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Assessment of the Condition of Public Secondary School Buildings and the Influence of Maintenance Policy

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ABSTRACT

This study evaluates the physical condition of public secondary school (PSS) facilities in Lagos State, Nigeria, and examines the impact of maintenance policies on facility quality. It aligns with Sustainable Development Goal (SDG) 4 (Quality Education), notably Target 4.a, promoting safe, inclusive, and effective learning environments. A mixed-method approach was adopted, combining quantitative data from structured questionnaires with qualitative observations of infrastructure. Correlation analysis and Partial Least Squares Structural Equation Modelling (PLS-SEM) were used to explore the relationship between maintenance policy implementation and facility condition. The study examines the cause-and-effect relationship between the implementation of maintenance policies (IMP) and the building condition (BC) of PSS in Lagos State, highlighting such challenges as deficit resource allocation and accurate data on building stock. The study provides objective recommendations for policymakers and school administrators in the formulation of need-based policies, thereby, contributing to the knowledge of education infrastructure management in the attainment of SDG 4.a.

1. INTRODUCTION

Several studies conducted on the physical conditions of public secondary schools (PSS) in developing countries and Nigeria in particular have concluded on the deplorable state of the schools emanating from such issues as inadequate infrastructure, lack of maintenance, and lack of adequate funds, amongst others [1-4]. The relevance of these issues is underscored by Sustainable Development Goal 4 (SDG 4) (Quality Education), which emphasizes safe and inclusive learning environments. The inadequacy of infrastructure and the lack of proper maintenance of the few existing facilities have led to subpar school facilities that are deteriorating in quality and cost without attention.

Despite extensive educational reforms and government investments in infrastructure, many PSS remain in poor conditions. The administrative structure of the existing PSS presupposes that maintenance of the infrastructural facilities is generally lacking due to insufficient funds earmarked for their maintenance [5-7]. A quality learning environment with quality school facilities is in short supply, mainly due to budgetary constraints [8]. Inappropriate policy formulation and uncommitted policies implementation have also been identified as responsible for the dilapidated state of the PSS building facilities [2, 9, 10]. The infrastructural facilities of public schools in Nigeria remain inadequate to cope with a system that is growing at a rapid pace, leaving the school environment inconducive to learning [11]. Moreover, the objective of granting the best maintenance practice for public schools has yet to be achieved due to long-term use and budgetary constraints [12]. Thus, the deterioration of PSS's facilities is caused by inadequate maintenance policies and poor response rate to maintenance requests, among other factors [13]. Nonetheless, a significant deficiency in empirical evaluations linking the actual condition of school facilities to the implementation of maintenance policies (IMP) in Lagos still subsists. This study fills the gap by assessing the physical building conditions (BC) of Lagos State's PSS and examining the impact of maintenance policies, thereby, highlighting the shortcomings in the policies, pointing out the extent of IMP and its challenges, and inadequacies of BC. The study's outcomes will guide policymakers in the need-based formulation, refinement, and enforcement of better outcomes. This will invariably ensure PSS remains functional at minimal cost of maintenance and invariably aid the attainment of SDG 4.a.

2. MAINTENANCE POLICY IN NIGERIA

For successful educational policy implementation in the school system of a country, facilities and infrastructural systems in the school are essential for positive learning outcomes [14]. The sustainability and functionality of

infrastructure across various sectors of Nigeria are heavily dependent on the formulation and effective IMP [11]. The current state of policy development in Nigeria has been plagued by several challenges along its path, as evidenced in the existing literature [15]. Aside from financial issues that have plagued maintenance culture in Nigeria, the lack of maintenance policies, political instability, and government awareness have also been identified as part of the challenges confronting effective maintenance. Ogunbayo et al. [10] and Aka et al. [14] identified a sound policy system as one of the factors that enhance maintenance management culture in developing countries around the world. Comprehensive assessment, robust maintenance plan, capacity building, technology-driven solution, and prioritizing maintenance with adequate funding have been identified as the way forward in tackling poor maintenance in Nigerian PSS [6]. This is supported by Adamu et al. [7], in pointing out the inadequacies in the teaching and learning process's physical facilities emanating from underfunding. Studies on hospital buildings and higher institutions of learning have also suffered a similar fate of inconsistent maintenance policy formulation and implementation [13, 14].

The encumbrances of the effects of deteriorated school facilities on the effective delivery of education have been suggested by various scholars [5]. Adamu et al. [7] assessed the maintenance of physical facilities in Bauchi State and reported poor and irregular maintenance practices, Opadeye [16] revealed ineffective infrastructural management in Oyo, Aka et al. [14] posited the deplorable state of physical facilities, while Uchenna and Egolum [17] revealed similar challenges in Anambra State, leading to grossly inadequate facilities for the effective teaching/learning process. These sectionalized studies inform the interpretation of maintenance practices and their effect on the attainment of SDG 4. The role of school administrators has also received scholarly attention. Enwezor [18] argued that the involvement of the administrator of schools in the maintenance of plant facilities will bring about effective maintenance of the plant through adequate inspection, supervision, and utilization of the plants. This study, focusing on Lagos State, further informs the extent of deterioration of infrastructures in PSS and identifies sustainable maintenance planning as an urgent priority.

Comprehensive analyses focusing on the identification of gaps in the implementation and coordination of maintenance policies in the education sector were also established by previous studies [19, 20]. On the critical factors affecting the development of a national maintenance policy in Nigeria, Ogunbayo et al. [9] indicated that political instability and administrative challenges had a significant impact on Nigeria's national maintenance policy development. Poor maintenance culture has been identified as a significant concern in the maintenance management of buildings in developing countries [10]. By examining the factors influencing maintenance expenditures at federal tertiary institutions and providing actual data that highlight the economic realities [21-23], added to the economic aspect of efficient maintenance management.

3. PUBLIC SECONDARY SCHOOL BUILDINGS

The majority of public schools in developing countries lack the necessary infrastructure and resources, resulting in graduates with poor standards [14]. The crisis in the educational system is evident in overcrowding, inadequate infrastructure, poor sanitation, inadequate budgetary funding, high rates of youth and out-of-school children, insecurity, and inadequate planning [7]. For instance, many schools in Sub-Saharan Africa are housed in sub-standard structures that fail to meet fundamental health and safety regulations [24]. Similar challenges are encountered in South Asian schools, where insufficient ventilation, lighting, and roofing negatively affect the learning environment [25]. According to UNESCO, there is a need for the effective implementation of standards set out by different countries on school buildings through the sharing of good practice between First World countries and developing countries [26].

The state of PSS buildings in Nigeria reflects many of the challenges encountered in developing countries. Despite attempts to enhance educational infrastructure, maintenance has been severely insufficient, and a large percentage of Nigeria's PSS exist in aging, deteriorating buildings that were constructed years ago [26]. It has further been established that adequate maintenance of PSS building facilities is lacking due mainly to inadequate funding, inappropriate policy formulation, and uncommitted policy implementation [2, 9, 10]. In order to alleviate infrastructure problems, the Nigerian government has also launched a number of programs, such as the Universal Basic Education (UBE) program; however, there are still significant obstacles.

Despite the crucial role played by the Lagos State government through several policies to address the inadequacies in building infrastructural facilities in the state's PSS, the problems of inadequacies in the infrastructure still exist. The state's PSS are overcrowded, with student-to-classroom ratios higher than recommended [27]. Over 40% of the state's PSS require major upgrades [2]. The majority of these schools have structural degradation, such as cracked walls, broken windows, and leaky roofs, which affect the learning environment [28]. There are other reports of poor educational facilities, such as unhygienic environments, a dearth of laboratories, inadequate libraries, and inadequate sports facilities [26]. Programs like the "School Infrastructure Upgrade Project," which focused on renovating and modernizing PSS buildings, have been carried out by the Lagos State government to forestall education infrastructural deficiencies. However, reports from Oguntolu et al. [2] show that the effectiveness of such schemes has been limited by complications of underfunding and poor upkeep following restoration. The fast urbanization of the state puts a great deal of burden on public services like education. As the population of the state increases, so does the demand for more educational facilities [29]. Additionally, schools and local government organizations typically lack a maintenance culture [10]. Sustainable school infrastructure requires a long-term commitment to maintenance [11].

The importance of maintenance policies in ensuring sustainable and effective infrastructure is acknowledged in the existing literature [6], but little attention has been given to how these policies are implemented at the school level. To examine the direct impact of maintenance policy implementation on BC, this study posits that administrative function, resource allocation, and policy prioritization are potential moderating variables.

4. METHODOLOGY

This study adopted a mixed-methods research design that

combined quantitative and qualitative techniques. By combining numerical data with firsthand observations, this approach allowed for systematic triangulation, which improved the validity and depth of conclusions. School administrators filled out generic questionnaires as part of the quantitative component, rating different aspects of the facilities on a five-point Likert scale from "Very Poor" to "Very Good." Providing quantifiable data on how stakeholders perceived the state of the building. The evaluation of physical and service elements, ranging from structural cracks, roofing, finishes, and utility services, necessitated the use of a qualitative approach of observation through site inspection with the use of a modified inspection checklist by Noy and Douglas [30]. This combined approach of data gathering, informed comparative analysis of subjective assessment, and objective observations. Thereby, correlating the relationship between the IMP and the physical BC of the school facilities.

The validity and reliability of the survey instrument were established with the use of a pilot study on five administrators who were not part of the main study. This necessitated a few modifications to the survey instrument. Questionnaires were administered to 168 public senior secondary school administrators in Lagos State. To achieve fair geographic representation and reduce selection bias, 12 schools were picked from each of the six educational districts using stratified random sampling. The five-point Likert scale (1-5) used to establish survey responses about the state of classrooms, laboratories, libraries, workshops, and outbuildings was split into intervals of 0.8 for interpretation of result in the following classification: Very Poor ($1.00 < X \leq 1.80$), Poor ($1.80 < X \leq 2.60$), Fair ($2.60 < X \leq 3.40$), Good ($3.40 < X \leq 4.20$), Very Good ($4.20 < X \leq 5.00$). The modified inspection checklist was applied through an observation data-gathering mechanism. Cronbach's alpha was calculated for each survey item, and the results showed good internal consistency ($\alpha > 0.78$). Composite reliability (CR), Average Variance Extracted (AVE), and indicator loadings were estimated using the Partial Least Squares Structural Equation Modelling (PLS-SEM) measurement model. Internal consistency and convergent validity were confirmed for each latent variable with $CR > 0.80$, $AVE > 0.50$, and indicator loadings ≥ 0.60. Consensus-based scoring, assessment exercises, and inter-rater agreement tests were carried out during the pilot study to ensure the accuracy of observational data.

Quantitative data from the questionnaires for both individual and composite facility scores were assessed using descriptive statistics. Spearman's rank correlation was used to investigate the relationship between IMP and perceived BC. PLS-SEM also evaluated the direct effect of maintenance method on overall BC using path coefficients, t-statistics, and p-values to establish significance. Summarized observational data were used to find consistent trends of physical decline across districts. In order to investigate similarities and differences between reported and real BC, a comparison study was carried out by contrasting administrator perceptions with observed circumstances.

5. FINDINGS

According to the profile of Lagos State's PSS administrators, 60.1% are female, and 79.8% are aged 55 or older. Principals made up the largest response category (57.1%), and the majority had Bachelor's degrees (70.8%), which is the typical prerequisite for administrative positions. Interestingly, 28% have been in their current positions for more than 15 years. Furthermore, 85.1% of the schools they oversaw were older than 15, which further supports the applicability of their viewpoints on facility upkeep. The majority of maintenance administrators (58.5%) were male, which is consistent with the demographics of the industry. A significant percentage (32.1%) were between the ages of 45 and 54, and the highest credentials were Bachelor's degrees and Higher National Diplomas (both 32.1%). However, they came from a variety of professional backgrounds in the construction industry. The majority had extensive experience, with 30.2% having worked for organizations including SCRPS, LASIAMA, and the Ministry of Education (Project Unit) for more than 15 years.

5.1 Implementation of maintenance policies

Table 1 presents descriptive statistics on the IMP in PSS in Lagos State. The data were analyzed on a 5-point Likert scale of "Never implemented" to "Fully implemented." Mean implementation ratings and standard deviations (SD) show how widely and consistently policies are applied. All IMPs are only partially implemented (PI), as indicated by the mean ratings, which varied from 2.88 to 3.46. None met the requirements for complete execution, indicating a lack of compliance with defined maintenance protocols. Identifying facility needs is the policy with the highest mean score, suggesting more focus in this area. Two measures, maintenance of comprehensive records and the provision of grants for minor repairs of infrastructural works, were comparatively well-executed.

Table 1. Maintenance policies implementation

Government Maintenance Policy	MIS	SD	Ranking	Remark
Identify the needs of facilities in schools	3.46	1.247	1	PI
Budgetary provision of grants to public schools for minor infrastructure repairs	3.45	1.339	2	PI
Maintain comprehensive records of schools' plants, equipment, and teaching facilities	3.42	1.253	3	PI
Render periodic reports on project programs in secondary schools	3.41	1.268	4	PI
Provide and maintain infrastructure in schools	3.4	1.165	5	PI
Execute maintenance/renovation works for public secondary schools (PSS)	3.29	1.248	6	PI
Initiation of maintenance/renovation requests by the school administration	3.28	1.233	7	PI
Map out strategies for equitable provision and utilization of facilities	3.21	1.219	8	PI
An appropriate mechanism is in place for assessing intervention funds for developing infrastructure	3.11	1.295	9	PI
Adequate provision of facilities for Science and Technology in schools	3.06	1.222	10	PI
Maintenance requests from other sources (media)	2.88	1.266	11	PI
Composite Score/Grand Mean	**3.27**	**1.25**	**-**	**PI**

Note: MIS = Mean Item Score, SD = Standard Deviation, PI = Partially Implemented

The maintenance of science, technology facilities, and the management of external maintenance requests policies measured the lowest scores; these areas suggest no prioritization. Lower values of SD (1.165–1.339) indicate moderate variability, implying uniformity in implementation. Infrastructure funding, needs assessment, and record-keeping are the most often applied policies based on the ranking. Incorporating outside feedback from sources like government agencies or the media is PI. The overall mean score of 3.27 implies partial IMP generally. Though maintenance models exist, the implementation is still inconsistent. The study highlighted the call for effective implementation, improved resource allocation, and uniformity in the blueprint of maintenance policies across all PSS within the state and the country at large.

5.2 Building condition

The current state of facilities in Lagos State PSS is reflected in the BC assessment. Respondents employed a Likert rating system of "Very Poor, Poor, Fair, Good, and Very Good" to evaluate the state of the specified facilities within their schools. The BC were examined across five latent variables: classrooms, workshops, libraries, laboratories, and outbuildings. The results are shown in Table 2. All of these latent variables and their observable components were reported as "Fair" by school administrators. Classrooms, workshops, libraries, and laboratories have latent variables with mean values of 3.04, 2.85, 2.06, and 2.65, respectively. According to the updated interpretation scale, these results are classified as "Fair" (> 2.60 to ≤3.40). This suggests that the current state of facilities such as fences, parking areas, and toilets (which encompass wall partitions, skirting, wall finishes, columns and beams, floor finishes, etc.), is generally moderate, although not in Good or Very Good condition. Additionally, the school administrators perceived that the regular maintenance, cleaning, and repairs of classroom facilities were sufficient. The SD values of 1.148, 1.163, 1.123, 1.084, and 1.105 for the conditions of classrooms, workshops, libraries, laboratories, and outbuildings indicate a spread or variability in the responses regarding the BC. Since the SD are relatively close to 1, it suggests moderate variability in the responses.

5.3 Observation of the building conditions

The BC assessment was conducted using a checklist designed by Noy and Douglas [30]. The findings from the observation are presented in Table 3. The analysis of the results supports the perception of the school administrators, indicating that the conditions of the BC are neither in “good” nor in “very good” condition. Rather, the facilities are in a state that is just barely sufficient to perform their design function [30-33]. Common issues observed include missing ceiling boards, faulty sanitary wares, inadequate supply of water and power, missing roof coverings, pipe leakages, erosion-damaged landscapes, and parking lots. Additionally, a majority of the schools lack functional workshops, libraries, and laboratories. It was also noted that some of the schools observed had no adequate supply of water. Wall, floor, and ceiling finishes are in a poor state, with some walls and ceilings displaying significant cracks. The severity of damage to the structural elements of certain buildings is so extensive that some have been abandoned, posing a health and safety risk to the users of the school premises. Figure 1 illustrates the state of various damages and deteriorations observed in some of the schools.

Table 2. Condition of building elements

Element	Very Poor	Poor	Fair	Good	Very Good	Total	Mean	SD	Rank	Remarks
Classroom (Composite Score)	**15**	**32**	**42**	**30**	**20**	**138**	**3.04**	**1.148**		**FAIR**
Classrooms [Wall Partitions]	9	25	42	40	30	146	3.39	1.171	1	Fair
Classrooms [Steps/Staircase]	13	33	40	36	22	144	3.15	1.200	2	Fair
Classrooms [Staircases, Handrailing, etc.]	15	29	42	31	18	135	3.06	1.196	3	Fair
Classrooms [Balconies]	18	33	47	29	22	149	3.03	1.224	4	Fair
Classrooms [Columns and Beams]	14	33	51	33	16	147	3.03	1.128	4	Fair
Classrooms [Roof Coverings]	20	38	50	30	21	159	2.96	1.211	6	Fair
Classrooms [Wall Finishes (Painting, Wall Tiles)]	16	34	55	25	17	147	2.95	1.143	7	Fair
Classrooms [Lintels and Arches]	18	37	45	31	13	144	2.89	1.153	8	Fair
Classrooms [Skirting (Tiles at The Foot of The Wall)]	18	22	46	18	13	117	2.88	1.183	9	Fair
Classrooms [Floor Finishes (Floor Tiles, Paved Floors)]	21	35	52	24	14	146	2.83	1.159	10	Fair
Classrooms [Ceilings]	27	38	50	29	18	162	2.83	1.227	10	Fair
Classrooms [Rendered/Plastered or Rough Cast Surfaces Outside]	18	43	40	30	12	143	2.83	1.153	10	Fair
Classrooms [External Wall Paint]	30	36	41	29	17	153	2.78	1.272	13	Fair
Classrooms [External Walls]	27	34	44	27	14	146	2.77	1.225	14	Fair
Classrooms [Fire Escape Stairs and Ladders]	15	37	43	21	8	124	2.76	1.077	15	Fair
Classrooms [Doors and Frames]	31	38	49	28	16	162	2.75	1.231	16	Fair
Classrooms [Eaves.]	20	38	50	30	21	159	2.75	1.063	16	Fair
Classrooms [Windows and Glazing Including Fittings]	26	52	39	30	12	159	2.69	1.175	18	Fair
Classrooms [External Decorative Condition]	20	39	41	20	9	129	2.68	1.125	19	Fair

Classrooms [Parapet Walls on Roof]	27	30	38	18	8	121	2.59	1.181	20	Poor
Classrooms [Roof Gutters and Rainwater Pipes]	31	36	34	20	11	132	2.58	1.236	21	Poor
Classrooms [Ironmongery (Keys, Locks)]	35	46	38	26	12	157	2.58	1.220	21	Poor
Classrooms [Electrical Installation (Lighting, Socket Outlets)]	40	39	41	29	9	158	2.54	1.213	23	Poor
WORKSHOPS (Composite Score)	**16**	**27**	**30**	**16**	**8**	**97**	**2.73**	**1.163**		**FAIR**
Workshops [Steps/Staircase]	9	23	37	17	9	95	2.94	1.090	1	Fair
Workshops [Balconies]	10	25	35	18	8	96	2.89	1.094	2	Fair
Workshops [Wall Finishes (Painting, Wall Tiles)]	14	27	33	18	10	102	2.83	1.170	3	Fair
Workshops [Skirting (Tiles at The Foot Of The Wall)]	12	25	22	14	10	83	2.82	1.231	4	Fair
Workshops [Wall Partitions]	14	21	32	14	9	90	2.81	1.179	5	Fair
Workshops [Columns and Beams]	14	27	31	14	11	97	2.80	1.196	6	Fair
Workshops [Roof Coverings]	15	29	34	22	7	107	2.79	1.125	7	Fair
Workshops [Fire Escape Stairs and Ladders]	10	28	26	13	7	84	2.75	1.118	8	Fair
Workshops [External Walls]	11	35	31	13	9	99	2.74	1.112	9	Fair
Workshops [Staircases, Handrailing, etc.]	17	22	31	19	6	95	2.74	1.160	9	Fair
Workshops [Roof Gutters and Rainwater Pipes]	14	27	25	16	8	90	2.74	1.186	9	Fair
Workshops [Rendered/Plastered or Rough Cast Surfaces Outside]	14	28	29	14	8	93	2.72	1.155	12	Fair
Workshops [Eaves]	18	23	27	20	6	94	2.71	1.188	13	Fair
Workshops [External Wall Paint]	17	27	35	17	7	103	2.71	1.134	13	Fair
Workshops [Electrical Installation (Lighting, Socket Outlets)]	20	28	32	17	9	106	2.69	1.198	15	Fair
Workshops [Lintels and Arches]	17	27	30	15	8	97	2.69	1.176	15	Fair
Workshops [Floor Finishes (Floor Tiles, Paved Floors)]	18	27	31	17	7	100	2.68	1.162	17	Fair
Workshops [Ceilings]	18	33	32	16	9	108	2.68	1.167	17	Fair
Workshops [External Decorative Condition.]	15	26	30	10	8	89	2.66	1.157	19	Fair
Workshops [Parapet Walls on Roof]	17	24	23	15	7	86	2.66	1.214	19	Fair
Workshops [Ironmongery (Keys, Locks)]	20	29	31	16	7	103	2.62	1.164	21	Fair
Workshops [Doors and Frames]	24	33	32	14	10	113	2.58	1.208	22	Poor
Workshops [Windows and Glazing Including Fittings.]	23	31	28	21	5	108	2.57	1.162	23	Poor
LIBRARY (Composite Score)	**15**	**29**	**39**	**22**	**9**	**113**	**2.85**	**1.123**		**FAIR**
Library [Steps/Staircase]	12	23	34	23	11	103	2.98	1.163	1	Fair
Library [Balconies]	10	29	35	25	9	108	2.94	1.101	2	Fair
Library [Wall Partitions]	14	21	38	20	11	104	2.93	1.168	3	Fair
Library [Staircases, Handrailing, etc.]	11	26	36	19	11	103	2.93	1.140	3	Fair
Library [Eaves]	11	25	32	23	8	99	2.92	1.122	5	Fair
Library [Fire Escape Stairs and Ladders.]	11	22	34	20	8	95	2.92	1.117	5	Fair
Library [Wall Finishes (Painting, Wall Tiles)]	9	35	49	23	9	125	2.90	1.019	7	Fair
Library [Parapet Walls on Roof]	9	23	30	19	6	87	2.89	1.083	8	Fair
Library [Roof Coverings]	15	29	39	24	10	117	2.87	1.141	9	Fair
Library [Skirting (Tiles at The Foot of The Wall)]	13	28	41	20	9	111	2.86	1.102	10	Fair
Library [Columns and Beams]	17	29	39	25	10	120	2.85	1.157	11	Fair
Library [Floor Finishes (Floor Tiles, Paved Floors)]	13	36	44	21	10	124	2.83	1.087	12	Fair
Library [Roof Gutters and Rainwater Pipes]	13	25	35	20	7	100	2.83	1.111	12	Fair
Library [External Decorative Condition]	13	25	35	19	7	99	2.82	1.110	14	Fair
Library [Ceilings]	21	27	48	23	11	130	2.82	1.160	14	Fair
Library [Electrical Installation (Lighting, Socket Outlets)]	17	35	43	23	11	129	2.81	1.137	16	Fair
Library [Lintels and Arches]	16	28	36	23	8	111	2.81	1.140	16	Fair
Library [Doors and Frames]	17	36	47	24	9	133	2.79	1.094	18	Fair

Library [Ironmongery (Keys, Locks)]	18	31	47	22	9	127	2.79	1.110	18	Fair
Library [Rendered/Plastered or Rough Cast Surfaces Outside]	16	30	35	23	7	111	2.77	1.126	20	Fair
Library [Windows and Glazing Including Fittings.]	20	34	41	22	10	127	2.75	1.154	21	Fair
Library [External Wall Paint]	21	32	37	21	10	121	2.73	1.183	22	Fair
Library [External Walls]	18	29	38	21	6	112	2.71	1.110	23	Fair
LABORATORIES (Composite Score)	**19**	**34**	**40**	**19**	**6**	**118**	**2.66**	**1.084**		**FAIR**
Laboratories [Steps/Staircase.]	15	21	42	21	7	106	2.85	1.102	1	Fair
Laboratories [Staircases, Handrailing, etc.]	10	31	42	18	6	107	2.80	1.013	2	Fair
Laboratories [Ceilings]	20	34	41	28	10	133	2.80	1.158	2	Fair
Laboratories [Doors and Frames]	14	42	48	20	11	135	2.79	1.080	4	Fair
Laboratories [Balconies]	14	32	39	21	6	112	2.76	1.068	5	Fair
Laboratories [Water Supply System (Borehole, Public Water Supply)]	20	35	39	26	8	128	2.74	1.138	6	Fair
Laboratories [Wall Partitions]	17	27	48	19	6	117	2.74	1.060	6	Fair
Laboratories [Wall Finishes (Painting, Wall Tiles)]	19	32	50	23	6	130	2.73	1.062	8	Fair
Laboratories [Columns and Beams]	18	34	41	24	5	122	2.70	1.073	9	Fair
Laboratories [Ironmongery (Keys, Locks)]	20	36	48	22	7	133	2.70	1.080	9	Fair
Laboratories [Skirting (Tiles at The Foot of The Wall)]	17	28	44	21	3	113	2.69	1.027	11	Fair
Laboratories [Windows and Glazing Including Fittings]	20	39	46	20	8	133	2.68	1.091	12	Fair
Laboratories [Roof Coverings]	20	37	41	22	7	127	2.68	1.105	12	Fair
Laboratories [Roof Gutters and Rainwater Pipes]	15	32	35	19	4	105	2.67	1.053	14	Fair
Laboratories [Parapet Walls Roof]	14	29	36	17	3	99	2.66	1.022	15	Fair
Laboratories [External Walls]	18	32	42	17	6	115	2.66	1.075	15	Fair
Laboratories [External Wall Paint]	20	32	38	22	5	117	2.66	1.100	15	Fair
Laboratories [Floor Finishes (Floor Tiles, Paved Floors)]	18	40	40	20	7	125	2.66	1.085	15	Fair
Laboratories [External Decorative Condition]	14	35	33	15	5	102	2.63	1.052	19	Fair
Laboratories [Fire Escape Stairs and Ladders]	16	30	36	10	7	99	2.62	1.095	20	Fair
Laboratories [Eaves]	19	31	37	19	3	109	2.60	1.055	21	Poor
Laboratories [Electrical Installation (Lighting, Socket Outlets)]	22	42	42	20	6	132	2.59	1.077	22	Poor
Laboratories [Rendered or Rough Cast Surfaces Outside]	21	30	38	15	5	109	2.57	1.092	23	Poor
Laboratories [Burglar Alarm System]	14	38	31	9	7	99	2.57	1.071	23	Poor
Laboratories [Cold Water Supply Pipes Including Provision and Location of Stop Valves/Taps]	25	31	31	18	7	112	2.56	1.184	25	Poor
Laboratories [Fire Appliances and Alarm System (Extinguisher, etc.)]	22	42	35	18	6	123	2.54	1.096	26	Poor
Laboratories [Electrical Installation in The Laboratory (Lighting, Socket Outlets)]	26	41	34	15	9	125	2.52	1.161	27	Poor
Laboratories [Sanitary Fittings: Lavatory Basins, Wash Hand Basins, WCs, Urinals, Sinks, And Bidets]	27	36	37	19	5	124	2.51	1.115	28	Poor
Laboratories [Waste Pipes and Traps]	24	38	34	17	5	118	2.5	1.100	29	Poor
Laboratories [Mechanical Ventilation Systems (Fans, A.C.)]	20	44	40	12	5	121	2.49	1.017	30	Poor
Outbuildings (Composite Score)	**25**	**37**	**46**	**24**	**7**	**140**	**2.65**	**1.105**		**FAIR**
Out Buildings [Parking Area]	17	30	58	28	9	142	2.87	1.064	1	Fair
Out Buildings [Boundary Fences, Walls and Gates.]	22	32	49	31	12	146	2.86	1.163	2	Fair
Out Buildings [Natural Features (Trees, Shrubs, Flowers, etc.)]	17	37	52	33	8	147	2.85	1.069	3	Fair
Out Buildings [School Frontage.]	19	36	52	32	9	148	2.84	1.095	4	Fair
Out Buildings [Floors of Toilets]	21	34	56	28	11	150	2.83	1.116	5	Fair

Out Buildings [Sanitary Systems in The Toilets (W.C, Wash Hand Basin, etc.)]	23	38	48	32	11	152	2.80	1.151	6	Fair
Out Buildings [Outbuildings – Garages, Security House, Sheds, Food Canteen]	22	34	52	27	8	143	2.76	1.102	7	Fair
Out Buildings [Walls of Toilets]	23	39	52	28	9	151	2.74	1.11	8	Fair
Out Buildings [Landscaping]	23	36	57	22	9	147	2.71	1.092	9	Fair
Out Buildings [Vent Pipes in Toilets]	23	40	49	26	6	144	2.67	1.077	10	Fair
Out Buildings [Power Supply System]	28	36	49	20	11	144	2.65	1.167	11	Fair
Out Buildings [Student Chairs and Tables]	24	46	45	25	8	148	2.64	1.107	12	Fair
Out Buildings [Paved Areas and Ramps]	24	39	44	27	4	138	2.62	1.075	13	Fair
Out Buildings [Refuse Disposal]	29	42	43	19	12	145	2.61	1.186	14	Poor
Out Buildings [Soil Drains (Disposal – Sewer/Septic Tank and Soak Away Pits or Cesspool, etc.)]	26	37	47	22	4	136	2.57	1.066	15	Poor
Out Buildings [Soil and Vent Pipes – Waste Pipes (Externally)]	25	40	40	23	4	132	2.55	1.079	16	Poor
Out Buildings [Staff Chairs and Tables]	30	43	50	22	5	150	2.53	1.073	17	Poor
Out Buildings [Cabinets, Boards, Shelves, etc.]	31	47	38	27	4	147	2.50	1.1	18	Poor
Out Buildings [Workshop/Laboratory Chairs, Tables, and Stools]	34	41	40	22	4	141	2.44	1.104	19	Poor
Out Buildings [Drainage System Including Positions of Inspection Chambers and Gulleys]	28	40	37	15	5	125	2.43	1.088	20	Poor
Out Buildings [Surface Water Disposal (Gutter)]	30	33	40	17	3	123	2.43	1.079	20	Poor
Out Buildings [CCTV Camera]	23	16	22	7	3	71	2.31	1.154	21	Poor

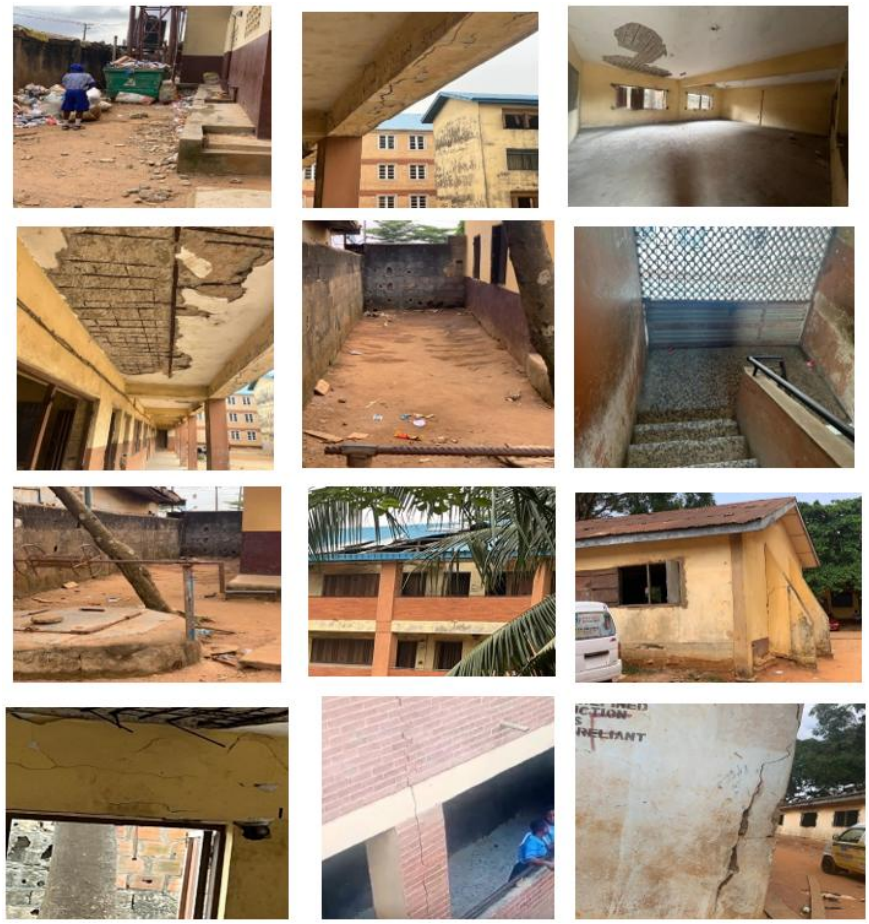

Figure 1. Extent of deterioration

Table 3. Building conditions (BC) observation

Location	Element	Description	Remark
District 1	Beams	Cracks on beams	
		Exposed soffit of the ceiling	
	Ceiling	Deteriorated ceiling finishes	
	Wall	Cracks on the walls	
		Deteriorated wall finishes	
	Services	Inadequate water supply system	No fire alarm systems
		Overstretched toilet	Dilapidated and abandoned classroom block
		Faulty sanitary wares	
		Damaged mechanical ventilation systems	Overcrowded classroom
	Roof	Missing roofing sheets	Inadequate laboratories
	Floor	Uneven flooring due to use	Lack of workshop
	External	Exposed foundation due to erosion	
	Furniture and fittings	Damaged furniture	
	Other facilities	Waste disposal is in total disarray	
		Unclean/littered environment	
		Unpacked/exposed refuse disposal	
District 2	Ceiling	Missing ceiling boards	
	Wall	Cracks on the walls	
		Deteriorated wall finishes	
		Paint defects on the walls	
		Biological growth	
	Services	No power supplies	No security house No CCTV
		Over-stressed toilet facilities	
		Leaking pipes	
	Roof	Leakage of the roof affecting the ceiling	
	Floor	Missing floor tiles	
	Furniture and fittings	Broken students and teachers furniture	
District 3	Ceiling	Cracks on the ceiling	
		Deteriorated paint finishes	
	Wall	Dilapidated wall finishes	
	Staircase	Collapsed landing wall	
	Services	No power supplies	No workshops and library Lack of power
		Damaged mechanical ventilation systems	
		Inadequate water supply	No provision of a solar system
		Broken pipes and sanitary systems	
	External	No perimeter fence	
	Furniture and fittings	Inadequate furniture in the classrooms and laboratories	
	Other facilities	Unkempt refuse disposal system	
District 4	Beams	Cracks on beams	
	Ceiling	Cracks and Exposed reinforcement bars on the ceiling	
	Wall	Crack on the walls	
		Deteriorated wall finishes	Abandoned classroom blocks due to the severity of structural damage
		Dampness on wall surfaces	
	Staircase	Broken/missing walls on the landing of the staircase	
		No fire appliances or/and alarm system	Inadequate furniture
	Services	Missing socket outlets	No laboratory, workshop and library
		Toilets are in bad shape	
		Leaking waste pipes causing biological growth on the surface of the walls	No security house
	Roof	Missing roof coverings	
	Ceiling	Missing ceiling boards	
		Deteriorated ceiling finishes	
	Wall	Deteriorated painting on the wall finishes	
		Biological growth on wall surfaces	
District 5	Services	Lack of power supply	
		Inadequate water supply	No provision for a mechanical ventilation system
		Missing taps in toilets	
		Faulty sanitary wares	
		No provision for wash hand basins	No wash hand basins
	Roof	Missing roof covering	
	Floor	Uneven flooring	
	External	Unpaved surroundings	
	Furniture/fittings	Inadequate/damaged furniture	
District 6	Ceiling	Deteriorated paint conditions	Inadequate laboratories and ICT rooms
	Wall	Cracks on the walls	
		Deteriorated wall finishes	Lack of natural features like trees and shrubs
		Cracks in plaster	

Services	No power supplies Inadequate toilet facilities No provision for surface water disposal Shortage of water supply system	The parking area is unpaved No provision of glazing for windows
Roof	Leaking roof Missing ceiling boards	
Floor	Missing skirting Deteriorated floor finishes	
External	Exposed foundation due to erosion Quadrangle damaged by erosion Eroded landscaping	
Furniture and fittings	Damaged furniture for both students and teachers	

Table 4. Spearman's correlation of maintenance policy and facility conditions

Variables Correlated	MS	SD	R-Value	P-Value	Significance	Decision
IMP × BC Classroom	2.75	0.999	0.521**	0.001	Significant	Reject H_0
IMP × BC Workshop	2.56	1.1	0.423**	0.001	Significant	Reject H_0
IMP × BC Library	2.73	1.077	0.379**	0.001	Significant	Reject H_0
IMP × BC Laboratory	2.56	0.977	0.467**	0.001	Significant	Reject H_0
IMP × BC Outbuildings	2.6	0.913	0.478**	0.001	Significant	Reject H_0

5.4 Spearman's correlation of maintenance policy and facility conditions

Table 4 presents the results of Spearman's rank correlation analysis between the IMP and the physical BC of facilities in public senior secondary schools in Lagos State. All facility categories, including classrooms, workshops, libraries, laboratories, and outbuildings, show statistically significant positive correlations with IMP, having coefficients (r) ranging from 0.379 to 0.521 and p-values of 0.001. These results corroborate the rejection of the null hypothesis by confirming the association's significance at the 0.05 threshold. The strongest connection (r = 0.521) has been seen in classrooms, suggesting a substantial relationship between improved classroom BC and successful IMP. Notable positive associations were also found for outbuildings (r = 0.478) and laboratories (r = 0.467), indicating that systematic maintenance affects the state of supporting infrastructure. Libraries had the poorest link (r = 0.379), suggesting comparatively less influence or lower policy prioritizing in this area.

All categories of the physical BC fell into the "Fair" category on the five-point Likert scale (1 = Very Poor to 5 = Very Good), with mean values ranging from 2.56 to 2.75. The SD revealed a substantial degree of variation in condition evaluations amongst schools, ranging from 0.913 to 1.100. These findings highlight how crucial it is to apply policies consistently in order to raise the standard of infrastructure. The strong correlations confirm that improved physical BC is a result of well-enforced maintenance strategies. The need for more equitable resource allocation and attention across all facility types is indicated by the weaker correlations in areas like libraries and workshops. The results show that in order to guarantee sustainable school infrastructure and improved learning environments, maintenance planning must be incorporated into a larger educational policy and budgetary framework.

5.5 Model analysis on the implementation of maintenance policy and building condition

The results of the PLS-SEM on the hypothesized relationship between the IMP and BC indicate that all the variables of BC significantly correlate with IMP (Table 5). The reliability and validity of the model exceed the 0.70 threshold for CR and AVE value of 0.50, with indicator loadings greater than 0.60.

Table 5. Model analysis on maintenance policy and building

Path	Path Coeff. (β)	T-Stat.	P-Value	Significance	Remark
IMP → BC (H_0)	0.493	7.624	0	Significant	Moderate-to-strong positive influence

A statistically significant and positive effect ($\beta = 0.493$, $p < 0.001$) with r-value IMP→BC for classroom, workshop, library, laboratory, and outbuilding as 0.521, 0.423, 0.379, 0.467, and 0.478, respectively, was found when the structural model analysis examined the hypothesized path from IMP to BC. The p-value (< 0.001) for the test of the relationship is significant and less than the critical p-value of 0.05; hence, the null hypothesis is rejected. The implication is that the higher the IMP, the better the BC in PSS. These results highlight the significance of improved policy frameworks and implementation commitment across school districts and indicate that the IMP is causally predictive of improved BC.

6. DISCUSSION OF THE FINDINGS

The study assessed the conditions of PSS building facilities and the IMP of the schools in Lagos State to gain an insight into the relationship between the two constructs. From the analysis of the result, the BC of all the various elements of the building facilities in Lagos State senior secondary schools were perceived as fair by the school administrators (Table 1). The findings point out that the exhibition of various traits of maintenance needs due to usage is necessary to forestall future deterioration if not prioritized. On the contrary, the result of the observation (Table 2) shows that quite a number of the elements in the school building facilities are in a deplorable state, needing urgent maintenance to fulfill their design functions. Some building facilities in the schools visited have been abandoned because of the bad state of their structural

elements, radiating an impending doom in the near future if not immediately addressed. The discrepancies between subjective perception and observable facts replicate the general trend in existing literature on the nature of dilapidation of public buildings. In order to identify distinct effects of IMP, this study breaks down facility categories (classrooms, laboratories, libraries, workshops, and outbuildings), an approach that was mainly lacking in earlier studies. Subjective-based data (perception), frequently used in previous studies [6, 7, 21, 22], largely document the condition of public school facilities and general maintenance practices. Additionally, efforts to project a more acceptable image may influence stakeholders' propensity to evaluate conditions more positively [10, 31], reflecting sociocultural processes that impact infrastructure perception. On the contrary, this study assesses the relationship between BC and IMP by combining systematic field observations with statistical analysis, such as PLS-SEM and Spearman's correlation. This reflects significant differences when subjective and objective evaluations are compared, as administrators may be less aware of structural and service flaws due to a lack of technical expertise and budget limitations [32].

IMP is partially carried out across all six districts of PSS in Lagos State (Table 3). Policies relating to the identification of the need and allocation of funds for minor repair works are PI, implying a baseline understanding of necessary maintenance. The dysfunction between maintenance policy formulation and execution has been attributed to budgetary limitations, bureaucratic tardiness, and the lack of maintenance culture [6, 7, 32]. Additionally, resource allocation and institutional capabilities have been identified as challenges to IMP [21-23]. However, a distorted prioritization and a disjointed maintenance management system are suggested by the significantly worse IMP pertaining to specialist infrastructure, especially for Science and Technology facilities, and external maintenance requests. The fundamental component of infrastructure quality is demonstrated in the statistically significant and positive correlation between the IMP and BC of the different categories of building facilities (Table 4), which stresses the need for systematic and proactive maintenance. This is supported by the assertions of previous studies [5, 6, 28] on the preventative importance of systematic maintenance. The PLS-SEM analysis (Table 5) provides quantitative confirmation of the crucial significance of execution quality in infrastructure management by demonstrating a substantial causal link between BC and effective IMP. This analytical finding directly addresses persistent recommendations in the literature for proactive maintenance culture development and strategic, data-driven frameworks [6, 31]. The observed moderate to strong influence indicates that even minor improvements in the IMP could result in significant improvements to the physical school environment. In order to provide favorable learning environments that are in line with more general objectives for educational quality, educational authorities have a strong obligation to promote both the design and the full IMP [2, 5].

7. IMPLICATIONS FOR THEORY AND PRACTICE

Previous studies have highlighted the inadequacies in the availability and maintenance of public institutions' infrastructure, which have been pointed out to affect teaching and learning negatively [10, 13, 14, 17]. The majority of studies have also pointed out the lack of adequate budget for the education sector, poor planning and administration for these inadequacies, but have frequently lacked empirical evaluations that explicitly connect IMP to infrastructure issues. This study, however, establishes a causal and correlational relationship between the physical state of school buildings and the execution of maintenance policies using both PLS-SEM and Spearman's correlation. The study provides a solid empirical foundation by combining perception-based data with systematic observations, in contrast to other research that mostly relied on perception-based evidence [2, 7, 13, 22]. Furthermore, the effects of IMP on BC of the various classifications of PSS facilities based on use have been added to the literature. With this, inadequacies in IMP in specific fields like laboratories and libraries were identified, hence calling for a more integrated and fair approach to maintenance planning. This paper makes significant theoretical advances in the knowledge of managing educational facilities and maintaining public infrastructure in developing nations. Also, by highlighting the mediating and moderating roles of administrative ability, resource allocation, and policy precedence at the school level—areas typically overlooked in previous studies [5, 23], this study advances the theory of policy implementation.

The findings have practical implications for administrators, policymakers, and infrastructure developers. This can be achieved by supporting the government in evidence-based policies that ensure efficient resource allocation, monitoring, and feedback. Also, the school administrators will be better informed about the criticality of the conditions of basic facilities, which may hamper the smooth running of the schools' objectives. These measures are important for fostering a safer, more conducive learning environment and for uniform and accountable information management for maintenance purposes.

8. LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

The limitation of this study stems from its focus on Lagos State PSS. To provide a more comprehensive understanding of maintenance difficulties nationwide, future research should be expanded to encompass multiple regions. Further studies are also encouraged on the long-term trends in the condition of building facilities and the implementation of changes in maintenance policies. Furthermore, the study focused primarily on the physical conditions of the building facilities, while their direct impact on academic results was not examined. Further studies might consider the broader impacts of infrastructure on educational quality, including variables like student performance and teachers' satisfaction. Lastly, to provide a more comprehensive knowledge of maintenance outcomes and policy efficacy, future research should investigate moderating and mediating factors such as budget availability, leadership qualities, and resource allocation.

9. CONCLUSION

This study has provided critical insights into the BC of PSS infrastructure and the IMP in Lagos State, Nigeria. It highlights significant gaps between the perceived and actual BC of school facilities, underlining the pervasive issue of

inadequate maintenance that hinders the educational environment. The study underscores the importance of effective IMP and the need for a more proactive approach to maintenance management. The findings confirm that IMP has a direct and positive impact on the BC of schools, which in turn influences the quality of education provided. The study also concludes on resource allocation and data management as challenges of IMP. This research emphasizes the crucial role of both policy and practice in shaping the condition of school infrastructure. It offers recommendations for policymakers, school administrators, and other stakeholders to focus on holistic and sustainable maintenance strategies, aiming to enhance the learning environment and ensure the sustainability of PSS facilities in Nigeria.

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