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User Evaluation for Sustainable Construction and Maintenance in Student Centres: A Pilot Survey of Aliyu Mustapha Student Centre

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ABSTRACT
Architectural design for effective construction and functioning of facilities demands maintenance policies that will create spaces which will attract and satisfy the users. This pilot survey presents an attempt to bridge this gap using users of Aliyu Mustapha student centre located on the main campus of ABU, Zaria, Nigeria, based on solution that will preserve, enhance and retain facilities of the building, due to the nature of activities and users it accommodates. The methodology employed a mixed approach using visual survey, and user perception survey through on-site questionnaires administration which had sections which includes user bio data and user evaluation on sustainable construction and maintenance problems encountered in the buildings. Obtained data were analysed using the SPSS v.21for descriptive statistics. Result from the questionnaire survey reveals: Perception of moderate level of response to the economy; moderate level of response to society; and, high response to the natural environment. Results also show positive attitude towards the combination of indigenous and modern architecture in the design. The study concludes that the design of Aliyu Mustapha student centre reflected considerable attempts at sustaining the natural environment and components of the building. These findings imply that in future, architects and allied professionals need to pay more attention to the method of construction adopted, maintenance provisions and building materials that can withstand the weather of the region of such buildings to enhance effective maintenance.
Key words: Sustainable Construction, Maintenance, Student Centre, ABU.

INTRODUCTION
One of the key features of sustainable construction is the construction and maintenance of facilities. These facilities should deliver environmental, economical and social services to all residents of a

community, without threatening the viability of the natural, built, economic and social systems upon which the delivery of these systems depends. This has been the focus of several studies assessing the achievements and lapses of such schemes across the country. The studies examine sustainable housing construction, housing finance and mortgage, land laws and acquisition, design and construction as well as building materials technology and management. Comparatively less research efforts have been paid on sustainable construction and maintenance problems for institutionalized public buildings especially in student centres in part, because Government in accordance with the current youth empowerment policy will be giving loans to graduates all across the country.

In spite of this development, many student centres in government institutions faces maintenance challenges such as ABU, Zaria. This information is rarely obtained directly from users who are best positioned to provide data on the student centre. Such data is important to ensure sustainability of the building, which constitute a major source of secure, convenient and durability of the building for university staffs and students.

This paper applied user perception and evaluation in order to determine the extent to which the architectural design of Aliyu Mustapha student centre reflected consideration for sustainable construction and maintenance through sustainable design and construction. The building was chosen for the study because it is one of the oldest student centre in Nigerian University that has received comparatively little by way of empirical research on maintenance. The objectives of the paper are:
(i) To conduct a review on maintenance of sustainable construction of student centre design requirements with reference to user evaluation;
(ii) To survey the perception of users on the reflections of sustainable construction in Aliyu Mustapha student centre,

(iii) To determine whether there are significant impacts on the users of the facility on the importance attached to sustainable construction and maintenance in the design of student centres.

SUSTAINABLE COSTRUCTION

Sustainable Construction is the adoption of materials and products in buildings and construction that will require less use of natural resources and increase the reusability of such materials and products for the same or similar purpose, thereby reducing waste as well. Sustainable construction also enhances the resilience of the industry as such materials are readily available in the world market. Steel, other metals, glass and prefabricated parts using combinations of these, as well as recyclable substitutes for concrete are examples of sustainable materials and products.

Three pillars of sustainability are social, economic and environment, which focus on physical environmental issues, recognise that social and economic factors are fundamentally important and relate to the design and construction of buildings.

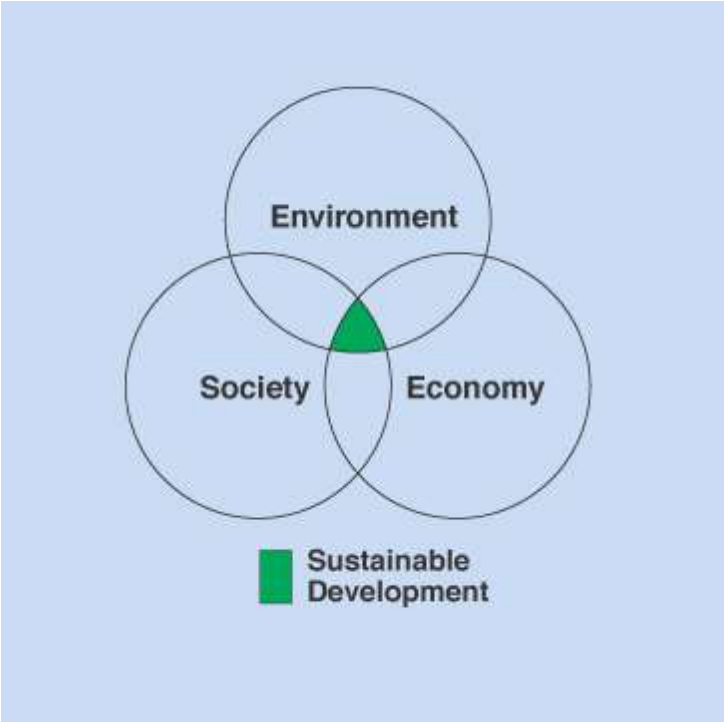

Figure 1: pillars of sustainability

Sustaining the Economy

One of the keys to sustainable construction is the ability to better value for owners and users by creating:

- Smarter buildings (technology optimising performance).
- Improve internal environmental quality (thermal, visual and acoustic) while being.
- Resource efficient (materials, energy, water).
- Minimizing the impact on the natural environment throughout the life cycle of the building.

In order to achieve sustainable construction, design should be based on study of the user needs, expectations and preferences, the type of facilities which would best satisfy them and the weather of the region.

Sustaining the Natural Environment

A sustainable construction should focus on the physical environmental issues such as available building material, durable material and easy to

repair and replace. Sustainable construction should minimize any form of environmental degradation or pollution. It should also aim at maintaining the visual quality of the setting (SATC, 2007). This demands that design be based on ecological factors of the location such as solar energy, soil, water supply, humidity, wind, topography, and altitude, and the use of sites natural attributes as primary experience and design determinant (Denver Service Centre, 2009). At the global level, the major issues are the minimization of greenhouse gas emission and conservation of non-renewable energy (SATC, 2007).

Sustaining the society

Design should encourage the use of local knowledge and skills. (Williams, 2007; SATC, 2007). Sustainable construction should also promote the identity and sense of place of the host community putting maintenance into consideration.

MAINTENANCE IN THE CONTEXT OF PUBLIC HOUSING

Maintenance as defined by the BS 3811is a combination of any actions carried out to retain an item in, or restore it to an acceptable condition. These actions can be carried out in anticipation of failure, 'retaining', and work carried out after failure 'restoring. Buildings generally, require proper and adequate maintenance to ensure comfort for the occupants for carrying out their day to day activities as well as to enhance the performance and life span of the buildings. Ansari (2014) also noted that buildings depending on their nature of activities require a maintenance plan, which when followed strictly, will ensure the postponement of building deterioration. Retention as noted by Maina and Haruna, (2014), relates to works carried out in anticipation of failure. This is commonly referred to as preventive maintenance. It entails works carried at predetermined intervals or according to prescribed criteria to reduce the probability of failure or degradation of the functioning of an item.

Restoration on the other hand occurs after failure. It is usually referred to as corrective maintenance. This entails maintenance carried out after the item has lost full or partial function. These are commonly unplanned. (Maina and Haruna, 2014)

An implication of these problems on maintenance is an area of whose responsibility it is to maintain public building; through government through its institutions or residents. Users usually address day-to-day repairs as this directly impinges on health, safety and comfort. Maintenance at this point is often well beyond the means and scope of occupants especially within low-cost public housing units.

ALIYU MUSTAPHA STUDENT CENTRE

The building is a property of Ahmadu Bello University Zaria, located opposite the Amina girls hostel and adjacent the Nuhu Ribadu girls hostel and the out - door basketball court. It is a public building with tenancy for offices, relaxation spaces, performance spaces, and other commercial activities. Plate I below shows the floor plan of the student centre and its relationship between the spaces. Plate II and III below shows the approach and rear view of the student centre.

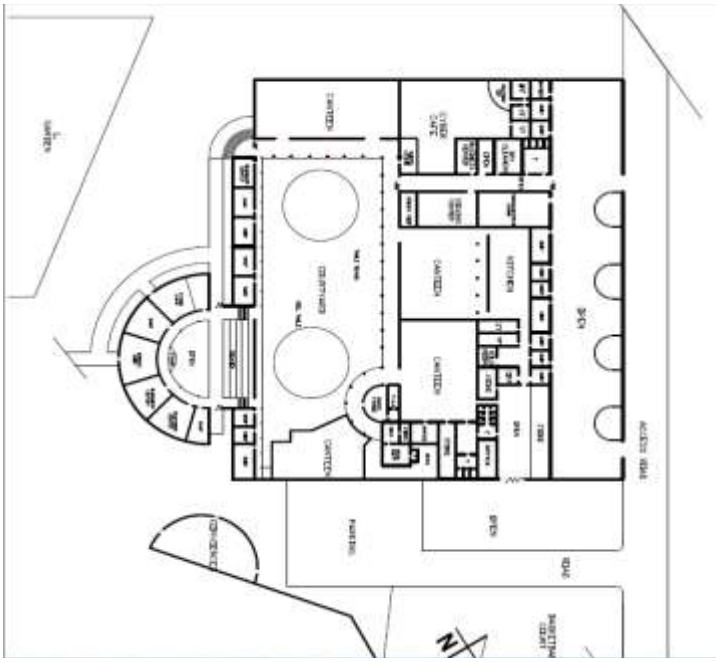

Plate I: Floor plan of Aliyu Mustapha student centre Source: Field survey 2016

Plate II

Plate III

Plate II and III: Front view and rear view of the student centre Source: Field survey 2016

METHODOLOGY AND RESEARCH APPROACH

The study adopted visual survey and user perception in the evaluation of architectural design of Aliyu Mustapha student centre with reference to the three pillars of sustainable construction and maintenance - economy, environment, and society. The users include students and residents of shops.

Site/user survey method was adopted. This approach has the advantage of high response rate and medium cost (Veal, 2006). 30 questionnaires were administered through systematic random sampling. This was based on a combination of respondent and interviewer completed methods through stationary interviewers distributed around the survey site. The questions were placed on a five point likert scale. The scale consists of a set of items of equal value and a set of response categories constructed around a continuum of important/not important and low/high.

Analysis was based on descriptive statistics, which involved the use of Statistical Package for Social Science (SPSS).

RESULT

Sustaining the Economy

With regards to sustainable construction and maintainance, the survey sought to ascertain the level of importance attached to facilities and users' rating of provision of such facilities atAliyu Mustapha student centre. The facilities are: Outdoor relaxation spaces; sports facilities; performance spaces; shopping facilities; outlets for food and drinks; and, conference facilities. The result shows that the most important facility was outdoor relaxation spaces with a score of 4.60 on a five point likert scale, while the provision of such facilities obtained a score of 2.29 on the same scale. The facility scored low on all aspects except for the provision of performance spaces. (See Table 1).

Table 1: User needs and its reflection in Aliyu Mustapha students centre

Facility	Importance	Reflection
Office and maintenance facilities	3.50	1.15
Outdoor relaxation spaces	4.60	2.29
Sports facilities	4.52	2.09
Performance spaces	2.52	2.05
Shopping facilities	4.10	3.64
Outlets for food and drinks	4.51	2.04
Conference facilities	4.00	2.09

Sustaining the Natural Environment

Five resources were investigated with respect to the sustenance of the natural environment. These are: Respect for topography; preservation of vegetation; natural lighting; natural ventilation; and, use of renewable energy. The result shows high correlation between the level of importance attached to the destination's natural environment and the

reflection of this. Aliyu Mustapha student centre.However scored low in respect for topography (see Table 2).

Table 2: Natural resources and its reflection in Aliyu Mustapha student centre.

Natural resources	Importance	Reflection
Respect for topography	2.85	1.00
Preservation of vegetation	3.82	3.60
Natural lighting	4.82	3.50
Natural ventilation	4.89	3.65
Use of renewable energy	3.78	3.04

Sustaining the Society

The study also sought to determine the level of importance attached to the needs of the students and the campus community and their levels of reflection in the existing facility. These elements are:use of indigenous building materials; use of indigenous building techniques; application of indigenous ornaments and decorations. Details of these are given in Table 4 below.

Table 3: Local resources and their reflection in Aliyu Mustapha student centre

Local resource	Importance	Reflection
Use of indigenous building materials	4.16	2.07
Use of Indigenous building techniques	3.11	2.08
Application of Indigenous ornaments and decorations	3.19	2.16

CONCLUSIONS

This paper applied user perception and evaluation to determine the extent to which the architectural design of Aliyu Mustapha student centre reflected consideration for sustainable construction and maintenance. The result shows moderate level of correlation between the importance attached to user need characteristics and their reflection in the design; and, fairly high level of correlation between the levels of importance attached to the destination's natural environment and its reflection in design.

Secondly, design professionals notably architects need to pay closer attention tospecification and design related matters.
Finally, other factors influencing sustainable construction and management of student centres should also be investigated in further studies. These includechanging in user needs and modernization trend.

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