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HERITAGE BUILDINGS CONSERVATION AND ENVIRONMENTAL SUSTAINABILITY: A CORRELATION ANALYSIS FOR SUSTAINABLE DEVELOPMENT IN NIGERIA

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Abstract: The study evaluated twenty conservation principles and sixteen environmental sustainability concerns, with a view to advancing the knowledge of heritage building conservation and integration of environmental concerns for sustainable development in Nigeria. The objectives are to; evaluate the level of use of the principles, integration of environmental concerns and the relationship between the use of the principles and the concerns. This study adopted the exploratory survey design approach using structured questionnaires purposively administered on 145 stakeholders resulting in 138 valid responses. Data were analysed using descriptive, severity index, Kruskal-Wallis and Correlation analysis. The study concluded that conservation policies/principles have not been optimally utilized for heritage buildings conservation. It was also concluded that about 62% of the environmental concerns attained significant integration level, with 38% below the cut off value of 0.6. The study also concluded that stakeholders' views vary concerning the usage of the conservation principles, but have a common opinion about the integration of environmental concerns. The current level of use of majority of the conservation principles do not significantly influence the integration of environmental concerns, as only very few concerns correlated with usage of conservation principles. It is recommended that stakeholders should improve the current use of conservation policies/principles, establishing a balanced approach between the heritage conservation principles and sustainability concerns, with emphasis on principles which could have more influence on the integration of environmental concerns. Heritage building conservation should be a continuous and dynamic process involving proper planning and development for enhanced community livelihood/benefits.

Keywords: *Conservation, correlation, environmental sustainability, heritage buildings, stakeholders.*

1.0 Introduction

Buildings apart from serving as supports in people's lives, are imbued with meaning and resonance, as they signify people's personal histories, interpersonal relationships, and

shared events in people's extended relationships, families, communities and wider culture (Ashworth, 2001). According to Law (2000), heritage buildings are real manifestations of town's identity, a physical expression of the cultural heritage of the people and provide a link to the history and culture of a nation and suitable background, or home, for the cultural life of a town. A well conserved and maintained heritage building enhances the quality of life for everyone in the community, helps to attract investment to the community (tourism product), contribute to revitalization and provide a source of local pride and sense of place (Forsyth, 2007). The preservation of the essential features of the building's history and cultural heritage, are made possible by identifying the best means of suitable protection from decay and destruction. Sodangi *et al.* (2013) opined that the conservation of heritage buildings reduces energy usage associated with demolition, waste disposal and new construction, as well as promotes sustainable development by conserving the embodied energy in the existing buildings. Elnokaly and Elseragy (2013) similarly, stated that with the increasing debate and concern over global warming and climate change, environmentalists, economists, architects and urban designers, and even politicians worldwide are now advocating for conservation as a process of sustainable development in historic cities. Karakul (2011) also observed that historical environments as intricate living entities which are in a state of incessant change need to be conserved throughout their life process.

Idrus *et al.* (2010) opined that the characteristics of a people and nation are largely defined by their heritage which is often passed from one generation to another. Therefore, through conservation of historic buildings we can pass on to future generations what is today identified as cultural values of monumental buildings. The term heritage building according to Sodangi *et al.* (2013) means and includes any building of one or more premises or any part thereof and/or structure and/or artifact which requires conservation and / or preservation for historical and/or architectural and/or artisanal and/or aesthetic and/or cultural and/or environmental and/or ecological purpose and includes such portion of land adjoining such building or part thereof as may be required for fencing or covering or in any manner preserving the historical and/or architectural and/or aesthetic and/or cultural value of such building.

According to Avrami *et al.* (2000), conservation has broad meaning, signifying the entire sphere of cultural heritage preservation, from academic inquiry and historical research to policy making to planning to technical intervention through the cooperation of different disciplines which is often difficult to achieve in practice. Heritage buildings have unique record that contributes to understanding the past and the present. Their presence contributes to the quality of life, by enhancing the familiar and cherished local scene, and sustaining the sense of local distinctiveness. They also have immense significance for leisure, recreation and as part of the global tourism industry (Zubairu *et al.*, 2012). Conservation is a process of continuous yet controlled interventions in the environment. Conservation of heritage sites in cities generally contributes largely

towards upgrading environmental quality, thus serving as a basic necessity for sustainability (Elnokaly and Elseragy, 2013).

Studies have identified some proposed principles for sustainable construction which includes; minimization of resource consumption; maximization of resource reuse; use of renewable and recyclable resources; protection of the natural environment; creation of a healthy and non-toxic environment; and pursuing quality in creating the built environment (Zhang *et al.*, 2011; Samari *et al*., 2013 and Djokoto *et al*., 2014).

A recent study in Nigeria by Gbadegesin and Osaghale (2014), observed that most researches concentrates on the display of cultural artifacts for tourists attraction and trace of historical antecedents, noting that much has not been done yet to deeply emphasise on management practice for posterity and sustainability purposes. This study therefore aims at advancing the knowledge of conservation principles and its influence on environmental sustainability for enhanced sustainable development in Nigeria. This study is of the opinion that sustainable development can be enhanced by the comprehensive policies and principles for conservation of heritage building which contribute to the achievement of social coherence, economic viability and environmental up-gradation (Chohan and Ki, 2005).

1.1 Objectives of the Study

The objectives of this research are namely;

1. To assess the implementation level of the principles and policies for conservation of heritage buildings in Nigeria
2. To evaluate the level of integration of environmental sustainability requirements in conservation of the heritage/monumental buildings
3. To correlate the implementation level of principles and policies of conservation with the level of integration of environmental sustainability requirements in the study area.

1.2. Hypotheses of the Study

Three hypotheses were postulated for the purpose realising the objectives of this study. The first, states that there is no significant variation in the perception of usage level of the conservation policies and principles on the heritage building among the stakeholders. The second states that there is no significant variation in the perception of the level of integration of environmental sustainability concerns in building conservation. The third hypothesis states that there is no significant correlation between the level of use of heritage conservation principle and integration of environmental sustainability concerns. The results of these hypotheses will assist National Commission for Museums and

Monuments as well as conservation stakeholders in placing efforts on important conservation issues and their effects on environmental sustainable concerns. This will to a substantial level contribute to sustainable development of the Nation.

2.0 Review of Related Literature

A number of studies on conservation policies/principles for heritage building and environmental sustainability concerns globally were reviewed as a basis for the questionnaire formulation for this study as highlighted hereafter.

2.1 Principle and Policies of Conservation

Elnokaly and Elseragy (2013) observed that, urban conservation in its wider term involves preserving tradition, social and cultural aspects as well as the physical improvement of historic places which is often witnessed as an approach towards higher levels of sustainability. In addition, sustainable areas are those which are created to support sustainable living, with primary focus being placed on economic, social and environmental sustainability.

The Welsh Assembly Government (2011) sees conservation principles as philosophical frameworks that will help stakeholders in decision making concerning the best approach to the protection and management of the historic environment as a whole. Drury and McPherson (2008) also noted that conservation principles provide a comprehensive framework for the sustainable management of the historic environment. Both studies identified six principles of conservation to include: Historic assets should be managed to sustain their values(social, economic and environmental); understanding the significance of historic assets is vital; the historic environment is a social and economic asset and a resource for learning and enjoyment; everyone will be able to participate in sustaining the historic environment; decisions about change must be reasonable, transparent and consistent and; documenting and learning from decisions is essential

Santoli (2001) also identified nine principles, while Lungu and Arion (2006) identified three principles, some of the principles are: using expert conservation advice; promoting minimum intervention; respecting earlier alterations of interest; repairing rather than replacing; promoting honesty of repairs and alterations; using appropriate materials and methods; ensuring reversibility of alterations; avoiding incremental damage; complying with the necessary regulations and others which were adapted for this study.

2.2 Environmental Sustainability Concerns

Saroop and Allopi (2014) identified eco-efficient criteria for sustainable green infrastructure as tools which can be used in the conceptualization, implementation, and monitoring of progress in urban infrastructure projects. The Criteria defined the essential components by which sustainability may be assessed. Collectively, the criteria provide an implicit, generally agreed-upon global definition for the concept of sustainability. Each criterion relates to a key element of sustainability. Through the measurement and monitoring of these indicators or concerns, the environmental effects of infrastructure solutions, can be assessed and evaluated, to meet stated aims and clients objectives more effectively, these are: efficient layout planning, resources utilization, environmental quality, functional efficiency, future maintenance, economy, safety and social concerns. The study concluded that sustainable design of township infrastructure services can be achieved by enforcing the consideration of resources, environmental impacts of design decisions, ecologically sensitivity, innovation, maintenance and materials at the design stage of a project.

Asad and Khalfan (2007) reported ten key indicators for sustainable construction as; design for minimum waste; applying lean construction principles; minimising energy; pollution reduction; preservation and enhancement of biodiversity; conservation of water resources; respect for people and local environment; and setting targets, monitoring and reporting, in order to benchmark performance. Shen *et al*. (2011) also identified 10 environmental aspects of sustainability; these are ecological effect, effect on land pollution, effect on air quality, effect on water quality, noise effect, waste generation, influence on public health, environment protection measures in project design, energy savings and protection to landscape and historical sites. These served as sources of the environmental sustainability concerns used in this study.

3.0 Methodology

This study adopted the exploratory survey design approach using structured questionnaires. The study population consists of stakeholders directly and indirectly involved in the conservation of heritage buildings in Nigeria. The study purposively sampled 152 stakeholders resulting in 138 valid responses from; Architect, Builders, Town Planners and Engineers. Twenty heritage conservation principles and sixteen environmental sustainability concerns were identified from literature as variables for the basis of formulation of questions in the questionnaire administered.

Data on the perception of the level of use of heritage conservation principles and level of integration of environmental sustainability concerns were collected from the stakeholders using structured questionnaires. The measurements were on a five point Likert-scale namely: nil=1, low=2, moderate=3, high=4 and very high=5 to assess

priority placed on conservation principles, and the integration of environmental sustainability concerns in the conservation of heritage buildings. The severity index (SI) calculated from the above were then differently classified as No significance (NS): 0-0.359, Low significance (LS): 0.36-0.529, Moderate significance (MS): 0.53-0.679, High Significance (HS): 0.68-0.839, Very High Significance (VHS): 0.84-1.0 with a cut-off of 0.6 as adapted from Ujene *et al*. (2011). The variation of the perceptions of priority placed on the conservation principles and the level of integration of environmental concerns were analysed with Kruskal-Wallis tests, while the correlation between the conservation principles and the components of environmental sustainability concerns was analysed using spearman rank correlation.

4.0 Presentation and Discussion of Results

4.1 Characteristics of Respondents used for the Study

The respondents that supplied the data used for the study were analysed for an understanding of the characteristics of the people whose perceptions were investigated. For this purpose; affiliation, sex, age, qualification, experience and professional registration were all evaluated and the result presented in Table 1. Table 1 shows that majority of the professional groups were covered with the proportion of male respondents used for the study being 73.91%, while that of female respondents is 20.09%. The result indicates that majority of the respondents used for the study were males.

The result shows that about 63% of the respondents have experience over eleven years. This indicates that majority of the respondents have reasonable experience to give reliable information on the issues at stake. The result also shows that majority of the professionals have adequate educational qualification with about 62% having B.Sc degree and above. Table 1 also shows that the ages of all the professionals are more than 17 years, with majority of the respondents being working adults (18-60yrs). It was also observed from the result that majority of the respondents are true professionals as only 11.59% of the respondents were not registered with their regulatory bodies. The results generally indicate that the respondents chosen for the study are appropriate and dependable.

Table 1: Descriptive results of Respondents' characteristics

Characteristics of Respondents	Sub characteristics	No	%	characteristics of Respondents	sub characteristics	No	%
Respondents affiliation	Architects	55	39.86	Respondents Professionals Registration	ARCON	49	35.51
	Builders	25	18.12		CORBON	23	16.67
	Engineers	40	28.99		COREN	37	26.81
	Planners	18	13.03		TOPREC	13	9.42
					UNREGISTERED	16	11.59
	Total	138	100		Total	138	100
Sex of Respondents	Male	102	73.91	Age of Respondents	1-17yrs	0	0
	Female	36	20.09		18-60yrs	121	87.68
					>60yrs	17	12.32
	Total	138	100		Total	138	100
Experience of Respondents	1-5yrs	20	14.49	Qualification of Respondents	O/L & Trade Tests	32	23.19
	6-10yrs	31	22.46		OND/HND	20	14.49
	11-15yrs	41	29.71		B.Sc	42	30.43
	16-20yrs	28	20.29		M.Sc	34	24.64
	>20yrs	18	13.05		PhD	10	7.25
	Total	138	100		Total	138	100

4.2 Evaluation of Level of Use of Conservation Principles

In order to evaluate the level of use of the elements of conservation policies and principles in the region, twenty elements of conservation were identified from literature. Respondents were then requested to indicate their assessment of the level of use of the elements. The results are presented in Table 2. Table 2 shows that all the groups of stakeholders perceived that the level of use of the conservation principles range between 0.64 (moderate significance) and 0.33 (no significance). This is an indication that conservation policies and principles have not been utilized for adequate conservation of the heritage buildings. The result further shows that the Architects perceive that keeping site continuously in use and, using appropriate material and method are mostly used, the Builders perceive that the mostly used principles are ensuring environmental sustainability and keeping site continuously in use. The Engineers are of the view that keeping site continuously in use, using appropriate material/ method and ensuring environmental sustainability are mostly used principles, while the Planners perceive that the most used principles are avoiding incremental damage, ensuring environmental sustainability and carrying out conservation sequentially.

Table 2: Results of evaluation of usage level of conservation principles

	Architects		Builders		Engineers		Planners		Average	
Elements of conservation policies/principles	SI	Rank	SI	Rank	SI	Rank	SI	Rank	SI	Rank
Keeping the site continuously in use	0.59	1	0.54	2	0.53	1	0.58	5	0.56	1
Using appropriate materials and methods	0.59	1	0.50	3	0.50	2	0.60	3	0.55	2
Avoiding incremental damage	0.58	3	0.50	3	0.48	5	0.64	1	0.55	2
Ensuring environmental sustainability	0.51	9	0.56	1	0.50	2	0.61	2	0.55	2
Carrying out conservation sequentially	0.55	5	0.49	5	0.47	7	0.60	3	0.53	5
Repairing rather than replacing	0.57	4	0.43	12	0.48	5	0.56	8	0.51	6
Use of heritage buildings for societal benefit	0.53	7	0.43	12	0.44	14	0.58	5	0.50	7
Ensuring short term gain usage do not reduce building values	0.49	14	0.46	9	0.50	2	0.55	9	0.50	7
Maintaining and preserving verifiable records	0.54	6	0.45	10	0.46	9	0.52	12	0.49	9
Promoting honesty of repairs and alterations	0.51	9	0.48	6	0.45	11	0.52	12	0.49	9
Ensuring reversibility of alterations	0.50	11	0.48	5	0.47	7	0.52	12	0.49	9
Promoting minimum intervention	0.50	11	0.43	12	0.45	11	0.53	10	0.48	12
Using expert conservation advice	0.48	16	0.44	11	0.43	15	0.57	7	0.48	12
Making research basic to all conservation	0.52	8	0.40	15	0.42	17	0.53	10	0.47	14
Respecting earlier alterations of interest	0.48	16	0.48	6	0.45	11	0.46	19	0.47	14
Establishing sound organizational structure	0.50	11	0.35	18	0.38	20	0.52	12	0.44	16
Establishing historic places as social and economic resource for learning/enjoyment	0.41	20	0.40	15	0.46	9	0.49	17	0.44	16
Ensuring social sustainability	0.49	14	0.33	19	0.42	17	0.49	17	0.43	18
Complying with the necessary regulations	0.48	16	0.40	15	0.40	19	0.45	20	0.43	18
Ensuring economic sustainability	0.45	19	0.33	19	0.43	15	0.52	12	0.43	18

SI-Severity Index

The result also shows that the severity indices (SI) for perception of the Architects range between 0.59 and 0.45; Builders, 0.56 and 0.33; Engineers, 0.53 and 0.38 and Planners, 0.64 and 0.45. Although, these values fall within the same range, there was a perceived significant variation in the perception of the stakeholders on the level of use of the principles, hence the confirmation by hypothesis one in the evaluation of agreement in perception in Section 4.4

4.3 Level of Integration of Environmental Sustainability Concerns

For the purpose of evaluating the level of integration of environmental sustainability concerns into the conservation of heritage building, sixteen environmental concerns were identified from literature, and then presented to respondents for subjective assessment with the scales provided as earlier described. The results are presented on Table 3.

Table 3: Result of level of integration of environmental sustainability concerns

	Architects		Builders		Engineers		Planners		Average	
Environmental sustainability concerns	SI	Rank	SI	Rank	SI	Rank	SI	Rank	SI	Rank
Concern for air quality	0.75	1	0.73	2	0.74	2	0.83	1	0.76	1
Concern for natural lighting	0.69	2	0.83	1	0.80	1	0.73	3	0.76	1
Landscape & historical sites protection	0.68	3	0.73	2	0.68	5	0.73	3	0.71	3
Biodiversity/ecology conservation	0.67	4	0.67	5	0.71	4	0.74	2	0.70	4
Concern for maintainability	0.65	6	0.63	8	0.72	3	0.71	5	0.68	5
Concern for waste generation control	0.66	5	0.71	4	0.63	9	0.71	5	0.68	5
Concern for pollution reduction	0.65	6	0.66	7	0.66	6	0.71	5	0.67	7
Enhancing environmental aesthetics	0.60	9	0.60	10	0.62	10	0.64	8	0.62	8
Concern for energy savings	0.61	8	0.59	12	0.64	7	0.63	9	0.62	8
Concern for Noise control	0.55	11	0.67	5	0.64	7	0.56	12	0.61	10
Discouraging importation	0.57	10	0.56	14	0.56	12	0.63	9	0.58	11
Concern for water quality	0.53	12	0.61	9	0.61	11	0.56	12	0.58	11
Concern for public health	0.52	13	0.60	10	0.56	12	0.60	11	0.57	13
Environment friendly innovation	0.51	14	0.59	12	0.56	12	0.54	14	0.55	14
Applying lean construction principles	0.46	15	0.53	15	0.53	16	0.49	15	0.50	15
Respect for people & local environment	0.39	16	0.53	15	0.54	15	0.38	16	0.46	16

In view of the observed similarity in the views of the respondents, it became necessary to combine all the views of the stakeholders for harmony. The results on Table 3 shows that the stakeholders perceive that the highest level of integration is given to concern for air quality, followed by concern for natural lighting, while concern for landscape and historical sites protection, concern for biodiversity/ecology conservation and concern for maintainability ranked third, fourth and fifth respectively. The results also show that about 62% of the identified concerns attained moderate integration level, with 38% below the cut off value of 0.6. This is an indication that the level of integration of environmental concern in the conservation of heritage building is not yet at optimum

level. This may be attributable to the lack of sustainability promotion strategy, lack of demand and lack of building codes and regulation which were found to be the most significant barriers to the integration of environmental concerns in building production in previous studies.

4.4 Evaluation of Agreement in the Perceptions of Stakeholders

In order to evaluate the respondents' agreement in the perceptions of usage level of conservation principles and the level of integration of the environmental sustainability concerns, the first and second hypotheses were postulated as previously stated. The results of the hypotheses which were tested with Kruskal-Wallis test at $p \leq 0.05$ were meant to provide confidence of views in the usage of conservation principles and integration of environmental sustainability concerns. The decision rule is that if p-value > 0.05, the hypothesis is accepted, but if p-value ≤ 0.05 the hypothesis is rejected. The results are presented on Table 4.

Table 4: Results of Kruskal-Wallis test for Comparison of respondents' perception

Items compared among Professionals	Extent of use of conservation policies and principles	Integration level of Environmental concerns
No of variables (N)	20	16
Mean Rank of Architects	50.350	22.760
Mean Rank of Builders	25.280	33.910
Mean Rank of Engineers	26.330	34.130
Mean Rank of Planners	60.050	35.250
Chi-Square	33.900	2.110
P-value	0.001	0.550
Significance level	0.050	0.050
Decision	Reject	Accept

The results in Table 4 show that the p-values for the first hypothesis is $0.001 <$ significance level of 0.05, the null hypotheses is rejected, implying that there is significant variation in the perception of the stakeholders concerning the level of use of the conservation principles in heritage building conservation. The divergence in the opinions of the stakeholders may be attributable to lack of communication, cooperation and participation of the conservation experts in the implementation of the principles and policies of conservation. The p-value for the second hypothesis is 0.550 greater than assumed significance level of 0.05, the null hypothesis is accepted, and it is concluded that there is no evidence in the data to suggest that the perceptions of the stakeholders are different. The results indicate that the stakeholders have a common opinion about environmental concerns, which may be attributable to the general low level of development, awareness and technology of developing countries.

4.5 Correlation of Conservation Principles and Environmental Sustainability Concerns

In order to ascertain if significant correlation exists between the perceptions of level of use of conservation principles and the integration of environmental sustainability concerns among stakeholders, the third hypothesis was postulated. Seven most significant conservation principles were correlated with six most significant environmental sustainability concerns. This will help to ascertain the level of influence the significant conservation principles have on the significant environmental sustainability concerns. This hypothesis was tested using the Spearman rank correlation test at $p \leq 0.05$. The decision rule for the hypothesis is that if $p \leq 0.05$, the test rejects the hypothesis, but if $p > 0.05$, the test accepts the hypothesis. The results are presented in Table 5.

The results in Table 5 reveal that the test of correlation between the principle of keeping the site continuously in use and the significant environmental sustainability concerns have p-values ranging between 0.015 and 0.863, with concern for maintainability having p-value of 0.015 < less than significant value of 0.05. Hence rejecting that there is no significant correlation between, keeping the site continuously in use and concern for maintainability. This implies that concern for maintainability is significantly influenced by the principle of keeping the site continuously in use, while other concerns are not significantly influenced by the principle. This may be due to stakeholder inadequate application of the principles as depicted by the moderate significance of the principles.
The result shows that the principle of using appropriate materials and methods in conservation did not have significant correlation with almost all the significant environmental concern (p-values range between 0.164 and 0.732), except the correlation with concern for quality which has a p-value of 0.005<0.05, implying that there exist a significant relationship between the two. The result indicates that the concern for quality impacts on the principle of using appropriate materials and methods, while other concerns do not impact on the principle.

The result also shows that the correlation of three of the conservation principles namely: avoiding incremental damage, ensuring environmental sustainability and carrying out conservation sequentially do not have significant correlation with all the significant environmental concerns. The p-values which ranged between 0.073 and 0.988 were greater than 0.05, hence accepting the hypothesis that there is no significant correlation. This indicates that the three principles do not influence the level of integration of the environmental sustainability concerns. This may be attributable to the current moderate level of application of the principles in the conservation of the heritage buildings. The principle of repairing rather than replacing did not significantly correlate with the environmental concerns (p-values >0.050), except the correlation with concern for waste generation control which has p-value of 0.004 <0.05. This indicates that the principle of

repairing rather than replacing has significant influence on the concern for waste generation control. The influence may be attributable to the fact that repairs of component have ways of reducing the rate of discard and disposal thereby reducing wastes.

Table 5: Result of Correlation of conservation principles and environmental concerns

Variable correlated	SUM	Mean	SD	R	P-value	Decision
Keeping the site continuously in use	389	2.819	1.216			
Concern for air quality	525	3.804	0.935	0.052	0.544	Accept
Concern for natural lighting	524	3.797	0.838	-0.144	0.093	Accept
Landscape and historical sites protection	494	3.580	0.772	-0.144	0.092	Accept
Biodiversity/ecology conservation	487	3.529	0.864	-0.068	0.429	Accept
Concern for maintainability	464	3.362	0.871	-0.206	0.015	Reject
Concern for waste generation control	471	3.413	0.942	0.015	0.863	Accept
Using appropriate materials and methods	380	2.754	0.870			
Concern for air quality	525	3.804	0.935	0.237	0.005	Reject
Concern for natural lighting	524	3.797	0.838	-0.119	0.164	Accept
Landscape and historical sites protection	494	3.580	0.772	0.029	0.732	Accept
Biodiversity/ecology conservation	487	3.529	0.864	0.058	0.498	Accept
Concern for maintainability	464	3.3623	0.871	-0.084	0.329	Accept
Concern for waste generation control	471	3.4130	0.942	-0.098	0.254	Accept
Avoiding incremental damage	380	2.754	0.870			
Concern for air quality	525	3.804	0.935	-0.024	0.782	Accept
Concern for natural lighting	524	3.797	0.838	-0.079	0.357	Accept
Landscape and historical sites protection	494	3.580	0.772	0.062	0.469	Accept
Biodiversity/ecology conservation	487	3.529	0.864	-0.020	0.820	Accept
Concern for maintainability	464	3.362	0.871	-0.103	0.230	Accept
Concern for waste generation control	471	3.413	0.942	-0.133	0.110	Accept
Ensuring environmental sustainability	374	2.710	1.068			
Concern for air quality	525	3.804	0.935	0.001	0.988	Accept
Concern for natural lighting	524	3.797	0.838	-0.050	0.562	Accept
Landscape and historical sites protection	494	3.580	0.772	-0.025	0.772	Accept
Biodiversity/ecology conservation	487	3.529	0.864	0.001	0.988	Accept
Concern for maintainability	464	3.362	0.871	-0.153	0.073	Accept
Concern for waste generation control	471	3.413	0.942	0.004	0.965	Accept
Carrying out conservation sequentially	366	2.652	1.023			
Concern for air quality	525	3.804	0.935	-0.072	0.403	Accept
Concern for natural lighting	524	3.797	0.838	-0.015	0.863	Accept
Landscape and historical sites protection	494	3.580	0.772	-0.094	0.272	Accept
Biodiversity/ecology conservation	487	3.529	0.864	0.090	0.295	Accept
Concern for maintainability	464	3.362	0.871	0.093	0.276	Accept
Concern for waste generation control	471	3.413	0.942	-0.039	0.648	Accept

Table 5 (cont.): Result of Correlation of conservation principles and environmental concerns

Variable correlated	SUM	Mean	SD	R	P-value	Decision
Repairing rather than replacing	352	2.551	0.921			
Concern for air quality	525	3.804	0.935	-0.052	0.545	Accept
Concern for natural lighting	524	3.797	0.838	0.013	0.876	Accept
Landscape and historical sites protection	494	3.580	0.772	0.071	0.406	Accept
Biodiversity/ecology conservation	487	3.529	0.864	0.090	0.295	Accept
Concern for maintainability	464	3.362	0.871	0.123	0.152	Accept
Concern for waste generation control	471	3.413	0.942	0.241	0.004	Reject
Use of heritage buildings for societal benefit	349	2.529	0.906			
Concern for air quality	525	3.804	0.935	-0.032	0.709	Accept
Concern for natural lighting	524	3.797	0.838	-0.002	0.983	Accept
Landscape and historical sites protection	494	3.580	0.772	0.059	0.490	Accept
Biodiversity/ecology conservation	487	3.529	0.864	0.087	0.308	Accept
Concern for maintainability	464	3.362	0.871	0.135	0.115	Accept
Concern for waste generation control	471	3.413	0.942	0.255	0.002	Reject

The result shows that the principle of using heritage buildings for societal benefit did not have significant correlation with the environmental concerns, except with concern for waste generation control (p-value = 0.002 < 0.05). This implies that the principle of using heritage buildings for societal benefit has significant correlation with concern for waste generation control. This may be due to the fact that heritage buildings may turn out to be monumental wastes if they are not conserved for societal benefits.

5.0 Conclusion

The study has evaluated twenty elements of conservation principles and sixteen environmental sustainability concerns which were identified from literature with a view to advancing the knowledge of the use of conservation principles and integration of environmental concerns for sustainable development in Nigeria. Based on the findings of the study it is concluded that conservation policies and principles have not been utilized for adequate conservation of the heritage buildings, as utility is just within moderate significance level. At present, the principles most significantly applied are: keeping the site continuously in use, using appropriate materials and methods and avoiding incremental damage. This may not ensure optimum sustainable development as such principles as establishing places as social/economic resource and assess for learning and enjoyment and, keeping site continuously in use with basic researches covering all aspects for sustainable development.

The study also concludes that the stakeholders perceive that the highest level of integration is given to concern for air quality, followed by concern for natural lighting,

concern for landscape/ historical sites protection, concern for biodiversity/ecology conservation and concern for maintainability. It was also concluded that that about 62% of the identified concerns attained significant integration level, with 38% below the cut off value of 0.6, an indication that the level of integration of environmental concerns in the conservation of heritage building needs improvement. The study also concludes that significant variation exists in the perception of the stakeholders concerning the level of use of the conservation principles, while they have a common opinion about the integration of environmental concerns in the conservation of heritage buildings. The study concluded also that the current level of use of majority of the conservation principles do not significantly influence the extent of integration of environmental sustainability concerns, as only very few environmental concerns correlated with the current level of use of the conservation principles.

Arising from the conclusions, the study recommends that, stakeholders should increase and improve the current level of use of conservation policies/principles and integration of environmental concerns. Emphasis should also cover other principles which could have more influence on the integration of environmental concerns for enhance sustainable development. Heritage building conservation should be a continuous and dynamic process involving proper planning and development of buildings, architecture, local culture and the community livelihood/benefit, through optimal use of the conservation policies/principles. A balanced approach is required to be established between the conservation of heritage and integration of environmental sustainability concerns. Adequate cooperation and involvement of all stakeholders should be encouraged so that, at all time all can have common perceptions of conservation and sustainability.

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