



POTENTIALS OF LIFE CYCLE MANAGEMENT PRINCIPLES FOR SUSTAINABLE BUILT ENVIRONMENT IN ABUJA, NIGERIA



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Abstract: The shift of the Federal administration in Nigeria from Lagos to Abuja has attracted private and public investments in the built environment to cater for the increasing population. Despite this expansion, issues of quality, costs, time, and human and environmental safety as well as sustainable development, and disaster management have posed a challenge to the sustainability of the built environment. These challenges are associated with the processes in building production. Hence, this study aimed at investigating the potentials of Life Cycle Management for sustainable built environment in Abuja, Nigeria. The objectives of the study are to: examine policies and procedural framework in the built environment; investigate how adoption of initial phase principles may affect the sustainability of the built environment; examine how planning phase principles influence the sustainability of the built environment; determine how implementation phase principles may influence the sustainability of the built environment; and ascertain whether completion phase principles could improve the sustainability of the built environment in Abuja, Nigeria. Data for this study was collected using questionnaires and interviews from a sample of 341 respondents, representing 20% of the study population through purposive and stratified random sampling. Data obtained were coded and analyzed using Statistical Package for Social Sciences (SPSS) version 17. Afterwards, descriptive and inferential statistics were used to analyze the data. Results shows a significant relationship since the $P < 0.05$ for all the variables. The study recommends that LCM potentials be adopted to improve the sustainability of the built environment in Abuja, Nigeria.

Keywords: Building industry, life cycle management principles, sustainability

Introduction

The Built environment contributes to socio-economic development of a country through the creation of employment, provision of shelter to millions, as well as provision of basic infrastructure (Ofori, 2014). The built environment refers to site for construction activities and the provision of shelter and infrastructural facilities for a sustainable environment. It is also the interrelationship of building materials, construction, services and spatial arrangement with their environments, occupants and contents, which are very complex and can influence the health of the building fabric and its occupants (Idoro, 2014; Ofori, 2014). The built environment has to be maintained so as to avoid disaster, which might have adverse effect on its sustainability. Sustainable development and disaster management can be curtailed through capacity building. Capacity building according to Adejuyode (2015) refers to dedication in strengthening of economies, governments, institutions as well as individuals. This can be achieved through education, enlightenment, mentoring and training. He added that the sustainability of structures, systems and organization can be enhanced through motivating people to improve their livelihood.

Life Cycle Management (LCM) principles are sequential phase activities used in enhancing sustainable built environment within cost, time and quality standards. These principles are applied during the initiation, planning, implementation and completion phases. The Life Cycle Management concept was developed in the 1960's and early 70's for space programs, and was used during the construction of the Pyramids in Egypt and the Great Wall of China (Roberts & Wallace, 2004). The algorithm process of LCM was first introduced in Europe (Ofori, 1994a), and from 1990 the LCM concept became popular within the built environment globally (Chih-Chiang, 2004; Chih-Chiang *et al.*, 2006; Usman *et al.*, 2014). LCM is a management process used in the built environment to enhance its sustainability. Usman (2015) opined that LCM has four phases: initiation, planning, implementation and completion. Right initiation is vital to the overall construction process because it is the basis

of LCM, and once it is not done correctly, it will affect the other processes in the built environment.

This built environment is faced by many challenges especially its sustainability (Ofori, 2014). The Built environment as a key employer in the global economy is saddled with challenges of project management especially its sustainability (Idoro, 2014; Okereke, 2008). According to Usman (2015), the sustainability of the built environment demands for increased effectiveness in the planning and control of projects. However, construction methods are aimed at meeting client's needs based on global economic development. As a result of population explosion and continued demand for shelter, there is the need for professional practitioners who are versed in project management systems (Usman, 2015; Ofori, 2007) to display their ability for the sustainability of the built environment.

The success of any project depends on how effective the LCM principles are from initial to completion phase. A major holdup facing the built environment is why projects are not being completed on time, at the budgeted cost and within specified standards (Usman, 2015). Chandra (2010) noted that building projects especially in the public sector compromise on quality, are not completed on time, and have cost overruns.

Justification of the study

The current status of the Nigerian built environment is life-threatening to the Nigerian economy, despite its contribution in providing shelter as well as employment to the citizens, its performance does not matched the nation's population demands (Usman *et al.*, 2014). This is a clear indication that the increasing demand for shelter and its sustainability cannot be ignored in the built environment. These increased in demand for more building and other infrastructure would provide employment to many people (Idoro, 2014). Past studies have shown that the movement of the administrative capital of Nigeria from Lagos to Abuja has brought about an expansion of infrastructural development in the Federal Capital Territory (FCT) Abuja, which is driven by public and private sector growth. This resulted from the need to cater for an increasing population. Over 40% of Nigerians now live in urban areas of varying sizes (Kabir *et al.*, 2009).

According to Idoro (2014), increased urban population has created severe housing problems resulting in overcrowding, inadequate dwellings, poor service provision, and poor management of projects, poor project implementation, inadequate planning and budgets, costly project execution, untimely completion of projects, abandoned or non-functional facilities, and collapsed buildings. The crisis is more acute considering that some Nigerians are homeless especially in rural areas (Kabir *et al.*, 2009; Ibrahim & Musa-Haddary, 2010; Usman *et al.*, 2014).

According to the National Bureau of Statistics (2014), the FCT Abuja had a population of 371,674 people in 1991 and 1,406, 239 in 2006, and by 2011 it increased to 2,193,613 people. It has a population density of 181.4 with a growth rate of 9.28%. This has attracted both private and public investments in the built environment to engage in building production to cater for the increasing population (Usman, 2015).

Statement of the problem

Besides the population expansion in Abuja, issues of quality, cost, reliability, and human and environmental safety in the built environment poses a challenge to the growth of the industry (Oladimeji & Ojo, 2012). Similar studies by Idoro (2014) reveal that planning and budget provisions, costly project execution, inefficient service delivery (Ibrahim & Musa-Haddary, 2010), and abandoned or non-functional facilities, and collapsed buildings pose serious challenges on the sustainability of the built environment (Jambol, 2012; Usman *et al.*, 2010). These could be a recipe for disaster on the economic development of the country.

Studies express concerns over issues of poor quality and the high cost of buildings as well as longer duration before project completion which prevent the built environment from successful project delivery (Usman, 2015). Hence the problem of this study is on the assessment of the potentials of life cycle management principles for sustainable development and disaster management in the built environment in Abuja, Nigeria

Significance of the study

Life Cycle Management concept may be effective and efficient in the disaster management for sustainable built environment; and also enhance technology transfer to the user through training workshops. The findings of this research could be used to help project management team to militate against the challenges of sustainability and disaster management in the built environment. This is because, through management systems, prediction of challenges and how to mitigate them becomes easier. Project managers will be able to plan for eventualities in the management of disaster for sustainable built environment. It could also enhanced communication between the designers and the contractors on how to improve efficiency in project performance. The findings will aid public and the private sectors to improve services and project delivery for sustainable built environment.

The findings will broaden the literature in management systems, project performance and the management of disasters in the built environment. The study will demonstrate the usefulness of employing effective management systems in achieving a desired project performance. This will be useful to future research, reference and teaching. The study will improve the level of compliance of policy and procedural frameworks by the stakeholders so as to achieve project success for sustainable economic development and management of disaster.

LCM principles and project delivery

LCM principles are laid-down procedures used for project delivery in the built environment. They include the policy and

procedural framework, and initial, planning, implementation and completion phase principles.

Policy and procedural frameworks

Policy and procedural frameworks are laws governing the built environment to enhance its sustainability. Globally, building laws, regulations and codes are established for use in the built environment. For example, UK has professional and regulating bodies, research institutions as well as effective utilisation of their tertiary institutions to ensure the production of buildings and proper disaster management at every stage (Jambol, 2012).

The production and management of the built environment have requirements backed by law such as:

- i. Method of controlling (inspecting and reporting building construction)
- ii. How services, fittings and equipment may be used
- iii. The inception and maintenance of any service, fittings or equipment

In a similar study Jambol (2012) and Ofori (2014) found that USA developed building legislation from a Uniform Building Code (UBC), to the Standard Building Code (SBC), and on to International Building Code (IBC) (Ofori, 2014). UK had an organized legislative system that guides the building in achieving project success thereby sustaining and managing disaster in the built environment. Like the UK legislation, the American system promotes good building practice in USA. In Nigeria, Jambol (2012), point out that the National Building Code (NBC) has elaborately provided for safety of operations at all stages of building construction management and sustainability.

Potentials of policy and procedural frameworks

Policy and procedural frameworks are supposed to be the guiding principles for built environment. Unfortunately, Government officials do not follow urban planning standards and allocate plots without following rules and procedures (Ede, 2010). Usman (2015) agrees with this assertion that urban planning departments are no longer performing their role as per the law. Contrarily, in Dubai, studies have shown that before any project starts, specialized property development consultants are engaged (Ike, 2012; Ede, 2010). These consultants assess the soil and carry out additional investigation. This is to avoid the challenges of disaster like abandonment and collapses of building. The construction design is then carried out based on the soil investigation reports. Usman *et al.* (2010) points that in Nigeria, policies are there but complying with them is the challenge.

Ike (2012) adds that in Dubai, it takes eight months for a building plan to be approved and adds that contractors are not allowed to mobilize to site until after the approval processes. Materials are also certified by a consultant before their use on the built environment and must be inspected and approved. Within this policy and legal frameworks, government and professional bodies track and monitor building production from the initial to completion phases for economic, environment, and social sustainability.

In spite of laws guiding the built environment in Nigeria, the hitches of using sub-standard building material and lack of compliance have increased (Usman & Keftin, 2015). This negatively influences cost, time, and quality standards, and ultimately sustainable built environment.

Policy and procedural frameworks help in the avoidance of the ills inherent in the construction sector and which leads to project failure, incompleteness, and abandonment (Idoro, 2012; Idoro, 2014; Usman, 2015). However, the sustainability of the built environment depends on the level of compliance to policies, procedures and control, as well as strict monitoring of time, cost, material, quality and environmental constraints (Nwachukwu & Fedelis, 2011; Kamau *et al.*, 2013).

Potentials of initial phase principles

The initial phase is the beginning of a sustainable built environment. In this phase, the feasibility and the viability of project takes place. The principles in this phase includes: identifying the project, determining its project goals and objectives, determining preliminary materials required for the project, conducting soil tests, conducting a survey, determining the level of equipment and personnel required, developing a budget and schedule, identifying the project team, and conducting an Environmental Impact Assessment, among others (Ofori, 2014).

Kamau *et al.* (2013) pointed out that sustainable built environment can be achieved when the initial phase principles are applied correctly. However, its sustainability depend on how well the consultants and contractors carry out the initial phase principles (Banki *et al.*, 2009; Ng *et al.*, 2009); as well as selecting the right contractors, will ensure quality, time and cost effectiveness of projects.

Basically, initial phase principles are activities that help meet project goals and expectations are met (Chan *et al.*, 2002). According to Kamau *et al.* (2013), initial phase principles are the determining factors to enhancing sustainable built environment especially when surveys, EIA, resources and feasibility studies are carried out according to plan. A study by Idoro (2014) shows that environmental issues during building construction receive more attention from governments, non-governmental institutions and the general public.

Usman *et al.* (2014) reported that 14 million tons of waste is put into landfills in Australia annually. Forty-four percent of this waste comes from the built environment. In developing countries, the built environment consumes 62.86% of non-metallic minerals, such as glass, cement, clay and lime (Chan & Chan, 2004). Banki *et al.* (2009) argues that 30% of the annual waste in UK comes from the built environment. These wastages have damage the environment which could be accounted for economic growth affects time, cost and quality for sustainable and management of the built environment.

Similarly, Belout and Gauvreau (2004) conducted a research on sustainable built environment and found significant predictors for its management and sustainability which include: setting out goals and objectives; resources (human, material and equipment), cash flows, as well as carrying out a survey and soil tests. This is consistent with findings by Nguyen *et al.* (2004) which reported that people are responsible for creating, managing, operating and utilizing projects towards success or failure for sustainable built environment. The results also revealed that contractors with adequate resources (human, materials and equipment) are more successful in disaster management and sustainable project delivery in the built environment. This is in agreement with Wong *et al.* (2003) findings that on-site productivity can be affected by availability of resources for sustainability and disaster management.

Potentials of planning phase principles

The planning phase is a principle in coordinating project activities to improve disaster management and enhances development of a building plan; hence, its sustainability. This is analogous to the development of a good facility design (Usman & Keftin, 2015). In addition the planner must weigh the costs and reliability of different options while ensuring practical possibility. Sustainable built environment requires changes environmentally and physically which is difficult but it's eminent though the processes differ from one project to the other (Idoro, 2012).

Usman (2015) opined that the planning process consists of three stages that take place from the moment of planning the building of the facility to the moment the valuation of the final building process. These stages include: estimation,

monitoring, control, and evaluation. The process of building production is quite interesting but its tedious. Making a good building plan is challenging and there are numerous plans available for any given project. While past experience is a pointer to good planning, every project is unique and has special threats or opportunities that need originality or creativeness to elucidate them. Unfortunately, it is hard to offer direction regarding procedure or strategy regarding the formation of good plans (Ofori, 2014; Idoro, 2014). One can provide good recommendations for a good plan but it is up to the actual planners to come up with his own plans (Usman, 2015).

Potentials of implementation phase principles

Project implementation and disaster management is a means of avoiding the ills inherent in the built environment, which lead to project failure, incompleteness, and abandonment (Idoro, 2014; Ofori, 2014). However, the success of any building project whether public or private sectors depends on the project manager's staff appointment and control, and strict monitoring of time, cost, material, quality and environmental constraints (Nwachukwu & Fedelis, 2011).

Usman (2015) opined that administrative and managerial elements are necessary to put a management policy in place, and that full implementation can take several months to years depending on the amount of coordination involved. His findings included: building an organization capable of carrying out the policy successfully; developing budgets and sharing resources internally on activities critical to strategic success; motivating people and modifying their duties and jobs to better fit the requirements of successful policy implementation; and providing the internal leadership needed to implement the plan and to keep improving on policy execution. Usman (2015) further proposed three steps for effective strategy implementation: Developing an organizational structure to delineate lines of authority and relationships; managing organizational activities, ensuring effective performance, and monitoring the effectiveness of the built environment. These implementation tasks helps in the building of a capable organizational structure and are further explored in detail hereafter.

Potentials of completion phase principles

Completion phase is also a step of building production. A project is completed successfully when client is satisfied. Timely project completion is vital to sustainable built environment (Usman & Keftin, 2015). Toors and Ogunlana (2010) in a related study in Thailand found that timely completion of projects carry more weight than other success criteria. The study revealed that projects and criteria for sustainable built environment vary, but timely completion and cost effectiveness are essential to its overall process.

According to Lam, Chan and Chan (2007), cost effectiveness is a measure of sustainability due to its relationship between cost and time. Atkinson in Usman and Keftin (2015) argued that in projects, where money is the major constraint, completing the project within budget is the overriding factor for sustainable built environment. Frodell *et al.* (2008) opined that exceeding the budget is permissible if it improves built environment. However, completion within budget, time and quality standards is mandatory in sustainable built environment.

Toors and Ogunlana (2010) express concern over poor quality of building construction as a result of project delays, disputes and non-project delivery. Large projects are difficult to manage because they involve many stakeholders, each with different perceptions of success, discipline and skills, as well as technology (Kolltveit & Gronhaug, 2002; Pheng & Chuan, 2006). Ofori (1994a) considers the role of transfer of technology to influence sustainable built environment. In this

regard, Ofori (1994b) proposed the need to develop technology of LCM.

The effectiveness of the joint venture is evident in the transfer of technology using LCM in Singapore from foreign contractors to their local counterparts. It was found that local contractors benefitted from the programme. In a similar study, Holt *et al.* (1994) discovered that contractors who completed and delivered projects successful are more likely to achieve project target in their future. Ofori (2014) advocated that predictive performance of contractors can be determined by investigating contractors' past performance. In the same vein, Khosrowshahi (1999) asserted that higher priority needs to be given to contractors past performance since delay in building performance has significant cost and quality implications on project delivery. Xiao and Proverbs (2003) added that contractors of high reputation and high past performance improve clients confidence and raise the possibility of future business. So LCM process, when carefully followed will improve project performance. A clear evidence is the transformation of the built environment in Singapore (Ofori, 2014).

Potentials of the built environment in Nigeria

Idoro (2014) advocated that the Nigerian built environment is bedeviled by serious planning and management snags, which have stunted its growth and viability and caused rampant project abandonment, high project costs, and prolong duration. Project planning and management is central to all construction projects and is a requisite to achieving objectives.

Shenhar *et al* (1997) in Usman (2015) suggested strategies that would enable the achievement of a project's objectives in the built environment. These include: ensuring that all projects are preceded by a feasibility report; recognizing, financing, designing and constructing projects as distinct and separate phases of project implementation that are preceded and controlled by proper planning and management. Providing up-to-date planning information and data for the construction industry, funding projects to ensure adequate planning design, construction and management; utilizing local expertise and resources in project planning and management; adopting an appropriate standard contract system

Usman (2015) opined that problems in the building industry include corruption during the awarding of contracts, and abandonment of projects owing to severe cash flow challenges. As a result, construction operatives have been subjected to a work environment, which has not encouraged high levels of efficiency. The non-payment of wages, the interruption of work due to lack of materials or tools, and the consequent loss of morale, had led to an exodus of traditional craftsmen from the built environment. This is important because the craftsmen contribute immensely to the growth of the industry by exhibiting their skills and wealth of experience. The adoption of appropriate planning, monitoring and evaluation techniques in the preparation of Master Plans for construction projects are essential tools for sustainable built environment. This is a process of achieving sustainable built environment using LCM.

Methodology

The study was carried out in Abuja, the Federal Capital Territory of Nigeria. It is between latitude 8.25 and 9.20 north of the equator and longitude 6.45 and 7.39 east of the Greenwich Meridian. Abuja is located in north-central of Nigeria. The Federal Capital Territory covers an area of approximately 7,753.853 km², and occupy 275.3 km² with a population of 1,406,239 (NBS, 2014). It has a population density of 181.4 with an annual growth rate of 9.28%. It is situated within the Savannah region with moderate climatic conditions. Njeru (2012) added that FCT is blessed with a mix

of agricultural produce such as yams, cassava, maize, guinea-corn, rice and plantain and has mineral deposits such as marble, tin and tantalite, among others.

Data for this study were collected using questionnaires and interviews through purposive and proportional stratified random sampling from a sample of 341 respondents, which represent 20% of the population of 2310 construction professionals(350 architects, 352 builders, 354 engineers, 354 Quantity Surveyors, 350 Urban and Regional Planners, and 350 contractors). The data were coded and analyzed using Statistical Package for Social Sciences (SPSS) version 17. Analysis conducted was descriptive (frequency tables) and inferential (Chi-square statistics and Analysis of Variance-ANOVA); this were conducted to test hypothesis and the strength of the relationship at 95% level of significant.

Results and Discussion

Table 1, indicates the results of significant relationship between policy and procedural framework and sustainability in the built environment (F= 5.657; P<0.05; df = 4, 336). Thus, the study therefore established that sustainability depends on compliance to policy and procedures of the built environment.

Table 1: One – Way ANOVA test results

Objective	F	P – Value	Df	Sig.
1	5.657	0.05	4, 336	0.000
2	91.574	0.05	4, 336	0.000
3	72.315	0.05	4, 336	0.000
4	81.820	0.05	4, 336	0.000
5	122.346	0.05	4, 336	0.000

Source: Field Survey (2013)

Besides, the results also indicates that there is a significant difference between adherence to initial phase principles and sustainability in the built environment (F= 91.574; P<0.05; df = 4, 336). Thus, the study established that sustainable built environment depends on how well the initial phase principles are observed. Moreover, results show that (F= 72.315; P<0.05; df = 4, 336), which suggested that there is a significant difference between sustainability and the planning phase principles. Hence the study established that sustainable built environment depends on proper planning. None adherence to planning phase principle leads to failure or abandonment of projects. Hence, projects are rarely completed within expected quality standards, cost, and time schedules. It means that sustainable built environment can be improved by good planning. This is confirmed by the fact that the relationship between planning phase principle and sustainability was statistically significant.

This revealed that the relationship between implementation phase principles and sustainability was statistically significant, F = 81.820, P =0.000, df = 4, 336 whereas, with alpha = 0.05, sustainable built environment can be influenced by proper implementation phase principles adoption since the probability value is less than the chosen alpha. It is therefore established that sustainability depends on effective adoption of implementation phase principles. Projects are completed with high cost and time overruns due to lack of adoption of implementation phase principles and as a result, projects are rarely completed within cost and time schedules.

ANOVA results indicates that F= 122.346; P=0.05; df = 4, 336. Thus, there is significant difference between completion phase principles and sustainability in the built environment.

The study therefore established that sustainable built environment depends on how effective the adoption of completion phase principles is. Completion phase principles can improve sustainability in the built environment; but in

Nigeria this is not what is happening. Projects are completed with high cost and time overruns due to lack of proper completion phase principles (Idoro, 2010; Ofori, 2014; Usman, 2015). As a result, projects are rarely completed within quality standards, cost, and time schedules.

Table 2: Chi – Square test for hypothesis

H0	A	Sig.	Decision
1	0.05	0.000	Reject
2	0.05	0.019	Reject
3	0.05	0.000	Reject
4	0.05	0.195	Accept
5	0.05	0.000	Reject

Source: Field Survey, 2013

H0₁: There is no significant relationship between policy and procedural framework and sustainability in the built environment in Abuja. Chi – square results shows that p-value $0.000 < 0.05$ meaning that there is statistical significance at 95% level of confidence (Table 2). Since the p-value 0.000 is less than the chosen alpha value the Null Hypothesis, thus it is rejected. This revealed that there is significant relationship between policy and procedural framework and sustainability in the built environment. In addition, it revealed that sustainable built environment can be improved by complying with policy and procedural framework.

H0₂: There is no significant relationship between initial phase principle and sustainability in the built environment in Abuja. Chi – square results shows that p-value $0.000 < 0.05$ meaning that there is statistical significance at 95% level of confidence. Since the p-value 0.000 is less than the chosen alpha value, hence the Null Hypothesis is rejected. This revealed that there is significant relationship between initial phase principle and sustainability in the built environment. It also implies that sustainable built environment can be improved by adhering strictly to initial phase principles.

H0₃: There is no significant relationship between Planning phase principle and sustainability in the built environment in Abuja. The results of Chi-square indicates that the p-value $0.000 < 0.05$ at 95% level of confidence. From the analysis, p-value was found to be less than the chosen alpha value 0.05 at 95% level of confidence suggesting the rejection of Null Hypothesis. This revealed that there is a significant relationship between sustainability and the planning phase principle. So, planning phase principle can influence sustainable built environment.

H0₄: There is no significant relationship between implementation phase principle and sustainability in the built environment in Abuja. The results of the analysis on Chi-square test, shows that p-value $0.195 > 0.05$ at 95% level of confidence. Since the p-value is greater than the chosen alpha ($0.195 > 0.05$), it reveals no significant relationship between sustainability and the implementation phase principle. Therefore, Null Hypothesis was accepted; meaning that implementation phase principles have no influence on sustainable built environment since LCM principle is not adopted; obviously sustainability cannot be achieved. It also reveals that sustainable built environment can be improved if implementation phase principle is adopted.

H0₅: There is no significant relationship between completion phase principles and sustainability in the built

environment in Abuja. Chi-square results show that p-value $0.000 < 0.05$ at 95% level of confidence. Since the p-value is less than the chosen alpha ($0.000 < 0.05$), Null Hypothesis was rejected. It reveals that there is a significant relationship between sustainability and the completion phase principles. Thus completion phase principles do improve sustainable built environment.

Conclusion

Despite LCM’s successful use in the built environment worldwide, its use in Nigeria is yet to be adequately exploited. The study concludes that right from the initiation to completion phases, some part of project processes have been faulty and so projects cannot be delivered on time, within budget and at the required quality standards for the sustainability of the built environment. Thus several questions emerge: are LCM principles being applied only by a section of the built environment in Nigeria? Is LCM seen by the key players as an effective means ensuring environmental, economic or social sustainability? The study has shown that there is little compliance to the LCM principles that will ensure sustainable built environment and this is not only experience in Nigeria, but cuts across the globe. So these posed a serious challenge for sustainable built environment in respect to quality, cost and time overruns; however, these challenges can be mitigated by applying LCM principles. The study has established that the building industry in Abuja, Nigeria is could not deliver projects efficiently and effectively. The Study found that issue of poor quality and the high cost of buildings as well as longer duration before project completion which prevents the BI from successful project delivery.

In conclusion, right from the initiation to completion phases, LCM principles have not been carefully followed which led to building collapses, abandonments, and delays in delivery as well as its sustainability. The BE is unable to deliver projects effectively and efficiently due to poor project management, inadequate planning, costly project execution which leads to abandoned or non-functional facilities and collapsed buildings

Recommendations

Based on the findings of this study, the following recommendations were proffered to help improve the built environment in Abuja.

1. There is the need for Federal Government to review the implementation act for best practices in the built environment
2. The built environment should improve the level of Adoption of LCM principles for enhanced its sustainability and disaster management
3. Monitoring and supervision mechanisms need to be intensified by the 3-tiers of Government and the professional bodies
4. Professional bodies and the Federal Government should ensure continuous capacity building in order to improve project compliance to sustainable development in the built environment
5. The professional institutions and regulatory bodies should establish punitive measures to check erring professionals for any unethical practices in order to minimize disaster in the built environment.

Contribution to knowledge

Life Cycle Management (LCM) is principle used by developed world to enhance disaster management and timely project delivery for sustainable development in the built environment. If the developing economies can also adopt this, it will enhance disaster management and project sustainability. By this, issues of building collapse,

abandonment and longer project duration at high cost will be minimized if not curtail to the barest minimum. It will also ensure project completion within budget, time and quality standards. This study will also help the stakeholders to ascertain which task is faulty during project implementation.

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