TIME, COST AND CONSTRUCTION OF PUBLIC PRIMARY SCHOOL CLASSROOMS IN SOUTHWESTERN, NIGERIA (2020 - 2024)

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ABSTRACT

This paper employed a planning strategy to determine the time and cost of constructing classrooms in South-western public primary schools in Nigeria from the year 2020 to 2024. The paper embraced the mixed-method research design by employing the qualitative and quantitative approaches to gain an in-depth understanding of the variables investigated. The study population comprised 8401 public primary schools in the six Southwestern states of Nigeria. The study sample comprised 1092 schools, 15 architects and quantity surveyors using the Research Advisor. The purposive sampling technique was used to select three out of the six Southwestern states. In each state, the simple random sampling technique was employed in selecting the schools and their head teachers, architects and quantity surveyors to respond to the questionnaire. An official document containing the primary data on pupils' flow collected from the offices of Universal Basic Education Boards of the selected state was used to generate baseline enrolment figure and to corroborate the data that was provided by the schools under investigation. In particular, Primary School Pupils' Flow Questionnaire (PSPF-Q) was administered on primary school head teachers, Cost Schedule Form Questionnaire (CSF-Q) on quantity surveyors and Time Schedule Form Questionnaire (TSF-Q) on architects. The results showed that ₦5,819,298,322.76 is the mean cost of constructing the required number of classrooms per state in Southwestern Nigeria in the year 2020, ₦7,820,342,573.22 in the year 2021, ₦10,363,911,641.54 in the year 2022, ₦13,585,830,755.00 in the year 2023 and ₦17,639,959,050.00 in the year 2024. Also, a maximum of 22 days, 15 hours is needed for the construction of one classroom based on the assumption that one worker will be allocated to each task per time. The study concluded that the government should be able to plan for the construction of the needed number of classrooms based on the time and cost estimate in this work.

Keywords: Time, Cost, Construction, educational planning, public primary school

Introduction

The growing concern for the quality of education at the primary school level necessitates a thorough and closer look at the number of pupils expected in each school and the number of classrooms required. Given that educational planning has been extended in terms of scope to cater for the efficiency of the education system, determining the required number of classrooms is unavoidable for achieving the primary school goals (Norton, 2014), and establishing a learner-friendly environment for schools to operate effectively (Peña-López, 2009).

Remarkably, it is expected that educational planners and managers aim for the effective and efficient allocation of resources to projects in order to achieve the maximum realization of educational goals. If resources are scarce, then the available ones should not be wasted rather, it should be used optimally and efficiently. Efficiency entails using the least time and cost to achieve the cheapest and most reasonable results. Therefore, educational planners should not just be concerned about

achieving the best results (effectiveness) but should be concerned about achieving these results with the least resources (efficiency).

This research observed that an efficient educational planner must count the cost of a project before embarking on it. Also, the educational planner must determine whether he/she has what it takes to complete the project before starting the execution process. Usually, it is expected that educational planners do not hurriedly start a project in order not to be forced to rush out of it before completion. Besides, the issue of over-allocation of resources is another critical reason why educational planners should count the cost of a project before the implementation stage. If too many resources are allocated to a project, all the resources would still be used on the project, as explained by Parkinson (1955).

A derivative of Parkinson's Law is that expenditure rises to meet income. In most cases, all the resources, for example, money and time, allocated to projects are always expended, no matter how huge the resources are when being compared with the size of the project. The amount of money spent on a project should be commensurate with the project itself; that is, the size of the project should be equal to the amount spent on it. In other words, there should be efficient management of resources.

According to The Cable News, the government of Osun State made it very clear at the commissioning of Olufi Middle School, Gbongan in Ayedaade Local Government Area of the State in 2015, that the money used to build the school was borrowed. It was said that N130 million was spent on the building of the school. On the one hand, some citizens opined that the cost of building the structure is on the high side. On the other hand, the same citizens' opinion may have some political undertone.

However, even when large amounts of money are invested in the construction of classrooms or schools, resources could still be wasted if they are not planned for and optimally utilized. The cost and time for constructing classrooms in schools can be brought to its barest minimum if proper planning is adopted. Moreover, the cost of the project should be determined before starting the project. Apart from determining the project cost, the duration of time required to complete the project should be determined.

Against the background described in the preceding paragraphs, this paper aims to determine the time, cost and construction of public primary school classrooms in Southwestern Nigeria. The paper focused on knowing (i) the number of pupils and classrooms available in schools, (ii) the number of pupils expected to be in public primary schools in future (iii) the number of classrooms required in these public primary schools. Additionally, the paper seeks to determine the cost and time needed to construct the required number of public primary school classroom in a defined study area within a specified period. For this research, the study area considered is the Southwestern states of Nigeria from 2020 to 2024. The goal of the study is to provide an educational planning framework to enable the government to plan for the construction of the needed number of classrooms based on time and cost estimates.

The remaining part of this paper has been structured as follows: In section 2, a literature review was established to provide an insightful background of the study. In section 3, the research questions for the study were outlined, while section 4 describes the significance of the study. Section 5 describes the research methodology explaining the approaches used, defining the research study population area, sample size and research instruments used. The results and discussion are provided in section 6. Finally, we presented the concluding remarks from our work in section 7, and, however, gave some recommendation in section 8.

Literature Review

Scarcity of resources, especially money and time, have always been the major limiting factors to the realization of school goals (Compen, De Witte, & Schelfhout, 2019). Such scarcity of resources is what brings about the lack of an adequate number of required classrooms in schools. Besides, casual observations have shown the dilapidated condition of some school buildings in the Southwestern part of Nigeria as a major challenge, which has resulted in the existence of unfriendly learning environments. The consequences of these prevailing challenges make the pupils feel insecure in school and may be a contributing factor to the high number of out-of-school children in Nigeria.

Again, the resources available for the construction of classrooms in Nigeria public primary schools are limited. This has resulted in more dilapidation and inability to achieve an adequate number of functioning classrooms. Apart from the construction of classrooms, there are other aspects of the school that are competing for limited resources. This has brought about delays in meeting the classroom needs of pupils by the government and has brought about many uncompleted public primary school classrooms. Also, this has brought about overcrowding in existing classrooms, especially in the urban cities, thereby leading to disadvantaged learners' output.

Another problem is the assumptions made on the time and cost for executing these projects, which is a potential cause for delay in the construction of the classrooms. Costs refer to the totality of resources used to achieve an objective, create goods or offer services. As observed in Adeniji (2004), the cost is a resource that is being forgone to achieve a particular objective. It is often referred to as economic cost. As reflects Adeniji (2004), the cost is considered the money that must be paid to acquire goods and services. It refers to whatever is sacrificed or incurred either by an individual, community, institutions, organizations or countries to ensure required materials are put in place such as the building of classrooms.

Similarly, Durosaro (2000) describe cost in education as synonymous with education expenditure. To him, it is one of the real resources used in the production of educational capital assets such as classrooms. However, efficient allocation of resources (that is, money and time) becomes expedient to ensure minimal wastages.

Under-costing might lead to the abandonment of projects in the long-run. At the same time, over-costing might hinder the government from embarking on the projects, which will both ultimately lead to an inadequate number of classrooms in schools. Financial mischief and dishonesty among officials can force the government to avoid constructing new classrooms entirely due to over-costing or even sometimes under-costing of the projects which would likely lead to delays in the implementation of the building plan.

There are several activities involved in the construction of a classroom or the construction of buildings generally. These activities or tasks must be carried out in a particular sequence. In this work, some of the tasks include site clearance, trench excavation, concrete in foundation, roofing, and painting, among others. All of these tasks must be arranged according to their precedent relationships; for example, the roofing of a building can not take place before carrying out the activity of concrete in the foundation.

Therefore, there is the need to take the building plan a little further by making the cost, time and activities that are involved in the construction of the required number of classrooms in schools

available to policymakers and education plan implementers. There is a need to be efficient in the allocation of resources to all segments of the construction process. The minimization of waste through an efficient allocation of scarce resources becomes imperative to the realization of the construction of the required number of classrooms in the study area.

Systems theory (Von Bertalanffy, 1968) is relevant and closely related to the current study since there will be the use of resources (that is, cost and time) for public primary school classrooms and, hence, to bring about efficiency, thereby eradicating waste. The value of the classrooms must be commensurate with the amount spent while constructing. When looking from an economist's and a planner's perspective, resources must be efficiently utilized in order to eradicate or at least, minimize wastage of resources and delay of projects. Calculation of the time and cost of constructing classrooms is germane if wastage must be eradicated to the barest minimum. There is the need for government and educational planners to consider the resources that will be required for the construction of public primary school classrooms before embarking on it so that the society can have less number of abandoned classroom projects and also curb misappropriation of public funds.

The theoretical framework in Figure 1 shows the relationship between the resources required for public primary school classrooms, the construction/ implementation process and the outcome of the efficiently constructed classrooms. Cost and time are the input variables; the construction process of public primary school classrooms in Southwestern Nigeria is the process/ throughput variable. At the same time, the end product of the classrooms is the output variable. Finally, the feedback is the efficiency to be achieved.
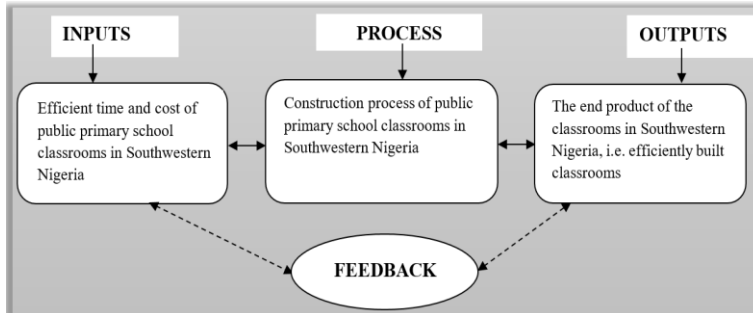

Figure 1: Theoretical framework of planning time and cost-efficient classrooms for public primary schools in Southwestern Nigeria (Source: Adapted from Olasimbo (2013))

Research Questions
The following research questions were answered in this paper:
1   How many pupils and classrooms are in public primary schools in Southwest, Nigeria?
2   How many pupils will be in public primary schools in the study area (2020-2024)?
3   How many classrooms are required for public primary schools in the study area (2020-2024)?
4   What is the time needed to construct a public primary school classroom in the study area? and
5   What is the cost needed to construct a public primary school classroom in the study area (2020-2024)?

Significance of the Study

1. The study will be beneficial to pupils, teachers, policymakers, parents, inspectors, donors and all other educational stakeholders. It will bring to light the present state of public primary school classrooms in Southwestern Nigeria, provide information on the number of classrooms available and needed presently and the number of classrooms needed for the next five years. It will provide information on the amount of time and cost that will be needed for the construction of the classrooms so that waste and delay can be reduced to the barest minimum.

2. The study will provide information to the government and policymakers on how to plan time and cost-efficient classrooms in Southwestern, Nigeria. It will make it achievable for teachers and pupils to teach and learn in conducive classrooms, thereby encouraging more pupils to enrol in schools and reducing the number of out-of-school children. It will also make teaching less stressful for teachers.

3. Parents will be encouraged to make decisions on which schools their children should attend when they are confused but when they know that all classrooms are conducive and not jam-packed and they know that their children are not at the risk of being involved in accidents in the school as a result of dilapidated buildings or heat caused by a crowded classroom.

4. Donors will also be encouraged to make decisions on donations to schools towards the construction of classrooms when they realize that there is a template to be followed that will ensure the efficient use of the money.

Methodology

This paper embraced the mixed-method research design by employing the qualitative and quantitative approaches to gain an in-depth understanding of the variables investigated. Notably, the mixed-method approach provided insightful information useful in planning for the efficiency of public primary school construction in Southwestern, Nigeria. The rationale for planning for the efficiency of constructing public primary school classrooms in Southwestern Nigeria hinges on the optimization of resources, thereby minimizing delay and waste. In this regard, the systems theory by Von Bertalanffy (1968) was used for analyzing the operations and interactions of the variables.

For qualitative research, a structured questionnaire and organizational documents were used to collect and analyze data. Figure 2 reflects the study population area in the six (6) Southwestern states of Nigeria and the total number of public primary schools in each state. Our target audience for data collection is the headteachers in the selected public primary schools, architects and quantity surveyors. These target audiences comprised the sample size for the study. In particular, the simple random sampling technique was used to select three out of the six Southwestern states. It was also employed in selecting the schools, their headteachers, architects and quantity surveyors to respond to the questionnaires. For the architects and quantity surveyors, the selection was based on a minimum of five years of public service experience. The sample distribution by state is as shown in Table 1.
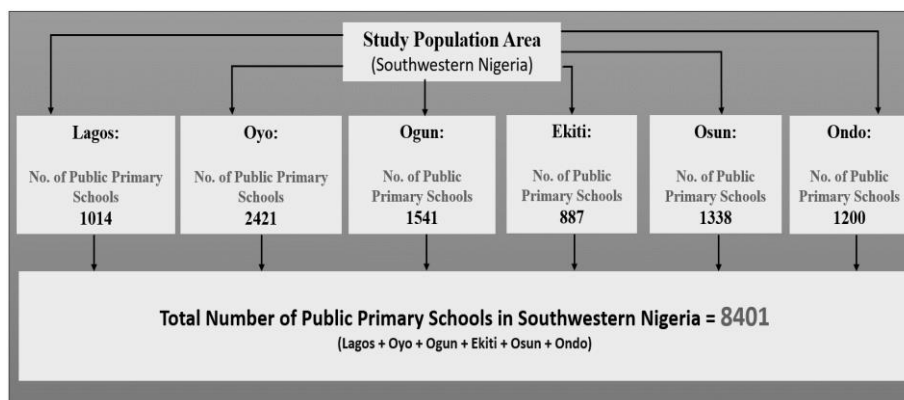
Figure 2: Breakdown of the study population area

Table 1: Sample Distribution by State

S/N	States	Number of Schools	Number of Head teachers	Number of Architects	Number of Surveyors
1	Lagos	370	370	5	5
2	Ogun	357	357	5	5
3	Oyo	365	365	5	5
	TOTAL	1092	1092	15	15

Source: Research Advisor (confidence level= 95%, Margin of Error=5%)

As Table 1 reflects, 370, 357, and 365 public schools and headteachers were selected from Lagos, Ogun and Oyo states, respectively. At the same time, 5 architects and quantity surveyors were selected from each state, making it a total of 15 architects and quantity surveyors.

Additionally, the organizational document inspected was an official document containing the primary data on pupils' flow collected from the offices of Universal Basic Education Boards of Lagos, Oyo and Ogun States. This document was used to generate baseline enrolment figure and to corroborate the data that was provided by the schools under investigation. Also, Primary School pupils' Flow Questionnaire (PSPF-Q) was administered on primary school headteachers, Cost Schedule Form Questionnaire (CSF-Q) on quantity surveyors and Time Schedule Form Questionnaire (TSF-Q) on architects.

The quantitative approach provides supports for measurement based on the data collected. The section on Result and Discussion explained how the various measurements were carried to answer the research questions.

Results and Discussion

In line with the research questions in section 3, this section outlined and discuss the findings of this study.

RQ 1: *How many pupils and classrooms are in public primary schools in Southwest, Nigeria?*

Based on the fieldwork conducted, the number of available classrooms in Southwestern, Nigeria, in the year 2020 is shown in Table 2. As Table 2 describes, there are 445,583 pupils in public primary schools, and 10,612 available classrooms in Ogun state. In Lagos state, there are 414,621

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pupils, and there are 10,833 available classrooms, while in Oyo state, there are 490,410 pupils and 14,060 classrooms. The mean or average number of pupils per state in public primary schools in Southwestern Nigeria is 450,205, while the average number of classrooms per state is 11,835

Table 2: Number of Pupils and Classrooms in Southwestern Nigeria

State	Total number of Pupils	No of available classrooms
Ogun	445,583	10,612
Lagos	414,621	10,833
Oyo	490,410	14,060
Total	1,350,614	35,505
Mean	**450,205**	**11,835**

Source: Fieldwork (2020)

RQ 2: *How many pupils will be in public primary schools in the study area (2020-2024)?*

This research question aims at projecting the number of public primary school pupils in Southwestern Nigeria from the year 2020 to 2024. The following steps achieved the projection: (i) finding the average annual rate of change in population in Southwestern Nigeria. This was achieved by using the census reports of the years 1991 and 2006 (see Table 3 and 4, respectively), (ii) using the compounding technique to calculate the number of pupils that will be in the public schools from the year 2020 to 2024.

Table 3:
Population of southwestern states for 2006

SN	State	Population
1	Lagos	9,013,534
2	Ogun	3,728,098
3	Oyo	5,591,589
	Total	18,333,221
	Mean	**6,111,074**

Source: Census Report, (2006)

Table 4:
Population of southwestern states for 1991

SN	State	Population
1	Lagos	5,685,785
2	Ogun	2,338,570
3	Oyo	3,488,789
	Total	11,513,144
	Mean	**3,837,715**

Source: Census Report, (1991)

The mean population of the year 2006 census for Nigerian Southwestern states were computed as 6,111,074 while that of the year 1991 was 3,837,715. Therefore, the Southwest's average annual rate of population change was computed with the formular in Equation 1:

$$r = \left(\frac{\frac{p_2 - p_1}{p_1} \times 100}{n} \right) - U \quad \text{......(1)}$$

where r = average annual rate of change in population
P2= mean population of the recent census (2006) = 6,111,074
P1= mean population of the last two census seasons (1991) = 3,837,715
n = number of years between the two censuses = 15 years
U= error term = 0.7
Thus;

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$$r = \left(\frac{\frac{6,111,07 - 3,837,715}{3,837,715} \times 100}{15} \right) - 0.7$$

$r = 3.949153771 - 0.7$

$r = 3.25\%$

The computation gave 3.25%. This average annual rate of population change is useful for projecting into years ahead. The compounding technique was used to calculate the number of pupils that will be in public primary schools in Southwestern Nigeria for the number of years under investigation. Equation 2 defines the compounding technique.

$A(1 + r)^n$ ……………………………………………………………………………..(2)

Where A= number of pupils in the year 2020

                r = average annual rate of change in population

                n = number of years

For this study, $r = 3.25\% = 3.25 / 100 = 0.0325$

$n = 2021- 2020 = 1$ year

$n = 2022- 2020 = 2$ years

$n = 2023- 2020 = 3$ years

$n = 2024 - 2020 = 4$ years

The computation of the number of pupils that will be in public primary schools in the study area from the year 2020 to 2024 is shown in Table 5.

The computation in Table 5 shows that individual states will have an average of 464,836 pupils in the year 2021 and an average of 479,944 pupils will be in Southwestern Nigerian public primary schools in 2022. It will be 495,542 in the year 2023, and the average number will be 511,647 pupils in public primary schools in Southwestern, Nigeria, in 2024.

Table 5: Projected Number of Pupils (PNP) for Southwestern Nigeria (2020-2024)

State	Lagos	Ogun	Oyo	Total	Mean
Number of pupils in 2020	414,621	445,583	490,410	1,350,614	450,205
PNP in 2021	428,096	460,064	506,348	1,394,508	464,836
PNP in 2022	442,009	475,017	522,805	1,439,831	479,944
PNP in 2023	456,375	490,455	539,796	1,486,626	495,542
PNP in 2024	471,207	506,394	557,339	1,534,940	511,647

Source: Fieldwork (2020)

RQ 3: *How many classrooms are required for public primary schools in the study area (2020-2024)?*

Answering research question 3 was based on the following- (i) calculating the projected number of pupils specified in research question 1, and (ii) calculating the expected number of classrooms for

those periods of years. Therefore, Table 6 shows the expected number of classrooms based on the number of pupils that were calculated in Research question 2 and based on the official number of pupils that should be in a classroom. Thirty (30) pupils are meant to be in a classroom, as stated by the Federal Government of Nigeria's (FGN) Decree 16 of 1985 on minimum standards for primary and secondary schools (FME, 2002). The revealed that the ideal number of pupils per classroom is 30, the optimal number is 35 while the maximum number is 40. However, as stated in the document, the ideal number of 30 pupils per classroom should be achieved in the next 10 years, that is, in the year 2012. So, since we have passed the year 2012 and this computation is for the year 2020 to 2024, the ideal number of 30 pupils was used for the computation.

As Table 6 reflects, the number of pupils was used to divide 30 (ideal number of pupils per classroom) to get the expected number of classrooms. Equation 3 was used to determine the expected number of classrooms.

$$p/n\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(3)$$

where p = projected number of pupils, and n = 30

Table 6: Expected Number of Classrooms from the Year 2020 to 2024

State	Lagos	Ogun	Oyo	Total	Mean
Number of pupils in 2020	414,621	445,583	490,410	1,350,614	450,205
Expected no of classrooms in 2020	13,821	14,853	16,347	45,021	15,007
Projected Number of pupils in 2021	428,096	460,064	506,348	1,394,508	464,836
Expected no of classrooms in 2021	14,270	15,335	16,878	46,483	15,494
Projected Number of pupils in 2022	442,009	475,017	522,805	1,439,831	479,944
Expected no of classrooms in 2022	14,734	15,834	17,427	47,995	15,998
Projected Number of pupils in 2023	456,375	490,455	539,796	1,486,626	495,542
Expected no of classrooms in 2023	15,213	16,349	17,993	49,555	16,518
Projected Number of pupils in 2024	471,207	506,394	557,339	1,534,940	511,647
Expected no of classrooms in 2024	15,707	16,880	18,578	51,165	17,055

Source: Fieldwork (2020)

As shown in Table 6, the average expected number of classrooms in the year 2020 is 15,007. This implies that all states in Southwestern Nigeria have an average expected number of classrooms to be 15,007 in the year 2020. For the year 2021, the number is 15,494, for the year 2022, it is 15,998, for the year 2023, it is 16,518 and 17,055 in the year 2024. This means that all the Southwestern states considered for this study (Lagos, Ogun and Oyo states) have an average expected number of classrooms for the years under consideration to guide proper planning.

Next, we calculated the number of classrooms required and that need to be constructed from the year 2020 to 2024, as shown in Table 7. This was achieved by subtracting the number of classrooms available presently from the expected number.

Table 7: Number of classrooms required from the year 2020 to 2024

State	Lagos	Ogun	Oyo	Total	Mean
Expected no of classrooms in 2020	13,821	14,853	16,347	45,021	15,007
Number of classrooms required in 2020	2,988	4,241	2,287	9,516	3,172
Expected no of classrooms in 2021	14,270	15,335	16,878	46,483	15,494
Number of classrooms required in 2021	3,437	4,723	2,818	10,978	3,659
Expected no of classrooms in 2022	14,734	15,834	17,427	47,995	15,998
Number of classrooms required in 2022	3,901	5,222	3,367	12,490	4,163
Expected no of classrooms in 2023	15,213	16,349	17,993	49,555	16,518
Number of classrooms required in 2023	4,380	5,737	3,933	14,050	4,683
Expected no of classrooms in 2024	15,707	16,880	18,578	51,165	17,055
Number of classrooms required in 2024	4,874	6,268	4,518	15,660	5,220

Source: Fieldwork (2020)

Table 7 reveals the number of classrooms required and should be constructed in Southwestern Nigeria's public primary schools from the year 2020 to 2024.

The average number of classrooms required in the year 2020 is 3,172. Suppose no classroom is constructed in the year 2020, three thousand, six hundred and fifty-nine classrooms should be constructed in the year 2021 in each Southwestern state. It is 4,163 for the year 2022, for the year 2023, it equals 4,683, and for the year 2024, it is 5,220. This implies that each state of Southwestern Nigeria requires an average number of classrooms for the number of years under investigation, as seen above. As shown in Table 7, each state has the mean values calculated for the expected number of classrooms, as well as the required number of classrooms to be constructed from the year 2020 to 2024.

RQ 4: *What is the time needed to construct a public primary school classroom in the study area?*
The Project Evaluation and Review Technique (PERT) formular was used to calculate the time needed to construct a public primary school classroom. The formular is as shown below:

$(O + 4M + P)/6$………………………………………………………………….…(4)

Where;
O = The most optimistic case where everything goes right
M = The most likely case given normal problems and opportunities
P = The most pessimistic case when everything goes wrong

It is worthy to note that in this work, 8hours is equal to 1day because construction workers work for 8 hours in a day. Also, the time estimates were fixed with the assumption that one worker will be allocated to each task per time.

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Table 8: Time Needed To Construct A Public Primary School Classroom in Southwestern Nigeria

Activities	Optimistic Time estimate (O)	Most Likely Time estimate (M)	Pessimistic Time estimate (P)	PERT estimate (O + 4M + P)/6	PERT estimate (approximately)
Site clearance	1hours	2 hours	8 hours	2.83 hours	3 hours
Trench Excavation	6 hours	8 hours	12 hours	8.33 hours	8 hours
Concrete in foundation	1 hour	3 hours	6 hours	3.16 hours	3 hours
Blockwork in foundation	6 hours	8 hours	12 hours	8.33 hours	8 hours
Backfilling	1 hour	2 hours	5 hours	2.33 hours	2 hours
Filling (laterite and Hardcore)	5 hours	8 hours	8 hours	7.50 hours	8 hours
Formwork	0.5 hours	1 hour	4 hours	1.42 hours	1 hour
Oversite concrete	5 hours	6 hours	10 hours	6.5 hours	7 hours
Blockwork	20 hours	24 hours	40 hours	26 hours	26 hours
Lintels Reinforcement	2 hours	5 hours	7 hours	4.83 hours	5 hours
Lintel concrete	0.5 hours	1 hours	3 hours	1.25 hours	1 hours
Lintel formwork	0.5 hours	1 hour	3 hours	1.25 hours	1 hour
Drying period	22 hours	24 hours	34 hours	25.33 hours	25 hours
Windows and doors	6 hours	8 hours	13 hours	8.5 hours	9 hours
Electricals	6 hours	8 hours	16 hours	9 hours	9 hours
Roofing	13 hours	16 hours	24 hours	16.83 hours	17 hours
Floor finishing	5 hours	8 hours	16 hours	8.83 hours	9 hours
Wall finishings (rendering)	18 hours	24 hours	28 hours	23.67 hours	24 hours
Landscaping	3 hours	4 hours	6 hours	4.17 hours	4 hours
Wall finishings (Painting)	5 hours	8 hours	12 hours	8.17 hours	8 hours

Source: Fieldwork, 2020

Table 8 shows the time needed to construct a public primary school classroom in Southwestern, Nigeria. The PERT estimate for site clearance is 3hours, for trench excavation, it is 8hours, for concrete in foundation, it is 3hours. When it comes to blockwork in the foundation, the time estimate is 8hours. Moreover, backfilling will take 2hours, filling (that is, laterite and hardcore) will take 8hours, formwork will take 1hour, and oversite concrete will take 7hours. In the same vein, blockwork will take 26hours; lintel reinforcement will take 5hours, lintel concrete will take 1hour, lintel formwork will also take 1hour. The estimated time for the drying period is 25hours. For windows and doors, it is 9hours; electricals are 9hours, 17hours for roofing, 9hours for floor finishing, 24hours for wall finishings (rendering), 4hours for landscaping and lastly, 8hours for wall finishings (painting).

The addition of all the PERT time estimate in Table 8 equals 178hours. Since 8 hours equal 1 day as used in this work, it means that the 178 hours equal 22.25 days. It can also be written as 22 days, 15 hours.

RQ 5: *What is the cost needed to construct a public primary school classroom in the study area (2020-2024)?*

Table 9 shows the cost of constructing a public primary school classroom in Southwestern, Nigeria, in the year 2020. It gave the cost estimates for all activities in all the states under investigation. Also, the calculated mean or average estimates are shown to reveal the cost of achieving the activities in all the Southwestern states.

Table 9: Cost Needed To Construct a Public Primary School Classroom in the Year 2020

Activities	Cost estimate in Lagos (₦)	Cost estimate in Ogun (₦)	Cost estimate in Oyo (₦)	Total	Mean
Site clearance	17,700.00	12,000.00	10,000.00	39,700.00	13,233.33
Trench Excavation	53,000.00	50,000.00	46,800.00	149,800.00	49,933.33
Concrete in foundation	40,000.00	40,000.00	50,000.00	130,000.00	43,333.33
Blockwork in foundation	205,000.00	180,200.00	150,000.00	535,200.00	178,400.00
Backfilling	27,000.00	30,000.00	30,000.00	87,000.00	29,000.00
Filling (lateriteand Hardcore)	59,500.00	40,000.00	48,000.00	147,500.00	49,166.67
Form work	142,500.00	130,000.00	120,800.00	393,300.00	131,100.00
Oversite concrete	270,000.00	250,000.00	250,000.00	770,000.00	256,666.67
Blockwork	285,000.00	400,000.00	450,000.00	1,135,000.00	378,333.33
Lintels Reinforcement	30,000.00	35,000.00	30,000.00	95,000.00	31,666.67
Lintel concrete	32,000.00	40,000.00	38,000.00	110,000.00	36,666.67
Lintel form work	9,000.00	7,000.00	8,500.00	24,500.00	8,166.67
Drying period	-	-	-	-	-
Windows and doors	90,000.00	95,000.00	97,000.00	282,000.00	94,000.00
Electricals	35,000.00	32,500.00	30,200.00	97,700.00	32,566.67
Roofing	240,000.00	250,000.00	285,050.00	775,050.00	258,350.00
Floor finishing	60,000.00	70,000.00	50,000.00	180,000.00	60,000.00
Wall finishings (rendering)	140,000.00	120,000.00	120,000.00	380,000.00	126,666.67
Lanscaping	10,000.00	10,000.00	5,000.00	25,000.00	8,333.33
Wall finishings (painting)	48,500.00	50,000.00	48,500.00	147,000.00	49,000.00
Total	**1,794,200.00**	**1,841,700.00**	**1,867,850.00**	**5,503,750.00**	**1,834,583.33**

Source: Fieldwork (2020)

As Table 9 indicates, it means that in Lagos, Ogun, Oyo, Osun, Ekiti and Ondo states, the activities can be achieved on the average with the mean cost estimates.

The total estimate for all the activities under investigation in Lagos state is ₦1,794,200, the total for Ogun state is ₦1,841,700, and the total for Oyo is ₦1,867,850. This reveals that it is most costly in Oyo state, then in Ogun state, and lastly in Lagos state. One would expect that the cost should be highest in Lagos state because the cost of living is higher than the other two states under investigation. However, it was found out that most of the construction materials are readily available in Lagos state. Besides, the cost of transporting the materials from Lagos state to other states makes the cost in Lagos state relatively lower than others. The average or mean cost of the activities

independently and collectively is as shown in Table 9. The total mean for all activities and all states under investigation is ₦1,834,583.33.

Therefore, to estimate the cost needed to construct a public primary school classroom in the study area from the year 2020 to 2024, the compounding formular in Equation (4) was used. It is notionally depicted as:

$$A(1 + r)^n \quad \text{... (4)}$$

Where A= Amount
   r = Rate of interest
   n = Number of years

A(Lagos) = 1,794,200
A(Ogun) = 1,841,700
A(Oyo) = 1,867,850

r = 16.5% = 16.5/100 = 0.165
n = 2021 to 2020 = 1 year
n = 2022 to 2020 = 2 years
n = 2023 to 2020 = 3 years
n = 2024 to 2020 = 4 years

As Table 9 reflects, the mean cost needed to construct a public primary school classroom in Southwestern Nigeria in the year 2020 is one million, eight hundred and thirty-four thousand, five hundred and eighty-three naira, thirty-three kobo (₦1,834,583.33) only.

Table 10 shows the cost needed to construct the required number of classrooms in public primary schools in Southwestern, Nigeria, from the year 2020 to 2024. In the year 2020, the cost of constructing one classroom in Lagos state is one million, seven hundred and ninety-four thousand, two hundred naira (₦1,794,200.00) only. The cost of constructing the required number of classrooms in Lagos state, that is, 2,988 classrooms is ₦5,361,069,600.00. The cost of constructing one classroom in Ogun state is ₦1,841,700.00, and the cost of constructing the required number of classroom, that is, 4,241 classrooms is ₦7,810,649,700.00. The cost of constructing one classroom in Oyo state is ₦1,867,850.00, and the cost of constructing the required number of classroom, that is, 2,287 classrooms is ₦4,271,772,950.00. Then, the mean cost of constructing one classroom in either of the six southwestern states in Nigeria in the year 2020 is ₦1,834,583.33 and the cost of constructing the required mean number of classrooms, that is, 3,172 classrooms is ₦5,819,298,322.76.

For the year 2021, the cost of constructing one classroom in Lagos state is ₦2,090,243.00, and the cost of constructing the required number of classrooms, that is, 3,437 classrooms is ₦7,184,165,191.00. The cost of constructing one classroom in Ogun state is ₦2,145,580.50, and the

cost of constructing the required number of classroom, that is, 4,723 classrooms is ₦10,133,576,701.50.

The cost of constructing one classroom in Oyo state is ₦2,176,045.25, and the cost of constructing the required number of classroom, that is, 2,818 classrooms is ₦6,132,095,514.50. Then, the mean cost of constructing one classroom in either of the six southwestern states in Nigeria in the year 2021 is ₦2,137,289.58, and the cost of constructing the required mean number of classrooms, that is, 3,659 classrooms is ₦7,820,342,573.22.

For the year 2022, the cost of constructing one classroom in Lagos state is ₦2,434,729.40, and the cost of constructing the required number of classroom, that is, 3,901 classrooms is ₦9,497,879,389.40. The cost of constructing one classroom in Ogun state is ₦2,499,186.90, and the cost of constructing the required number of classroom, that is, 5,222 classrooms is ₦13,050,753,991.80. The cost of constructing one classroom in Oyo state is ₦2,534,672.45, and the cost of constructing the required number of classroom, that is, 3,367 classrooms is ₦8,534,242,139.15. Then, the mean cost of constructing one classroom in either of the six southwestern states in Nigeria in the year 2022 is ₦2,489,529.58 and the cost of constructing the required mean number of classrooms, that is, 4,163 classrooms is ₦10,363,911,641.54.

Table 10: Cost Needed to Construct Public Primary School Classrooms (2020-2024)

Description	Lagos	Ogun	Oyo	Mean
2020: For one classroom	₦1,794,200.00	₦1,841,700.00	₦1,867,850.00	₦1,834,583.33
2020: For required no. of classrooms	₦5,361,069,600.00	₦7,810,649,700.00	₦4,271,772,950.00	₦5,819,298,322.76
2021: For one classroom	₦2,090,243.00	₦2,145,580.50	₦2,176,045.25	₦2,137,289.58
2021: For required no. of classrooms	₦7,184,165,191.00	₦10,133,576,701.50	₦6,132,095,514.50	₦7,820,342,573.22
2022: For one classroom	₦2,434,729.40	₦2,499,186.90	₦2,534,672.45	₦2,489,529.58
2022: For required no. of classrooms	₦9,497,879,389.4	₦13,050,753,991.8	₦8,534,242,139.15	₦10,363,911,641.54
2023: For one classroom	₦2,836,630.20	₦2,911,727.70	₦2,953,070.85	₦2,900,476.25
2023: For required no. of classrooms	₦12,424,440,276.00	₦16,704,581,814.90	₦11,614,427,653.05	₦13,585,830,755.00
2024: For one classroom	₦3,304,916.40	₦3,392,411.40	₦3,440,579.70	₦3,379,302.50
2024: For required no. of classrooms	₦16,108,162,533.60	₦21,263,634,655.20	₦15,544,539,084.60	₦17,639,959,050.00

Source: Fieldwork,2020

For the year 2023, the cost of constructing one classroom in Lagos state is ₦2,836,630.20, and the cost of constructing the required number of classroom, that is, 4,380 classrooms is ₦12,424,440,276.00. The cost of constructing one classroom in Ogun state is ₦2,911,727.70, and the cost of constructing the required number of classroom, that is, 5,737 classrooms is ₦16,704,581,814.90. The cost of constructing one classroom in Oyo state is ₦2,953,070.85, and the cost of constructing the required number of classroom, that is, 3,933 classrooms is ₦11,614,427,653.05. Then, the mean cost of constructing one classroom in either of the six southwestern states in Nigeria in the year 2023 is ₦2,900,476.25 and the cost of constructing the required mean number of classrooms, that is, 4,684 classrooms is ₦13,585,830,755.00.

For the year 2024, the cost of constructing one classroom in Lagos state is ₦3,304,916.40, and the cost of constructing the required number of classroom, that is, 4,874 classrooms is ₦16,108,162,533.60. The cost of constructing one classroom in Ogun state is ₦3,392,411.40, and the cost of constructing the required number of classroom, that is, 6,268 classrooms is ₦21,263,634,655.20. The cost of constructing one classroom in Oyo state is ₦3,440,579.70, and the cost of constructing the required number of classroom, that is, 4,518 classrooms is ₦15,544,539,084.60. Then, the mean cost of constructing one classroom in either of the six southwestern states in Nigeria in the year 2024 is ₦3,379,302.50, and the cost of constructing the required mean number of classrooms, that is, 5,220 classrooms is ₦17,639,959,050.00.

Conclusion

This paper employed a planning strategy from an educational perspective to determine the time and cost of constructing classrooms in Southwestern public primary schools in Nigeria from the year 2020 to 2024. In the context of the research, the government should be able to plan for the construction of the needed number of classrooms based on the time and cost estimate in this work. This research will help in achieving the efficiency of public primary school construction in Southwestern, Nigeria. The results of this research will enhance the achievement of cost and time efficiency in the construction of the required number of classrooms in Southwestern, Nigeria. It will also help the government to adequately plan and allocate resources efficiently for the implementation process of the construction of the classrooms.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. More classrooms should be built periodically in public primary schools in Southwestern Nigeria in order to achieve a maximum of 30 pupils per classroom at every point in time.
2. More teachers should be employed for the classrooms that will be constructed. For every classroom that will be constructed, there should be teachers that will handle the pupils in the class in order to achieve optimal utilization of the classrooms.
3. All other beneficiaries of education should collaborate with the government to fund the construction of classrooms, as posited by Gambo and Fasanmi (2019). According to them, apart from the government, parents/guardians, organizations in and outside the country, individuals/citizens in the country, etc., who are beneficiaries of education are supposed to be part of funding education. The construction of classrooms should, therefore, be a collective effort of all beneficiaries of education. Since it is not only the government that benefits from the education

of the citizens, the burden of funding and constructing classrooms can be borne by willing beneficiaries.
4. Pupils, teachers, and all education stakeholders should take responsibility for ensuring that the good and available classrooms are maintained very well.

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