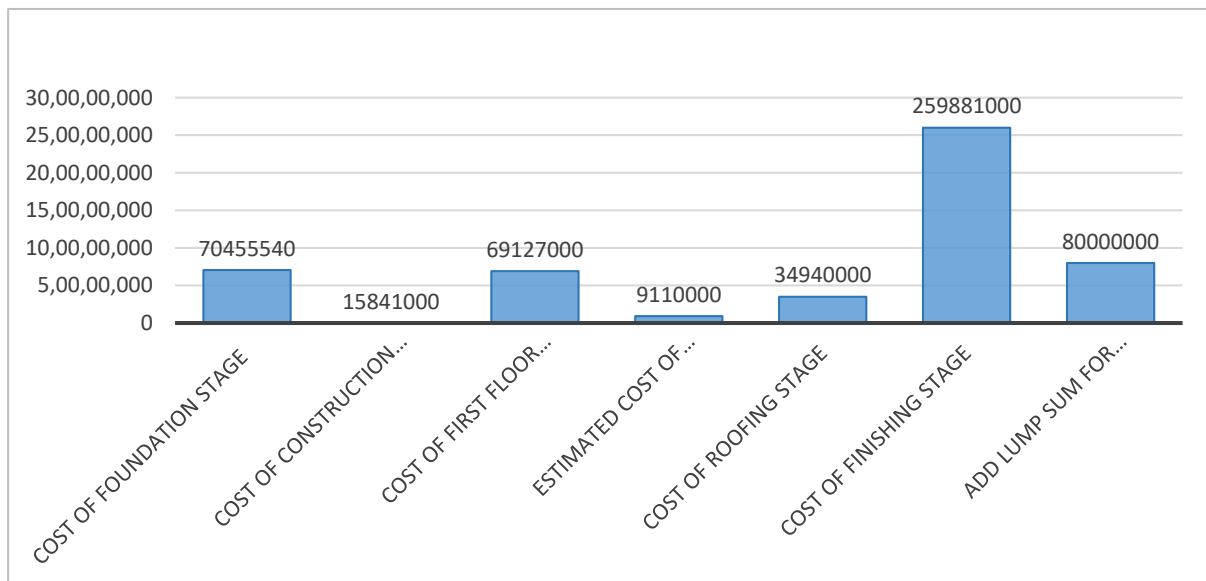


Figure 6: Graphical representation of Cost analysis of different stages of housing development project

Table 3: Unit Rate and total cost of housing estate development project

| Unit Rate | Total Amount |
|------------|--------------|
| 3,522,777 | 70,455,540 |
| 7,920,700 | 158,414,000 |
| 3,456,350 | 69,127,000 |
| 455,500 | 9,110,000 |
| 1,747,000 | 34,940,000 |
| 12,994,050 | 259,881,000 |

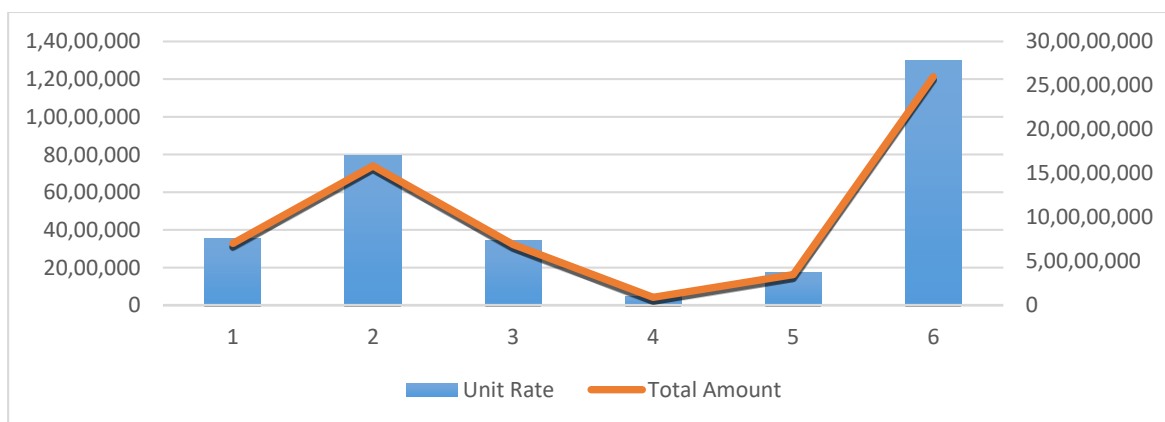


Figure 7: Graph showing unit Rate and total cost of housing estate development project

Table4: Responses from distributed questionnaire

| Questions | Agree | Strongly Agree | Disagree | Strongly disagree | Neutral |
|---|-------|----------------|----------|-------------------|---------|
| Cost of estimation does not affect housing estate development project | 3 | 5 | 47 | 50 | 3 |
| Cost of estimation affects housing estate development project | 52 | 45 | 2 | 4 | 5 |



Figure 8: Effect of cost estimation on housing estate development project

Discussion of Results

As can be seen from the results of this research, the estimated total cost of building 20 standard identical blocks of 4-bedroom duplexes in Nigeria is NGN 681,927,540. This involves *only* the development of the project sit, as the land for this project was inherited. However, a plot of land around the location for this project cost about 1.8million Naira or more as at the time of this evaluation.

This figure or estimated cost is unique to this project. The unit prices of all items are changeable in the open market. The design is a simple one with an aesthetically conscious approach. For more complex designs, the cost will exceed what has been estimated above.

The interior design of this estate is to be handled by the tenants to suit their respective taste and needs. When adequate survey such as this is carried out before hand, and the cost estimate is prepared based on current, accurate findings, it makes for a smooth running of a building development project especially for commercial Housing Estate project developers.

According to CIVE [22], As a commercial construction developer, it's impossible to underrate the importance of estimating cost of construction projects. It is essential in keeping developers in touch with any probable construction cost limitations and potential risks. Estimating costs of construction variables is the most crucial step in achieving successful project completion. Abiding by necessary cost calculation estimates will help deliver all of your customers' requirements without any deviations.

Hence the results of this evaluation will be of great help to any commercial Housing Estate developer in Nigeria. It could serve as a guide to create a cost estimation that is suitable for the Housing Estate development project that is to be carried out by the developer.

This evaluation points to the fact that cost estimation aids housing estate development project by assisting the developers in determining the feasibility and profitability of a potential project. It is almost inevitable that the estimators' initial estimate will be the same as the project's final cost.

Nevertheless, comprehensive estimates like this one allow developers to make important decisions in this regard when the need arises. This study also points out that estimating materials costs is unique to the housing estate being developed, with consideration of things like location, year(time), market rate or price, specific standards or plan of the houses to be developed.

To make it clearer, the cost of a given material may vary, depending on current market demand and supply, the quantity required, the cost of transportation to site, and even exchange rates, if the materials are to be shipped in from another country.

Accurate cost estimation like this one keeps all parties focused on delivering a Housing estate project within the estimated budget.

It holds a developer/contractor accountable for increased costs and overruns.

Accurate cost estimation of a housing estate development project will help in cost management during the entire project. And cost management is a long serving regulation throughout the life cycle of any housing estate development project.

It will ensure effective and efficient procurement process. The overall effect of cost estimation of a housing estate development project will help to evaluate cost, complete the project within the stipulated budget and achieve a finished product that will give value for money.

Conclusion

The aim of this evaluation is to get the cost estimation of a housing estate development project. Based on the evaluation that was carried out, it can be concluded that the cost estimation of 20 blocks of standard 4-bedroom duplexes is about NGN 681,927,540. This study can be used as detailed guide to Information on what it would cost to develop a standard 4-bedroom duplex,

and a standard housing estate in Nigeria, after the land has been purchased. It can serve as a guide to housing estate developers and building project estimators'. Cost estimation is an integral part of the process of housing estate development and should be done honestly and accurately. This evaluation shows that the project site and environment play great role in the cost estimation process. It is therefore recommended that estate developers, building project estimators' or anyone who may want to use this study as a guide to develop a house or a housing estate, should put that into consideration. More thorough evaluation could help with useful information on the entire cost of land purchase, interior design, and maintenance of a housing estate in Nigeria. However, the credibility of this study is not affected by the absence of information on the areas stated above. This process evaluation was exciting and insightful. One of the highlights was getting to interact with new people at various levels.

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