

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,
KUMASI

**STRATEGIES FOR IMPLEMENTATION OF SUSTAINABLE
DEVELOPMENT IN THE CONSTRUCTION INDUSTRY IN GHANA: CASE
STUDY IN NKORANZA SOUTH AND SUNYANI EAST**

By

PETER KWASI EFFAH

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DECLARATION

I hereby declare that this work was solely undertaken under supervision and is the result of my effort and that all quotations from books and other sources of information have been duly acknowledged and that no part of it has been presented for another award of this university or elsewhere.

.....

Peter Kwasi Effah (PG1742514)

(Student)

.....

Date

I declare that I have supervised the student in undertaking the research reported herein and I confirm that the student has my permission to present it for assessment.

.....

Mr James Coffie Danku

(Supervisor)

.....

Date

I confirm that the student has duly effected all the corrections suggested by the examiners in conformity with the Department's requirements.

.....

Dr. Bernard Kofi Baiden

(Head of Department)

.....

Date

DEDICATION

I dedicate this dissertation to my lovely wife Lydia Takyi Effah, my father Stephen Appiah Yaboah, Owusuaah Comfort my mother, Dr. Korantwi-Barimah Solomon, hon. Emmanuel Kwadwo Agyekum, Monica Fosuah, Appiah Samuel, Appiah Solomon and all my siblings, and all Holy Spirit R/C Church members for their contribution and prayer towards this study.

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ABSTRACT

Sustainable construction is very vital towards nation development. Majority of developing countries fail to critically implement sustainable construction so as to improve the development of the construction industry. This is a quantitative study which aimed at investigating the strategies for implementation of sustainable concept in the Ghanaian building industry with specific objectives of identifying the factors that act as impediment, negative effect to these impediment and develop strategies for implementation that enhance developmental projects in Ghana. Data was collected by using questionnaire survey. The purposive sampling and snowball sampling were adopted in selecting professionals in the building industry in Ghana for the study. A total number of seventy questionnaires were administered and fifty-eight were retrieved representing a response rate of 82.86%. Data collected was analyzed using mean score ranking to rank the barriers identified; negative effects of the factor and strategies for implementation of sustainable building. Furthermore, the most relevant effect of unsustainable construction practices were also disclosed as an extension of project duration, water pollution, air pollution, excessive energy and resource consumption, deforestation and global warming. The study therefore recommended that some of local building materials should be looked at and if possible improved upon to enhance construction procedures to promote their usage.

Keywords: Barriers, Building industry, Sustainable, Sustainable building.

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CHAPTER ONE

GENERAL INTRODUCTION TO THE STUDY

1.1 INTRODUCTION

This research work identified the strategies for implementation of sustainable construction in indigenous Ghanaian building industry. This was to enable researcher to come out with problems that bind the poor adaptation of strategies implementation to the development of the sustainable building industry in Ghana. In the strategies, the researcher will look at the effect to the economic, social, and environmental for the implementation of sustainable building in Nkoranza South and Sunyani East Municipalities in the Brong Ahafo Region.

1.2 BACKGROUND TO THE STUDY

According to Margolin (2007), the last two and half decades, environmental activist declared that shared obligation of people should be paramount in order to oppose the neglect of environmental degradation in our society. This statement indicates that there are fundamental principles that must be followed. Building activities most at times have positive intensions to the development of every nation. In view of this, issues about the strategies for sustainable construction implementation in Ghana have to be with the Metropolitans, Municipals and (MMDA's), Consultants, Contractors, and Private Developers. There were conflicts on the roles of parties in sustainable buildings implementation and addressing them, proper policies were determined in order to forecast its development.

The case of the environmental, social, and economic issues that confront sustainable construction in Ghana are considered as poor implementation. In order to sustain the

situation, engagement between all the parties concerned about sustainability were included this study. It seems like the stakeholders in many years have had a lot of discussions and seminars to resolve sustainable development concerning economic, social and environmental issues. However, there have been an improvement, but unawareness of most of the policies still exists.

This research work looked at sustainable construction and its implementation which is very important to the development of every nation which includes Ghana. The research was to developed strategies for implementation of sustainable buildings. According to Ahadzie *et al.*, (2009) the construction industry adds up to every economy by providing substantial work to many who are unemployed in the society. The employment opportunities offered by the construction industry is an indication that, the industry is the backbone of infrastructure development in Ghana and great avenue to implement sustainable strategies to better the lives of everyone.

Again the water bodies, energy conservation and culture issues and several others have become an impediment to the strategies for implementation of sustainability construction in Ghana. Jones (2008) wrote that the standard change of attitude, beliefs and the way of doing things are fundamental shift of human behavior in the world.

The knowledge and procedures impose challenges that change the need for specialists to reconsider and improve the development of the construction industry. These economic, social, and environmental factors demonstrate the major potential in the advancement of sustainable development in the building industry's practices. In order to adopt sustainable green building, there should be a decrease in the general energy use, exploit renewable energy supply, preservation and protection of water bodies, include design of water sensitive and minimization burden of flooding, discharge to

minimization water, minimization of air, soil, noise pollution to its limit. This research work looked at the effects of sustainable construction and its implementation which is very important to the development of every nation which includes Ghana.

1.3 PROBLEM STATEMENT

There have been an issues about implementation of sustainable construction principles in the whole world which Ghana cannot be excluded. These issues of sustainable construction are not well understood, that is why policy makers must educate citizens to understand factors affecting sustainable development activities in the Ghanaian construction industry. In view of this Cooper (2006), Du Plessis (2007), Hill and Bowen (1997) and Ofori (1998) agreed that, there are countless number of documents developed for sustainable development, but the inadequate comprehensive definition of the concept which is acceptable for all had crippled its implementation.

Bourdeau (1999) noted that development in various countries widely reveals the need for interpretation under the sustainable building practices. Pearce (2003) challenged that before the building industry can go ahead in the process of sustainable development, the definition of sustainable building should be more explicit. If clearer definitions of sustainable construction are not well defined in the entire world, then the understanding will be more complicated in the Ghanaian construction industry.

GVA (2011), also noted that there are fundamental links in the building industry to achieve targets of sustainable development, but the efforts are not happening fast enough in the industry. Halliday (2008) claimed that in UK a small proportion of buildings can be declared as sustainable. In view of this if UK construction industry had small proportions who practice sustainable development, then there is a need to evaluate the Ghanaian construction industry principles in general. Moreover, the

impact of failure to adhere to sustainable development practices in our system is getting alarming. Developers do not follow policies, they rather do their own things during construction.

According to (Innovation and Growth Team –IGT, 2010); and Walker and Brammer (2009), despite the available numbers of strategies and guidance, it appears that the impact is not felt. Sustainable development strategies implementations are instituted in various construction industries and form part of construction activities in Ghana. This will enable stakeholders in the construction industry to participate and move the education to the owners.

Cox et al., (2002) and Du Plessis (2007) mentioned that, several reasons may account for the failure of the implementation of strategies and guidance by stakeholders at project level. These may be the absence of understanding, the inability of better interpretation to decision in integration of construction sustainability systems, and the poor relationship amongst strategies and realities on the ground. This shows that policies in place are not giving the necessary attention and is the same way construction development policies and principles have been ignore by all the stakeholders. These human activities have led to climate changes and it continues to affect the environment, due to this it has affected the growth of building industry.

The evidence of this situation are rivers, lower water tables and increase in flooding of many areas of our environment are becoming increasingly arid. These basic problems and others are looked at in this study. It was against these problems that the researcher was interested in examining the previous work done by others and improves on their studies.

1.4 RESEARCH QUESTIONS

Why is sustainable construction important to socio-economic development in Ghana?

What impacts do the social, economic, and environmental issues under sustainable construction have on developmental projects in Ghana?

Are the parties in construction industry adhering to the policies in place?

1.5 AIM AND OBJECTIVES OF THE STUDY

1.5.1 Aim

The aim of this research was to develop strategies for the implementation of sustainable construction for indigenous Ghanaian construction firms.

1.5.2 Objectives:

1. To identify factors that impedes the implementation of sustainable construction strategies in construction.
2. To identify the negative effects of these factors on developmental projects.
3. To develop strategies for implementation of sustainable construction practices for developmental projects.

1.6 SCOPE OF THE STUDY

The dissertation covered only building works in Nkoranza South and Sunyani East Municipal Assemblies within Brong Ahafo Region of Ghana.

1.7 SIGNIFICANCE OF THE STUDY

The research was to explore new dimensions for the implementation of sustainable construction strategies in Ghana.

To the higher extent, the research will equip all parties to have special attitude towards effective, dynamic and support the systems in terms of execution, thus making sure that proper monitoring system of strategies are adhered to. Then again, policy makers will look at the monetary models that are continuous to see through the end value of the implementation of sustainable building.

1.8 METHODOLOGY

The research adopted the quantitative techniques. Literature research was conducted carefully to evaluate current extant literature and previous research work that were studied by others in the field of sustainable building, the impact from the architect's designs selections and state in Ghanaian construction projects. The parties necessary in making the concept of sustainable construction realized were involved to collect direct information for this research. These were MDA's, contractors, consultants, private developers and Environmental Protection Agency (EPA) and other parties in the industry.

The literature research was conducted to help identifying the background issues in relation to the subject matter of sustainable construction. Data was collected through the use of survey questionnaires to investigate the strategies for implementation of sustainable building practices in Ghana. Data analysis for this study was undertaken using descriptive statistical tools at this stage to provide useful information, with more detailed analysis using mean score ranking analysis. The study employed Statistical

analysis software such as Statistical Package for Social Sciences (SPSS) where essential, to do the analysis.

1.9 STRUCTURE OF THE STUDY

This research was structured into five main chapters. Chapter one was the overview of the research, which comprises the background; problem statement; aims and objectives; scope of research; method used for the study; limitations; and the organization of the study. Chapter two looked at previous researchers work relating to this study. The third chapter looked at the method of the study in detailed. Chapter four of this study concentrates on the investigation and discussion of the data collected during the study, and the final chapter was a summary, assumption and recommendations for the research work do.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This literature review was looking at sustainable construction and strategies to its implementation in Ghana. In general sustainable construction is one of the most important element in construction development in every country in the world. Furthermore, it is important to socio-economic and employment effects in both develop and developing countries and cannot be overlook.

According to International Energy Agency (2009) Implementing Energy Efficiency Policies, UK government experts in building industry are making effort to achieve target of reduction on Green Building Gas emission by 80 percent in 2050, then what target Ghana government has set out for proper implementation of sustainable construction to be part of developing agenda? The main emphasis is on the need to adopting sustainable construction practices in Ghana's development. In real sense construction and sustainable concepts are both complex and are much debatable in the sense that it poses concern in the industry.

The literature review will look at previous research which relate to this study. Finally, this chapter will conclude with a summary.

2.2 CONCEPT OF SUSTAINABLE CONSTRUCTION

According to Kibert (1994), the definition of sustainable construction can be the responsibility and creativity of managing a built environment on the ecological principles of producing structures which are healthier for use. Whiles Twidell and Weir (2006) also acknowledged that sustainability refers to producing, consuming and living the way that enhance needs of today without affecting the generation to come.

From the definitions above, strategies in the implementation of sustainable construction can be defined as procedures that are setup to control the activities of plans in sustainability construction for development, without compromising future generation.

Utmost deliberations on sustainable development according to Mehta (2009) and Sobol (2008) they create Brundtland Commission references to formulate their policies. According to Mebratu (1998) noted that Brundtland commission's work is to place a better role by making sure that sustainable development concept becomes the fundamental.

Bebbington (2001) highlighted that literature review concept profile employed stream policy by introducing sustainable lead agenda on the concept. The literatures above place emphases on the concept of sustainable development by showing significant role that ensure proper policies to open up the positive aspect to achieve the aims of development.

Farley and Zachary (2013) indicated that by integrating envelopment, economic and social justice in the sustainable construction helps reduce biodiversity restoration preservation, consumption, and social justice in the society. To achieving social aims mean policies that have combination both foreign and Ghanaian cultures that can be learnt and implemented which can help deal with the sustainable construction issues in Ghana. Economic under sustainability development aims at the policies that look at improvement of human life to the environment. Subsequently, UN Department of Economic and Social Affairs, (2012) maintained that sustainable construction by goal of government policies have become predominant to it implementation.

The governments all over the world are working tirelessly to achieve economic policies by trying to adopt sustainable construction by integrating the fundamental principal concept of sustainability. Environmental in the sustainability development aims at policies that will enhance effective use of present environment and also focus on the generation to come in the future. It focuses on the way human beings are using their activities to bring degradation to the environment. These three important ingredients are very critical in any study about sustainable construction.

The figure 2.1 shows the main ingredient in sustainable development.

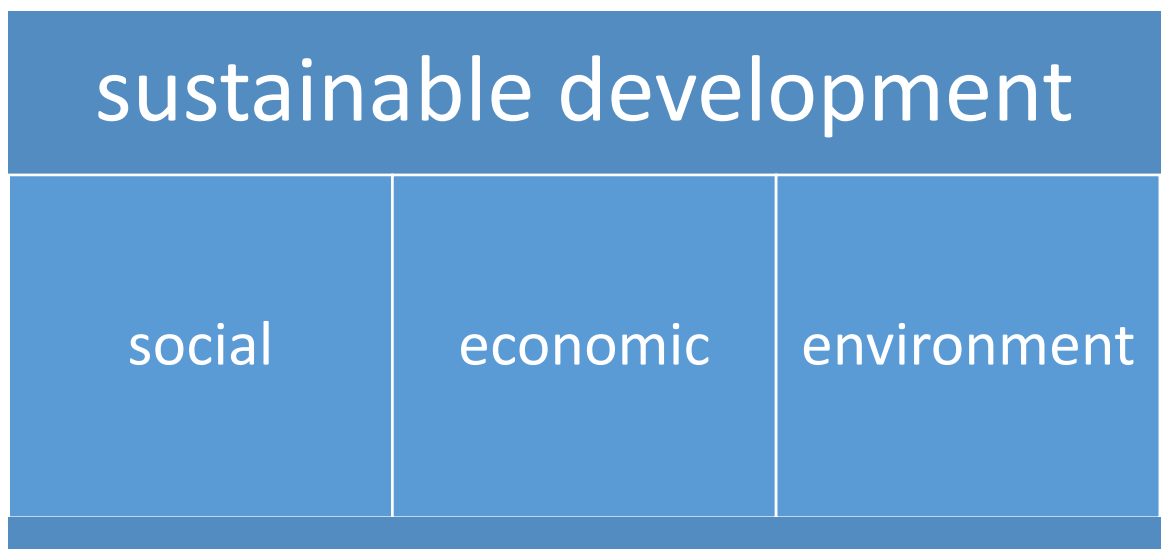


Figure 2.1: Adopted from UN Department of Economic and Social Affairs, (2012)

2.2.1 Principles of Sustainable Development

The principle of sustainable strategies in the behavior change of mankind cuts across all areas of sustainable construction within environmental limits. These environmental limits have to do with things that are under human capacity to achieve. The outline of Eco homes has delivered another tool through which housing links can diminish by environmental impacts. These will safeguard a resilient, healthy and just people to improve the benefits of sustainable development in all stakeholders in society. The

figure below shows the principles from which the pillars of sustainable construction strategies must be understood. On the diagram the smaller circle indicates the people of the society which the new standards and behavior of people must be adhered to.

The standard here indicates what to achieve when adopting strategies of sustainable construction, while the behavior can be both negative and positive in respect of the attitude of the society. The medium circle indicates new values in respect of the customs; culture and traditions of the people in the society, what they believe and the impact based on beliefs that they live in. These values may have severity in the economy because upon these drive that the change of values will come out.

The biggest circle represents the environmental impact, whenever it is affected; it has effect on both society and economic issues. The environmental is what sustains all mankind, and too much misuse of the environment reduces the ecosystem which increases the potency of climate change.

Sustainable Development Strategy and Action Plan (2003) published that, a broad aim of “...sustainable development in the housing association sector will significantly contribute to the development of sustainable communities across the country”. The corporation states that housing contributes to sustainable development in the following ways;

Quality and well housing management is a basis to sustainable societies

The design, planning and layout are significant to sustainable development practices.

Healthier and well housing policies have significant role to the condition and quality impact to sustainable development.

Fuel alleviation of poverty, employment, educational improvement, social combating exclusive, people support, generation and homes which are decent.

And;

Energy use, use of water, site selection for development type of construction materials, availability of public transport and implication of major effect in the environment.

These principle raised in 2003, have fundamental issues to the sustainable development, which are much more needed in building sector, moreover, there are a lot of chaos during development of the communities. The designers, consultants, architects, opinion leaders, and other stakeholders have responsibility of helping developers to respect strategies in placed to run environment in the effective manner. The principles stated in the 2003, have to do with the inhabitants of the communities which, when allow, will have very negative impact to the degradation of the environment.

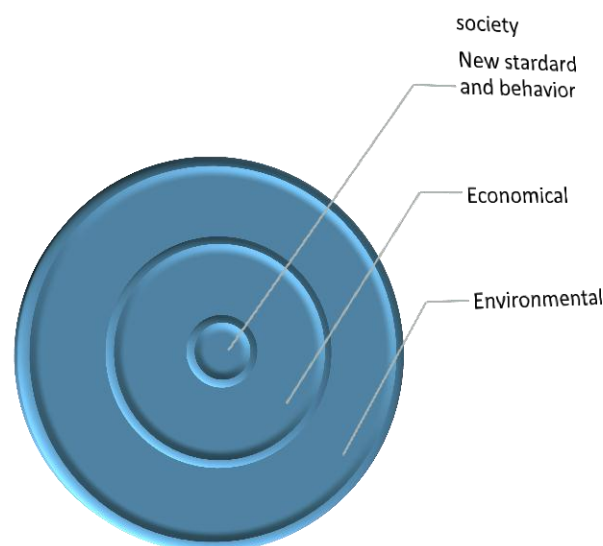


Figure 2.2: Adopted from; Sustainable Development Strategy and Action Plan (2003)

According to principles NDoH (2009) building from social are hinged on the principles stated as follows;

1. Creating well managed rental buildings for Promotion option,
2. Quality living environment and Promotion creativity of housing for low income persons,
3. Generate enabling environment for the economic development of small income earners in every level,
4. Inspire participation of the private partners where possible.

This is laudable but housing co-operatives Ghana competing with private sector in getting social housing grant from the Central Banks is nearly impossible to say is the least. The housing co-operatives are up against a formidable force that could further emasculate the co-operative housing subsector. This is borne out of the fact that the private sector is better positioned in terms of preparing and submitting accreditation documents that will give it an advantage over the housing co-operatives;

Promotion of the involvement of residents in the projects through information sharing, training and skills transfer; and Propel by all spheres of government.

These have been an issues for long time, because many developers assume that whatever they put up are inhabitable to mankind, they refuse to accept the fact human behaviors have impact to our environment. This indicates that stakeholder had misunderstood the basic principles that should be followed in order to make concepts of sustainable development realized. Upon these issues that Miyakate raised the following six principles which are so significant in sustainable construction.

According to Miyakate (1996); CIB (1996) the proposed six principle raised in the sustainable construction are as essential:-

- Minimize resource intake,
- Maximize resource recycle,
- use of recyclable and renewable resources,
- environment protection to natural resources
- Creating environment free from toxic and healthier to the society

And;

- Built environment that pursue quality creation.
- Reduction of waste
- Adoption of new techniques for development
- Using local base materials that are sustainable
- Biogas to various homes
- Enforcing building regulation and codes
- Avoiding building materials with generates server heat

These principles determine the core issues of resource consumption, reuse of resources, materials that are renewable and recyclable, protection of the environment by avoiding toxic substances creating quality built environment which may improve the living standards through the creation of an atmosphere which is inhabitable.

2.3 BARRIERS IN SUSTAINABLE CONSTRUCTION

2.3.1 Human Settlement in Urban Areas

There are many factors that impede the implementation of sustainable construction in Ghana; it is impediment since introduction of sustainable development. Governments and other stakeholders for the long time have pay no attention or ignore the called to sustainability. These factors affect many countries in the world which include Ghana;

human settlement, designs and construction, inadequate of sustainable construction studies in educational system, clients demand on building project and improper policy formation in government institution amongst other are impeding the process.

Human settlement since civilization in the initial days on world has terrestrial the ecosystems and it has provided indelible mark to our development in sustainability. The activities of human settlement parklands for agriculture, both natural and semi natural lands, creation of wild lands interface with urban development has occur. But, according to Radeloff *et al.*, (2005) there are discussions between human and natural procedures both in the settlement zone and it surrounding natural lands.

Again Liu *et al.*, (2007) maintained that human growth are couple with the natural system which is relatively slow to understood, but by providing synthesis patterns and procedures in discussions human and environment in order to widespread the effect beyond wildfire. The main emphases here is human and it environment which has become prone to degradation per the activities of those who force settle on non-settlement areas of the land.

In the area of human settlement the emphasis is not on those who convert natural lands into building according to Forman and Alexander (1998), Hawbaker *et al.*, (2006), but the construction of road network that accompanies and often precedes settlement of human, major influence to the fragmentation which has limited latitudinal degree in overall landscapes.

2.4 FACTORS THAT IMPEDE SUSTAINABLE CONSTRUCTION

There are many factors facing policies implementation in sustainable development practices in Ghanaian construction industry. These factors are categories into five and these are; policies implementation, professional, culture, steering and financial that

detail the practices of sustainability. The factors identified should be tackled to obtain proper implementation system of sustainable development.

2.4.1 Sustainable Construction Policies Implementation Factor

According to UN-Habitat (2006) it was instituted that strategies and policies implementation are well organized in providing buildings in several states to aid their citizens. But, UN-Habitat (2006) than again stated that policies implementation are absent in certain states as an outcome of these explanations:

Feeble established preparations; Provision of appropriate permitting structures to enhance their contribution to the development, unproductive apparatuses to involve and deprived themselves.

- Insufficient lawful structures in place,
- Inadequate of strategic focus, such as on the needs and potential contributions of women;
- Financial means are limited, and
- Inadequate administrative determination.
- Commitment of laws and regulation
- Low sanction to culprits found culpable.
- Inexperience
- Commitment of government agencies
- Inadequate enforcement
- Inadequate expertise

2.4.2 Sustainable Construction Professionals Factor

Architect's, and other stakeholders play important role in strategies of implementation of sustainable construction, the design muddle of construction development rest on

what output the architect and other cater parts offer. Stieg (2006) maintained that designs to sustainable are both complex and difficult due to observation to the practice in many areas of development. Presenting understanding to the social, economic and environment which may include association of moral obligation, designers must therefore be acknowledge the practice and bring on board difficulties that impede sustainable designs. The architect and other cater parts have the responsibility of making sure that whatever building designs are fit to the environment.

Furthermore, Cooper (2006) mentioned that the need of bringing sustainable construction to the door step of urban planning agencies is paramount. The ultimate recognition of urban planners working closely to achieve holistic method in the sustainable societies in the sub-region is important. In view of this Department for Business Enterprise and Regulatory Reform -BERR (2008), report said consultants in the public domain should draft policies to the sustainable construction implementation agencies and concluded that the duty of urban designs in the range of the policy awareness that have be recommended must be followed. Clients conceive the idea of putting up construction projects, this means that they have little or no idea of sustainable construction and order or not what to be built are sustainable to the environment.

This indicates that the designers must muddle the client ideas to suit the fundamental principles of sustainable development. Designs should strategize by the design team to meet climate changes by following the layout of site to ensure that all other facilities in the area are well plan to avoid negative effect to the environment.

Professional

- Inadequate design and construction team
- Inadequate expertise
- Inadequate professional knowledge
- Inadequate data and information
- Inadequate technology
- Inadequate training
- Inadequate cooperation

2.4.3 Sustainable Construction Culture Factor

In Ghana most commonly materials used in the building projects are blocks and concrete irrespective of other materials which are preferable in the sector, construction owners still maintained old traditional method. This has become difficult for both designers and their cater parts to introduce new system of construction to their understanding. According to Williams and Dair (2006) stressed on the fact sustainable measures fund by stakeholders are inability to commonly record the challenges. The most significant challenge cited was demand that is lacking in the building industry because building projects moved with owners and without their consent to the concept of sustainable construction, it implementation cannot be realized (Landman, 1999; Ahn *et al.*, 2013).

These perception about construction owners have be maintained for quit a longer time, it has be the culture and tradition of many developers to adopt to new changing in order to facilitate faster adoption to sustainable development. Client may be define as owner of the project; He may not be the designer but consumer or user of the building project. The knowledge of the client in the construction industry in little, but clients

have financial obligation to ensure that building projects are paid for after completion. They also want to make sure that traditional commonly use materials are purchased for construction works, policies implementers should intensify education on sustainable construction in order to mitigate deficit in the construction industry.

Since owners resist change the duty of designers in the strategies of sustainable construction are to ensure that construction projects will not affect the social, economic and environment life of the people. This is to ensure that policy formation in Ghana must be adhere to policies place in order to avoid negative impact to the environment. This can be overcome by client demand and willingness as found in the UK where pioneering of sustainable buildings has often been procured by owner-occupiers who are less constrained by market norms.

According to Toronto Green Development Standard (2006) maintained that community mindfulness on the green house is important factor that steered their quest of the people. Therefore, the benefit that will in nor on this concept of community awareness in the sustainable will compel with product demands leading to increase in achievement of the needs produced.

Culture

- Inadequate public awareness
- Inadequate demand
- Resistance to change

2.4.4 Sustainable Construction Financial Factor

Häkkinen and Belloni, (2011) maintained that sustainable structures are in the panic of high financial cost as compared to the traditional structures and there are so many unforeseen cost that posed challenges to the sustainable structures. In the same way

that Hydes and Creech (2000), Larsson and Clark (2000), Nelms *et al.*, (2005) also emphasises that owners anxieties about threat which is higher to the acceptance of sustainable structures explanations can be stuck, and it was attribute to the skills which are not familiar to the techniques, inadequate performance information, previous experience that is inadequate, support from manufacture and supplier.

From the write up Bartlet and Howard (2000) noted that cost specialists underestimated and overestimated of capital cost are potential cost savings. Hydes and Creech (2000) added that consultant's charges are indirectly resulting in raising up newness of the design team and contractors with sustainable structures methods. But according to Kats (2003), sustainable development practices in building industry adds to early charge of investment ranging from 1% to 25%, this compensation important reserves in the operation charge. But, intellectual in the life-cycle will analytically applied to this practice, designers and house owners will escalate to obtain the profits and those profits are quickly reduced.

In Sunyani East and Nkoranza South the chargers of consultants range from 10% to 20 of the contract sum. This was clarified Kats (2003) of benefits that construction industry managers obtained. Nevertheless, that the implementation processes of sustainable development are overlook and recognized well in Ghana. This will also means that not only sustainability will reduced Wargocki (2000) but productivity cost of life-cycle will increase the workforce using the structure.

Financial

- Incentive is lacking
- Cost investment which is high
- Threat of investment

- Final cost higher

2.4.5 Sustainable Construction Steering Factor

Construction industry is one of the complex entity with the large number of persons counting from owners to artisans thus an effective control or approach will be needs to implement sustainable development in that sector. In this case good control and measures may be required to manage the industry, this means that wrongful control may be impediment to sustainable construction development, whiles control measures may benefit to it implementation. Meanwhile, government strategies, building codes, and other measurement and supports tool and equipment are very insignificant in the sustainable development practices.

But, on the other hand, Rohrer (2001) emphasis that innovative and arranging duty of the public players and other structure authorities in the construction industry are paramount. In some countries application of measurement tool have be developed to aid measuring of principles of sustainable structures. This are application of measuring tool and equipment that aid and monitor sustainability construction are not practice in Ghana and if practice there is little work done. Meanwhile, Sunyani East and Nkoranza South Municipality do not have any measuring tool and equipment at their outfits. Meanwhile, Häkkinen and Belloni, (2011) noted that methods of implementation will depend on the impact of these measuring tools.

Steering

- Inadequate government support
- Inadequate measurement tools
- Inadequate control
- Lack of respect

- Improper monitoring
- Inadequate professional workforce

2.5 NEGATIVE EFFECTS OR CHALLENGES IN SUSTAINABLE CONSTRUCTION

The major effects to the challenges of strategies in the implementation of sustainable construction may be attributed as follows; change of ecosystem, degradation of landscapes and poor implementation of sustainable development and disposition of natural resources.

2.5.1 Change of Ecosystem

One major is the industrial technology which has produced damage to the cycles of environment. The intensity evidence is energy use resource causing depletion, pollution of air, water and ecosystem degradation. There are huge amounts of industrial and hazardous wastes that cause serious environmental health problems. As far as industrialization is concerned, there is a lot of wasted waste. There is waste and misuse of the environment as well as increased environmental degradation. There is an increased moral degeneration to the workers in the industry and this affects sustainable development. Secondary, industrialists aim at profit maximization at the expense of the welfare of the community. Externalities lead to the deterioration of the living standards of the people.

2.5.2 Poor Implementation of Sustainable Development Projects

Construction companies in Ghana recently adopting sustainable construction which are characterized as trusting, reliable, forceful sector on old-style approaches of building. The building industry has followed the old-style of using known materials such as blocks and reinforced concrete in construction which has made the alternative

materials entry difficult to as building material. Djokoto *et al.*, (2013) maintain that owners and other partners in the industry are not ready to accept any invention materials that the manufacture will produce into the market but they prefer the old materials in building.

But in the Asamoah and Decardi-Nelson (2014) research work, it was stated the with all this difficulties from owners to accept the need for change Ghanaian building companies has found their way out to overcome this challenges. In speck of all these negative effects to sustainable development practices, Djokoto *et al.*, (2013), maintain that the industry suffer with implementing sustainable development practices in Ghanaian construction industry. One of the major effect in building industry is the professionals who are not properly trained in the built environment and the ability to carry on what they practice is sometime problematic. All these are characterized by lack situational change which every Africa countries found it difficult to accept. Sustainable built environment is on significant in teams maintaining efficient work in the building industry.

Nevertheless, what depict issues in sustainable development during it implementation in the building industry still stand as economic gear to the socio-economic development drive in Ghana's determination to use the industry to reduce unemployment rate in the country. Ampadu-Asiamah and Ampadu-Asiamah (2013), employed that projects are critical in terms its completion since owners and users are in deem need of it due to rate of interest increasing, plan target in development and inflations that effect the industry, the training to this important details are paramount to the players in the industry.

Turner (2006) and Atkinson (2008) divided sustainability into two these are weak sustainable and strong sustainable, the triple bottom-line principle in content of sustainable development. These researchers also acknowledge that environmental transformation should be part of sustainable development (Mol and Spaagaren, 2000; Gibbs, 2003; Naess 2006), or development reproach by Daly (1993); Kovel, (2002); Nørgaard (2006); Rees (2008) was also acknowledged. Approaches to sustainable development is most officiated event in the construction industry which need professionals with proactive characters to organized each activities to achieve its implementation. According to Robinson *et al*, (2006); Atkinson, (2008) addressed the issues of triple bottom-line corporate social sustainable or corporate sustainable in this stage of the works of establishments which both of them simultaneously solving problems confronting the triple bottom-line with the view to taking stakeholders from shareholder. In the statement by Ajzen and Fishbein's (1980), they strongly acknowledged that behavior intentions theory of reasoned action existing that goes with certain character, have links that couple with attitude and belief. Both combined with micro-environment influenced by motivations, personal values, pressures and personal links.

Hobson and Essex (2001) point out that the general attitude towards environment and the implementation of sustainable construction practices is most important. However, several authors highlighted the agreement with broad statements representing the idea of sustainability is easy (Horobin and Long, 1996; Dewhurst and Thomas, 2003; Deng, Ryan and Moutinho, 1992). But more specific statements and actions taken are more difficult to agree with and a certain gap between attitudinal statements and actual initiatives becomes apparent (Dewhurst and Thomas, 2003). The studies about sustainably construction approaches towards accountability for sustainable

development disclose challenging results. This shows that comparable of the strength of these studies will be inadequate because strategies in the implementation of sustainable construction ensures changed of structure, and usage of site.

2.5.3 Land Degradation in Sustainable Development

Most activities of human when not checked will lead to poor natural resource management, and if continues will severely affect the landscapes. Deforestation and land pollution including erosion of soil, encroachment of land and many other are the causes of degradation that affect the inhabitants. This degradation is as a consequence from multi-lateral courses that invade our society. This will amount to the higher agitation for mismanaging economic natural resources dynamic, agriculture intensification, energy, transportation and urban building in team of sustainable development. But, according NEMA report (2004) the major cause of degradation to the land and depletion of resources are poverty in the communities. This poverty in the brittle communities activates the intensity of degradation to the environment.

In Sunyani East and Nkoranza South Municipalities are not different from land degradation due to misuse of the natural resources available. Communities in these Municipalities abuse the land through illegal felling of timber, bush fires felling trees closed to rivers and streams bank, building on the water ways amongst other activities are practices in these two Municipalities. From the seen the two Municipalities are most losing the natural resources and policy makers and implementers are folding their powers to allowed on-going practices to continue. Some of man's activities once not controlled lead to poor management of natural resources. These activities lead to soil erosion, bush encroachment, deforestation and pollution. These effects generally sum up to environmental degradation.

Environmental degradation is a result of multi-lateral processes that encroach the environment. These include socio-economic, institutional and technological activities on the environment. High agitation for economic growth, intensification of agriculture, rising energy and transportation, and urbanization results into mismanagement of natural resources thus dynamic environment changes. One major causes of environmental pollution and degradation deforestation which also must be tackle in the sub-region. The raising of illegal structures has become unbearable in these two Municipalities due protection of land cover floods, drought landslides, water scarcity and the threat imposed on the ecosystem are getting alarming according to Gastone (2013).

2.6 IMPLEMENTATION OF SUSTAINABLE CONSTRUCTION STRATEGIES THAT AFFECT ENVIRONMENT, SOCIAL AND ECONOMIC

2.6.1 Sustainable Construction in Environmental

These photos were captured in Sunyani East and Nkoranza South Municipality. It depicts the way these two Municipalities are planned for the environment. These two Municipality are emerging where many rural people have to seek green pastures for their survivor. The activities of these people prevent the policies maker to plan for the sustainable environment. According to Pennington *et al.* (2011) noted that generating waste beyond Europe amount to the consumption and production patterns of the people. The problems that these settlement bring to cities are many. Some of them availability of resources, biodiversity' environmental stress, water and air pollution, demand of housing, high rate of growth, increase in crimes and robbing and many others may happen to the environment. Tam *et al.* (2006), noted that construction impact may include noise pollution, air, dust, gas emissions, waste generation, use of land, water resources use, and destruction of inhabitants and dereliction of existing

site. These have been in existence in sub-Saharan Africa which includes Ghanaian communities.

Whenever stresses exceed then environmental impact like flood, extreme weak soil result in erosion in affected communities. A lot is spent on the big families and so little is saved for investment. This eventually leads to the persistent vicious cycle of poverty. Rural urban migration that comes as a result of failure to have adequate jobs in rural communities have led people moving to urban centers to look for jobs. This has rapidly increased population in the urban areas enforcing most people to put up unauthorized structures in the city which is contrary to sustainable practices. There will be a lot of pressure on the available resources such as housing, energy, education, health, transport water, and recreational amenities. It leads to the deteriorating of social services such as water and air, growth of slums and congestion amongst others.

Meanwhile, Beckerman (1994) acknowledge that environment concerns in economic strategies have generally been taken from the developmental policy and have produce global warming in the whole wide world.

The effect of consumerism has been observed to be one of the key problems towards environmental management around the world. Consumption patterns have changed a great deal. There is overconsumption that strains the available resources. Such mass consumption calls for the matching supply to make the situation in equilibrium. The level mass consumption has been rapidly growing and has had an impact on the environment. How do we consume and for what purposes determines how we extract resources. This creates the type of products needed on the market that ends up with pollution and waste. It therefore directly affects environmental degradation, poverty, hunger and also obesity that is on the rise.

Solutions to the problems like poverty, hunger, environmental degradation and other related problems need to be sought by researchers, policy makers in consultation with the local communities. Poor disposal of polythene bags is also detrimental to the environment. The polythene bags once poorly disposed choke the environment because they do not decay. Atuheire (2012) explained that it is important to replace the unfriendly environment polythene bags with those made out of banana fibers. She adds that products such as paper, carpets, and fabrics can be made out of banana fibers.

These principles of sustainability built environment are mentioned in literature of Anink et al. (1996); Dair and Williams (2006); DETR (2000); Hill and Bowen (1997); Venters et al. (2005) and they includes;

1. Reduction of consumption resources includes, materials, land, energy (particularly carbon based), and water.
2. Reduction of recycling re use resources.
3. Using of non-renewable resources in preference to renewable resources.
4. Mineral, extract fossil fuels minerals, produce persistent substances foreign to nature, minerals, at degrees which are not quicker than their slow redeposit into the environments layer
5. Enhancing and protecting and environment, energy and bio-diversity.
6. Formation of a healthier and non-toxic atmosphere by reducing pollution and contamination.
7. Chasing of quality in creating the conducive built environment.
8. Reducing landscape sensitive damage.

Most research work are done concerning the environmental issues and it dynamics to sustainable development perceptions and attitudes, these have received more comprehensive understanding towards sustainability practices which Ghanaian construction industry are trying to adopt. According to UK Green Building Council (2009) reported quantifiable targets in sustainable construction principles are social and economic. Again, Adetunji *et al.* (2003) noted that those in sustainable construction environmental management background should take responsibility of the industry to implement.

2.6.2 Sustainable Development in Economic

‘Economic sustainability refers to a business’s ability to make profit in order to survive and benefit the economic systems at the local and national level’ (Roberts and Tribe, 2008). Most human in one way or other contribute to the growth of our economy situations in Ghana, some create job, pay wages, pay taxis which make impact in the various communities. According to Adetunji *et al.*, (2003), construction economic sustainability in the industry add up towards maintenance of stable and high level of economic productivity and improve, employment and growth of project delivery. But their activities should be comply with Sustainable development policies which may benefit the communities at large. Meanwhile BRE (2002) noted that profit pursuit should not be sought at the expenditures of public or environment wants. Also suppliers’ engagement across the supply chain to ensure similar values and practices are issues of economic sustainability. In write up of Landrum and Edwards (2009) construction entities must sustain profit in their monetary firmness. Developers in Sunyani East and Nkoranza South acquire buildings for economic and profit purposes in quest to sustain in the construction business, this has be in their agenda in the construction industry. (Bosher et al., 2007), noted that not only the industry is seen as

critical component for achieving aims of the government policy, but the industry is economic giant sector in many countries.

“The principles of economic sustainability of construction found in literature include” (Dair and Williams, 2006; DETR, 2000; Hill and Bowen, 1997; Sjostrom, 2001);

1. Ensure monetary affordability for recipients by bringing down perception on practical sustainability.
2. Promote creation and labor intensive employment in building industry in order to keep the monetary input in indigenous hands.
3. Use real cost pricing and full cost accounting to indicate the amount and tariffs services and good totally reflecting bio physical and social price.
4. Enhance competitive and efficiency by accepting strategies and technical that sustainable in matters.
5. Select contractors and suppliers responsible in environmental matters.
6. Investment human made capital and certain proceedings from the use of non-renewable resources (this will guarantee the needs of the upcoming generations would be met).
7. Obtaining monetary profits/benefits.
8. Assistant the indigenous business/ economic variety.

2.6.3 Sustainable Construction Practices in Social

The moral responsibility or pure desire to contribute to society might be the reason for adopting sustainable construction practices for some industries (Tzschentke *et al.*, 2004); but for many the business case for sustainability and the benefits related to sustainable business practices tie the commercial interest of business to the goals of society (Miller and Twining-Ward, 2005).

Pawlowski (2008) made these views that element of social under degradation an environment would undergo the same way of natural environment. Again, Pawlowski (2008), maintain that environmental factors include tradition and customs, spiritual, culture, living condition and interpersonal relationship will be part of the environment. Sustainable construction concerned is addressing social needs of the society and it involve stages of construction in different dimension of life cycle. Hence, stake holder such as owners/occupiers, employees and local community should be included in this integration. In tackle concern of social on life cycle construction are difficult, unlike other production industry, facilities under construction especially buildings have longer use periods.

Irurah (2001) as cited Du Plessis (2007) indicate that the four stage of describing buildings are in line with sustainable and it shows that the outward significant implication on determining quality of life of the people that the building industry activities have to be maintained. Moreover the quality of life that require greater amount of resources are energy, money which are problems in following the ambitious buildings programmes in traditional manner in support of improvement quality life.

According to Construction Industry Research and Information Association - CIRIA (2001); Myers (2005) mentioned that building industry considered as one of the dirtier amongst other manufactures products, dangerous, disruption, sometimes dishonest and old fashioned. But in latter (DETR, 2000) placed this emphasis these attributes are known as 'cowboy building' that was meant to disgrace the image of these noble industry. But, UN-Habitat (2006) than again stated that policies implementation are absent in certain states as an outcome of these explanations: feeble established preparations; Provision of appropriate permitting structures to enhance their

contribution to the development, unproductive apparatuses to involve and deprived themselves.

But in the reviewed of literature of Dair and Williams (2006); DETR (2000); Hill and Bowen (1997); Sjostrom, (2001); the sustainable construction under social principles are found as listed;

1. Improvement of value of human life, comprising poverty mitigation.
2. Creation for cultural variety on social self-government in development design.
3. Societies uplifting.
4. Promoting and protecting and promoting healthier safe working environment.
5. Enhancing standard of ethic (fairness at work policies and ethical trading standards).
6. Human resources development.
7. Enhancing capacity building to valuables in society
8. Implementing skills training and distribution of social costs of construction equitable and fairness.
9. Distribution of social benefits of construction equitable.
10. Equity in inter-generational seeking.
11. Facilities to serve development and provide adequate local services.
12. Integrating development within the locality.
13. Provide high standards and livable developments.
14. Preserving the indigenous heritage and culture.
15. Provide buildings that meet what customers and users' needs (example, well-being and value, provide greater-satisfactory).
16. Respecting of fair treatment of stakeholders in sustainable construction

According to Tam et al., (2006) the most environmental impact of building are air, energy consumption example dust and gas prevention, generating of waste noise, use of land, existing land dereliction, destruction of inhabitant and water use as resources water discharge.

2.7 SUMMARY

The literature review showed that sustainable buildings are progressively significant question in the construction industry must be answered by all. While the theory is problematic to describe and the industry is struggling for self-regulation which has been disapproved, the construction or housing industry progressively anticipates to device sustainable occupational practices. The purposes of these approaches of managers are probable to be prejudiced by influences such dimension, possession or place of the occupational. This review briefed certain displays for sustainable in housing industries and also drew the aids and obstacles related with an effective operation in sustainable occupational practices.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

Cooper and Schindler (2003) indicated that the suitable methodology proceeds after the study of literature of that particular study which includes discovering the findings and research problems. The methodology for the study attempts to tackle the approach used for the study. It discusses the procedure and strategic approaches adopted for the study and it includes the design and development of questionnaires, concise definition of the population, sampling techniques and the determination of the sample size and the relevant techniques regarding research.

Naoum (1998) and Fellows and Liu (2003) explained that the findings of any study is as a result of the methodology used and consequently the success and validity of the research critically depend on the appropriate selection and implementation of the research method. When the aim of a research is determined and literature review is thoroughly undertaken, it becomes adequately convenient to design a detailed research (Naoum, 1998). Research methodology discloses an adequate understanding of how the research was carried out and structured so as to acquire relevant information. The survey questionnaire was designed in relation to the methodology adopted and administered to the relevant stakeholders in-charge of providing an inclusive built environment in Ghana. This chapter provides the features of the developed study, highlights the methods adopted for the study to obtain information from the various stakeholders and also highlights on the collected data and its analysis. It also indicates the selection of participants in the research and finally concludes with the approaches adopted for the analysis of data collected.

3.2 PHILOSOPHICAL CONSIDERATIONS AND STANCE OF THE RESEARCH

‘Pragmatic social researchers can use philosophical and political debates as resources for achieving certain mental attitudes rather than a set of underlying principles from which all else must follow creating unnecessary obstacles to flexible stimulating inquiry’ (Ritchie and Lewis, 2003).

Koeting, (1996) and Christou, et al., (2008), indicated that the knowledge of philosophical reviews in research coincides with the previous works done. But Bryman (2004) brought out two key philosophical points namely ontology and epistemology. In addition, Denzin and Lincoln (1998) also named ontology and epistemology as fundamental to every paradigm. According to Christou, et al., (2008), epistemology, axiology and ontology are the philosophical matters that suppositions to be used in order to address the selection of unmistakable plans for the instrument used in research. (One of the branches of epistemology is philosophy that interprets the positions that pertains to how individuals regulate what is right during study (Streubert and Carpenter, 1999).

Table 3.1 Summary Epistemological Considerations of Social Science Research

<i>Epistemology</i>	
<i>Positivist</i>	<i>Interpretivists</i>
Application of natural science methods to the study of social reality and beyond	Absence of universal truth and emphasis on realism of context
World conforms to the laws of causations and complex issues can be resolved by reduction	Understanding and interpretation come from researchers own forms of reference

Source: Baiden (2006)

Bryman, (1992) c.f Osei-Hwedie, (2010) indicated that knowledge should be positivist's style. Positivists believe that knowledge in science proves facts and establishes information through gathering. The opinion of this research was to identify and analyse the factors that impedes the implementation of sustainable strategies construction.

Marsh and Stoker, (2002) maintained that the real world exists in the sovereign of knowledge that Ontology referred to as enquiring the existence of knowledge. It is a theory of living being. Ritchie and Lewis (2003) is also of the view that ontology is concerned with researcher's beliefs about the nature of the social world and what can be known of it.

Table 3.2 Summary Ontological Considerations of Social Science Research

<i>Ontology</i>	
<i>Realist</i>	<i>Relativist</i>
External world comprises pre-existing hard and tangible structures	Existence of multiple realities as subjective construction of the mind
Structures exist independent of individuals ability to acquire knowledge	Perception of reality is directed by varying socially transmitted terms

Source: Baiden (2006)

3.3 RESEARCH STRATEGY

The research procedure used for this study would guild us to one of these two processes that is quantitative or qualitative in the starting. The suggestion made by Yin (1994) indicated that the research strategy used is dependent on the aims and the accompanied research questions. The strategies are thus explained as follows:

- A quantitative method suggests the search for information that will describe, measure, and clarify the phenomena of our reality. It is often structured and

well organized. Quantitative research aims to quantify the data and, usually, applies some procedure of statistical analysis (Malhotra, 2007). A quantitative method is a research procedure in which concrete, scientific and projectable statistical data are statistically analyzed. It is also a gathering of statistical facts in order to describe, predict, and explain or control phenomena of concern. Qualitative methods on the other hand are more flexible and could be used to exploit in-depth different areas of research question (Ghauri and Gronhaug, 2002)

- A qualitative research basically examines, deduces and appreciates the inner perspectives about the phenomena in the study. According to Malhotra (2007) qualitative research provides comprehensions and understanding of the difficult situation. This may often relate to research work, where the purpose is to receive detailed evidence in order to obtain a deeper insight into difficulties encountered during the research. Furthermore, it is more real in seeking the conduct and attitude of each individuals when ‘open ended’ through focus groups or in-depth interviews.

This research was based on quantitative research. As said by O’Leary (2004), quantitative research is defined as creating quantitative data that can be represented through statistics and analyzed using statistics.

3.4 RESEARCH DESIGN

This research work adopted a quantitative strategy with structured questionnaire in a mission to identify strategies for implementation of sustainable development for indigenous Ghanaian building industry. The structured questionnaire is perhaps the most broadly used data collection technique for guiding surveys to discover out facts, views and opinions (Naoum, 1998). The survey questionnaire is selected because of the need for simplification on the outcomes across the construction industry. This also increases the reliability of opinions and expands replications because of the accepted measurement and sampling procedures (Oppenheim, 1996).

In order to design a comprehensive survey tool which addresses the objectives for this study, a detailed literature assessment related to the study was first directed. Simple and upfront words and verdicts were used in the arrangement, thus, creating easy understanding and hence, providing extra accurate and reliable data from the respondent. The questionnaire was separated into two main divisions: the first division was the profile of respondent's and the second division addressed the specific variables or factors. The designed questionnaires were to include only scaled-response questions. A five point Likert scale of 1-5 was employed to measure the intensity or strength of respondent's view.

3.5 RESEARCH PROCEDURE

The sampling method, data collection instruments, and procedures are addressed in this section of the research methodology. It involves descriptions to each of the approaches engaged and accepted in order to address the aim, objectives, and research questions.

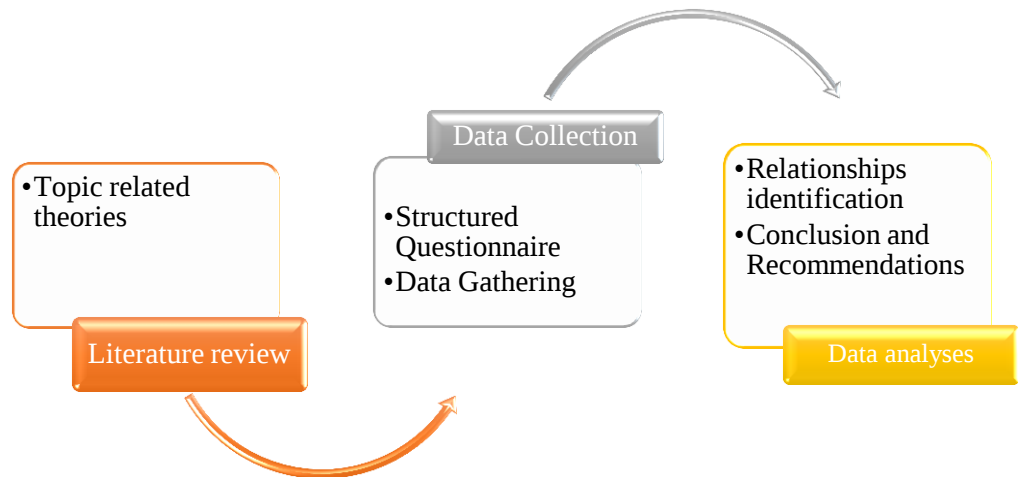


Figure 3.1: The flow process chart of research procedures

3.6 POPULATION

Saunders et al., (2007) indicated that the whole set of cases from which the sample is taken describes a population. Furthermore, a population can be described as the calibre of people or an element that the researcher is interested in. Peck et al., (2008) concur with Saunders et al., (2007) by stating that the total collection of persons or objects about which information will be desired is referred to as the population of interest while the target population or a sample is a subgroup of the population nominated for study in some prescribed method. The population for this study was the professionals in the MDAs, contractors, and private developers, consultancy firms and stakeholders in the Sunyani East and Nkoranza South Municipalities. The population for the study area is undefined. This is due to the fact that there was no information on the respondents. All efforts to obtain this data proved futile. The study therefore considered a convenient target population of 70 respondents.

3.7 SAMPLING TECHNIQUE AND SAMPLE SIZE

Webster (1985) describes ‘sample’ as a determinate part of a statistical population whose properties offer information about the whole population. ‘Population’ on the other hand as defined by Mugo, (2002) includes individuals in a group, objects or items from which samples for measurement are chosen. The researcher adopted the Purposive sampling technique which is a procedure that involves the selection of persons who represent the desired population. Polit and Hungler (1999) affirms that, purposive sampling technique is a non-probability sampling method which involves the conscious selection of certain subjects to be included in the study where the actual population is unknown. Purposive sampling is used because specific information is needed from a particular group of people due to their specialty in the area of study.

However, snowball sampling technique was utilised in locating the contractors, corporate and private developers, consultancy firms and other stakeholders because of the complications encountered in measuring the size of population. Snowball sampling is a technique for discovery research subjects (Atkinson and Flint, 2001). Kumar (1996) defines the snowball sampling technique as a procedure of choosing a sample by networking. The snowball sampling approach is to locate information on rich-key informants. De Vos (1998) affirmed that snowball sampling is appreciated in research since it is focused on individuals that are difficult to find. So, by using this method, a few probable respondents were contacted and then asked whether they can identify any other respondent with the features being sort for in the research. This technique was adopted to reach hard-to-get respondents. The contractors, private developers, consultancy firms and other stakeholders which were easy to locate in the metropolis and other municipalities were first contacted and they gave leads to others

with the same characteristics. This process continued till a sample size of fifty-eight (58) respondents was obtained.

3.8 QUESTIONNAIRE ADMINISTRATION

Collection of data is used to define a process of formulating and collecting data and the purpose of these procedures is to attain information to keep on record, to make decisions about vital issues, and to pass information on to others. The questionnaires developed were dispersed to and reclaimed from the professionals in the selected stakeholders. Ahadzie (2007) highlighted that the procedure of sharing and reclaiming of the questionnaires in person would be for two motives. Firstly, to ensure that the questionnaires gets to the projected respondents or recipients and secondly, to help improve the degree response. The professionals from the MDAs, contractors, private developers, consultancy firms and other stakeholders were given the questionnaires for responses. Continuous follow-ups were made to the respondents to prompt them to complete the questionnaires through telephone calls and personal visits.

3.9 DATA PRESENTATION AND STATISTICAL TOOLS FOR ANALYSIS

In order to translate the collected data into meaningful research result, a statistical technique was use for the study. Statistical Package for Social Science (SPSS) was used to carry out the analysis for this study and a computer database that helps to accelerate the statistical figures such as creating frequency tables, descriptive statistics together with Microsoft excel and the Mean Score rankings. The SPSS was used for analyzing the quantitative data. Charts, tables, percentages and documented reports of the statistics gathered among others were used in the event of the quantitative technique.

CHAPTER FOUR

RESULTS, ANALYSIS, AND DISCUSSIONS ANALYSIS

4.1 INTRODUCTION

This section represents the results of the research and discusses the results by establishing the key findings of the study.

4.2 DEMOGRAPHIC INFORMATION

Table 4.1: Demographic Variables

PROFILE	FREQUENCY	PERCENT
Organization of respondents		
Contractor	12	20.69%
Corporate and Private Developers	15	25.86%
Consultants	14	24.14%
EPA	17	29.31%
TOTAL	58	100%
Academic Qualification		
Postgraduate	13	22.41%
First degree	40	68.97%
SHS/ Vocational	5	8.62%
TOTAL	58	100%
Experience in Practice		
Less than and equal to 5years	13	22.41%
6 - 10years	13	22.41%
11 - 15years	24	36.22%
16 and more years	11	18.96%
	58	100%

Source: Field Survey (2015)

In general, (58) respondents took part in the questionnaires administration. From Table 4.1, 12 contractors of the respondents representing 20.68%, 15 corporate and private developers of the respondents representing 25.86%, 14 consultants of the respondents representing 24.13% and 17 Environmental Protection Agency (EPA) of the respondents representing 29.31% took part in this research work. Because most of the respondents have knowledge in sustainable construction in Ghana, it is believed that, the results presented in this study act as a check of balance for the other respondents. This also shows that the respondents are professionals in the construction industry and therefore the responses given are credible.

In Table 4.1 (58) respondents with highest academic qualification were indicated as follows: 13 of the respondents holds postgraduate degrees ranging from MSc to PhD representing 22.41%, 40 of the respondents representing 68.96% holds first degree and 5 of the respondents are SHS/Vocational school graduates representing 8.62% who voluntary took part of this study. The data collected have first-hand information from those with Highers academic qualification in construction industry in Ghana and can enhance the development of strategies for implementation of sustainable construction.

In the table 4.1 the practical work experience of respondents are indicated. The table shows that 13 respondents representing 22.41%, have less than or equal to 5 years' experience, 13 respondent with 6-10 years' experience representing 22.41%, 24 respondent with 11-15 years' experience representing 36.22% and 11 respondent with 16 or more years' experience representing 18.96 were also indicated. These are the people with the requisite knowledge in sustainable construction and have undertaken many projects in the Ghanaian building industry.

4.3 BARRIERS AFFECTING THE IMPLEMENTATION OF SUSTAINABLE CONSTRUCTION- OBJECTIVE 1

This section solicited for information using the likert scale ranking of 1 – 5. 1 indicates strongly disagreed, 2 indicates disagreed, 3 indicates neutral, 4 indicates agreed and 5 indicates strongly agreed how respondents agree with the various factors identified to be barriers affecting the implementation of sustainable construction in the study area. Using a test value of 3.5, factors with mean values 3.5 and higher were deemed to be significant whilst factors less than 3.5 were deemed not to be significant. 9 of the 29 factors were insignificant because they recorded mean values less than 3.5 as shown in Table 4.4.

Table 4.2: Barriers affecting the implementation of sustainable construction

	Mean	Std. Deviation	Ranking
Inadequate preferred workforce in demand of sustainability	4.24	0.59	1
Resistance to change	4.19	0.87	2
Inadequate public awareness on sustainable construction	4.13	0.60	3
Inadequate measurement tools	3.92	1.05	4
Inadequate preparation and planning of human settlement	3.90	0.74	5
Inadequate administrative determination	3.90	0.90	6
Weak cooperation between stakeholders	3.82	0.78	7
Inadequate on sustainable construction from client	3.8	1.01	8
Unwillingness to introduce sustainable construction	3.76	1.03	9
Lack of government support	3.71	1.12	10
Inadequate data and information on sustainable construction	3.69	0.97	11
Inexperience of policy implementers	3.65	1.20	12
Final cost higher	3.58	1.23	13
Inadequate professional knowledge	3.56	1.02	14
Provision of appropriate permitting structures to enhance their contribution to the development, unproductive apparatuses to involve and deprived themselves	3.55	0.99	15
Low commitment of government agencies	3.54	1.17	16
Cost investment which is high	3.52	1.18	17
Inadequate training	3.50	0.94	18
Financial means for implementation are limited	3.50	1.01	19
Inadequate technology	3.50	0.89	20
Improper monitoring	3.42	1.09	21
Inadequate enforcement	3.37	1.09	22
Inadequate design and construction team	3.36	0.97	23
Insufficient lawful structures in place	3.26	1.14	24
Incentive is lacking	3.25	0.95	25
Inadequate expertise from professionals	3.22	1.04	26
Inadequate job security	3.21	1.00	27
Low sanction to culprits found culpable	3.19	1.08	28
Inadequate strategic focus, such as on the needs and potential contributions of women	2.90	1.22	29

Source: Field Survey (2015)

The five most significant factors that impede the implementation of strategies in sustainable building were identified as inadequate preferred workforce in demand

with mean score of 4.24 which ranked 1st, resistance to change ranked 2nd with mean of 4.19, inadequate public awareness on sustainable building ranked third with mean of 4.13, inadequate measurement tools with mean of 3.92 ranked fourth and inadequate preparation and planning of human settlement with mean of 3.90 was ranked fifth.

4.3.1 Inadequate Preferred Workforce in Demand

Mostly, in every sector demand must meet supply. Since most of the workforces in the sustainable building industry is inadequate to meet the demand of client for the implementation process to take effect, there is a need to enhance the workforce of this industry. According to Toronto Green Development Standard (2006), community mindfulness on the sustainable green building is an important factor that steered the quest of the people. The need to develop proper templates for all sustainability workforce is paramount in attaining sustainable building strategies for development in Ghanaian building industry.

4.3.2 Resistance to Change

Most people believe that change is a difficult decision to make in life time, but the reality of change brings transformation when it happens. Resistance to change was ranked 2nd with a mean score of 4.19 by the respondents as most significant factor in sustainability. But according Liu *et al.*, (2007) the human growth are couple with the natural system which is relatively slow to understood changes, but by providing synthesis patterns and procedures in discussions human and environment in order to widespread the effect beyond wildfire.

4.3.3 Inadequate Public Awareness

The other significant factor ranked as 3rd with a mean score of 4.13 was inadequate public awareness on sustainable construction in our communities. Most people do not understand the concept. Department for Business Enterprise and Regulatory Reform - BERR (2008), intimated that consultants in the public domain should draft policies to the sustainable construction implementation agencies and concluded that the duty of urban designs in the range of the policy awareness that have be recommended must be followed. They only speculate about what sustainable buildings are about, but in reality stakeholders are not serious about sustainability issues in Ghana. The public education should be one of the priorities and when adapted well the goals of sustainability development transformation will be achieved. The Environmental Protection Agency (EPA) is doing its best but it is still inadequate because developers continue to practice what they knew before sustainability emerged.

4.3.4 Inadequate Measurement Tools

An inadequate measurement tool ranked 4th, with a mean score of 3.92. This means that, it is an equally important factor. Measuring tools are relevant and must be provided to policy implementation developers in order to facilitate their work. Meanwhile, Häkkinen & Belloni, (2011), methods of implementation will depend on the impact of measuring tools provided.

4.3.5 Inadequate Preparation and Planning

One of the issues confronting Ghana sustainability development is resettlement of immigrants in urban areas. Most at times, policy planners allow migrants to settle at areas which are not inhabitable and they engage in practices that affect the sustainable development. Inadequate preparation and planning of human settlement is key to

policy makers because to resettle this migrants become problems in Ghana. According to UN-Habitat (2006), strategies and policies implementation should be well organized in providing buildings in several communities to aid their citizens. If the government is not able to provide adequate buildings for the citizens of Ghana, then the possible way for each and every one is to find their way to acquire building.

Meanwhile, the respondent ranked inadequate strategic focus, such as on the needs and potential contributions of women as least and irrelevant factor in strategies implementation of sustainable building in Ghana.

4.4 EFFECTS OF UNSUSTAINABLE CONSTRUCTION PRACTICES

This section solicited for information using the likert scale ranking of 1 – 5. 1 indicates strongly disagreed, 2 indicates disagreed, 3 indicates neutral, 4 indicates agreed and 5 indicates strongly agreed how respondents agree with the various factors identified to be effects of unsustainable construction practices. Using the mean score ranking, mean values of 3.5 and higher were deemed to be significant whilst factors less than 3.5 were deemed not to be significant. 4 of the 19 factors were insignificant because they recorded mean values less than 3.5 as shown in Table 4.5.

The five major ranked negative effect of sustainable building practices are extension of project duration with mean of 4.23 which ranked 1st, water pollution with mean of 3.98 which ranked 2nd, air pollution with mean of 3.98 which ranked 3rd, excessive energy and resource consumption with mean of 3.84 which ranked 4th, deforestation with mean of 3.80 which ranked 5th are most significant variables that were ranked by the respondents.

Table 4.3: Effects of unsustainable construction practices

Effects of unsustainable construction practices	Mean	Std. Deviation	Ranking
Extension of project duration	4.23	0.80	1
Water pollution	3.98	1.16	2
Air pollution	3.86	1.16	3
Excessive energy and resource consumption	3.84	1.22	4
Deforestation	3.80	1.02	5
Global warming	3.78	1.27	6
Generation of solid waste	3.77	1.29	7
Abandonment of projects	3.77	1.28	8
High maintenance cost of construction	3.66	1.07	9
Health and safety risks	3.62	1.31	10
High cost of construction	3.56	1.16	11
Unfair labour practices	3.54	1.08	12
Quality of a project is compromise	3.52	1.11	13
Soil erosion	3.50	1.08	14
Land use pollution	3.5	1.01	15
High turnover of labour	3.34	1.06	16
low profit margin	3.32	1.01	17
Increase litigation issues	3.24	1.22	18
Exploitation of indigenous heritage and culture	3.22	0.84	19

Source: Field Survey (2015)

4.4.1 Extension of project duration

Extension of project duration is one of the negative effects of the lack of sustainable building practices. It also affect cost and time in many situations. Nevertheless, this portray issues in sustainable development during it implementation in the building industry, it still stand as economic gear to the socio-economic development drive in Ghana's determination to use the industry to reduce unemployment rate in the country. Ampadu-Asiamah and Ampadu-Asiamah (2013), confirmed that projects are

critical in terms of its completion since owners and users are in dire need of it due to rate of interest increasing, plan target in development and inflations that affect the industry, the training to this important details are paramount to the players in the industry. Meanwhile in Ghana most project projects are delayed due to poor implementation strategies in the building project. Most private and corporate developers abandoned most building project in a middle way due to their inadequate planning during initial preparation.

4.4.2 Air, water pollution, resource consumption and deforestation

The 2nd ranked significant factor was air pollution, the 3rd factor was water pollution, the 4th factor was resource consumption and the 5th factor that was ranked most significant was deforestation. This has become apparent in many Municipalities in Ghana. This confirmed what Tam et al., (2006) the significant environmental impact of buildings are air, energy consumption. Examples include, dust and gas prevention, generating of waste noise, use of land, existing land dereliction, destruction of inhabitant and water use as resource and water discharge. In addition to the above factors the planning of various communities to enhance effective practices are relevant in achieving sustainability construction in Ghana. . Meanwhile, NEMA report (2004) also acknowledged that the major cause of degradation to the land and depletion of resources are poverty in the communities. Air, water, excessive energy and resource consumption and deforestation were ranked as important factors that detained the strategies for implementation of sustainable construction in Ghana. Whenever communities' members are allowed to do things their own way, such unfortunate things mentioned above are likely to happen. Gastone (2013), added up that, issue of illegal structures that has become unbearable in the urban areas due to protection of

land covered with floods, drought landslides, water scarcity and the threat imposed on the ecosystem.

4.4.3 Global warming, Abandonment of projects and High maintenance cost of construction

The following factors were ranked by the respondents as significant and believed that they must be checked as far as sustainable construction is concerned. Meanwhile, Beckerman (1994) acknowledge that environmental concerns are in economic strategies that have been generally taken from the developmental policy and have produced global warming in the whole wide world. In Ghana projects are quick to start but the reality is these projects are delayed and sometimes abandoned in many occasions.

The factor that was ranked least by the respondents was exploitation of indigenous heritage and culture which the respondents considered as having no impediment to the strategies for implementation of sustainability.

4.5 STRATEGIES FOR THE IMPLEMENTATION OF SUSTAINABLE CONSTRUCTION

This section solicited for information using the likert scale ranking of 1 – 5. 1 indicates strongly disagreed, 2 indicates disagreed, 3 indicates neutral, 4 indicates agreed and 5 indicates strongly agreed how respondents agree with the various factors identified to be the strategies for implementation of sustainable construction practices. Using the mean score ranking, mean values of 3.5 and higher were deemed to be significant whilst factors less than 3.5 were deemed not to be significant. All 29 identified were significant because they recorded mean values greater than 3.5 as shown in Table 4.6.

Table 4.4: Strategies for implementation of sustainable construction

	Mean	Std. Deviation	Ranking
Enhance material recyclability	4.56	0.60	1
Using sustainable local materials	4.46	0.57	2
Human resources development	4.43	0.57	3
Promoting and protecting and promoting healthier safe working environment	4.39	0.68	4
Assess the impact on health and the quality of life	4.36	0.56	5
Enhance materials re-usability	4.35	0.55	6
Enhance a participatory approach by involving stakeholders	4.35	0.59	7
Increase material efficiency by reducing the material demand of non-renewable goods	4.34	0.62	8
Avoid using materials that generate heat	4.32	0.67	9
Provide buildings that meet what customers and users' needs. (example, well-being and value, provide greater-satisfactory)	4.32	0.58	10
Promote public participation	4.25	0.62	11
Reduce and control the use and dispersion of toxic materials	4.20	0.66	12
Develop appropriate economic instruments to promote sustainable consumption	4.20	0.68	13
Implementing skills training and distribution of social costs of construction equitable and fairness	4.20	0.63	14
Providing Biogas facilities at a subsidized rates to residents	4.18	0.65	15
Consider life-cycle costs	4.18	0.68	16
Reduce the energy required for transforming goods and supplying services	4.15	0.71	17
Maximize the sustainable use of biological and renewable resources	4.13	0.55	18
Consider the economic impact on local structures	4.13	0.52	19
Reduce the material intensity via substitution technologies	4.07	0.75	20
Enforce building regulations and other relevant codes	4	0.78	21
Consider the impact of planned projects on air, soil, water, flora, and fauna	4	0.68	22
Support the instruments of international conventions and agreements	3.96	0.71	23
Internalize external costs	3.94	0.66	24
Promote the development of appropriate institutional frameworks	3.94	0.75	25
Using of non-renewable resources in preference to renewable resources	3.92	0.92	26
Consider the influence on the existing social framework	3.90	0.65	27
Reducing landscape sensitive damage	3.90	0.86	28
Consider alternative financing mechanisms	3.88	0.70	29

Field Survey (2015)

4.5.1 Enhance material recyclability

Materials recycle is something that policy makers in sustainable building should look at in whatever decision that are taken about sustainable development. Pennington *et al.* (2011) noted that, generating waste amount to the consumption and production patterns of the people. In Ghana people generate waste without looking at the negative effect to the development of this nation. Policy makers are not thinking beyond the box because they are confused in what to do with those wastes. As shown in the appendix, car tyres have been used to construct the walls of a single bedroom and 1No 3-Unit classroom structure for pupils in Nkoranza Asekye Dumasi. There are several waste materials causing unpleasant pollution in various Municipalities. Meanwhile in Sunyani alone, in every 1Km these tyres and other waste materials are found that can be used for the purpose. No wonder recyclability was ranked 1st first with mean score 4.56, because leaders of sustainable practice should rebuild an industry that will promote recycling of used materials. This should be part of the developmental agenda thereby solving some of the unemployment issues in the country. According to Boshier *et al.* (2007), the industry is not only seen as a critical component for achieving aims of the government, but also as an economic giant that plays a fundamental role in the development of the economy.

4.5.2 Using sustainable local materials

The respondents ranked using sustainable local materials as 2nd with mean score of 4.46. Ghana is blessed with many local materials that are sometimes ignored but rather looks for composite material for development. Consultants, policy implementers and other stakeholders must stick to the development of the Ghanaian building industry by designing structures that use locally base materials to enable proper strategic implementation of sustainable building to take place. The pictures in

the appendix may look funny but there are lessons that can be learnt from them. According to Construction Industry Research and Information Association - CIRIA (2001); Myers (2005) the building industry is considered as one of the dirtiest amongst other industries. DETR, (2000) placed emphasis that this attributes are known as 'cowboy building' that was meant to disgrace the image of these noble industry. But this study disputes that statement and believed that going back and adding value to these structures will solve many issues in the building industry. Significantly it can also help some low income earners in various communities in Ghana to acquire their own buildings.

4.5.3 Human Resources Development

The factor ranked as the 3rd most significant was human resources development. Strategies for implementation of sustainable building practices can only be achieved when stakeholders develop the requisite knowledge. UN-Habitat (2006), noted that policies implementation are absent in certain states. This shows that knowledge in the sustainable development are very important and needed to be acquired in order to aid smooth implementation.

4.5.4 Protecting and Promoting Healthier Safe Working Environment

The 4th ranked factor was protecting and promoting healthier safe environment. Ajzen and Fishbein's (1980), strongly acknowledged that behavior intentions theory of reasoned action existing with certain character have links that couple with attitude and belief. Both combined with micro-environment influenced by motivations, personal values, pressures and personal links. Promoting personal values are indication of community development which has positive effects to sustainable buildings and protecting healthier safe environment.

4.5.5 Assess the Impact on Health and the Quality of Life

Assess the impact on health and the quality of life was ranked 5th as significant factor and it is also relevant in strategy for implementing sustainable development in Ghana. Du Plessis (2007) indicated that stages of describing buildings are in line with sustainable and it shows that the outward significant implication on assessing health on quality of life of the people depend on building industry. Moreover the health and quality of life that require greater amount of resources are energy, money and good accommodation.

4.5.6 Other Significant factors ranked by respondents

From the respondents other significant factors ranked were ‘enhance materials re-usability’, ‘Enhance a participatory approach by involving stakeholders’, ‘Increase material efficiency by reducing the material demand of non-renewable goods’, ‘Avoid using materials that generate heat’, ‘provide buildings that meet what customers and users’ needs. (example, well-being and value, provide greater-satisfactory), Reduce and control the use and dispersion of toxic materials, providing Biogas facilities at a subsidized rate to residents and amongst others were ranked between 4.35 to 4 by the respondents. Meanwhile the researcher also acknowledged that providing bio-gases in most homes are relevant in developing strategies in sustainable buildings in Ghana.

The factor ranked least by the respondents was ‘consider the impact of planned projects on air, soil, water, flora, and fauna’. But the researcher believed that the factor although ranked least had positive effects in sustainability when policy makers place essential role on that.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The study conducted indicates that sustainable buildings are keen in the construction industry in Ghana.

For instance respondent agreed that inadequate preferred workforce on demand of sustainability is the most deterrent factor to sustainable buildings. Others are resistance to change, inadequate public awareness on sustainable building, inadequate measurement tools and inadequate preparation and planning of human settlement are most significant factor ranked by the majority of the respondents.

On the other hand, inadequate government supports in strategies for implementation of sustainable buildings, the respondents ranked as the least factor, meanwhile, the researcher belief that government failure to support sustainable buildings are inadequate in sustainable development in Ghana.

On the negative effect for sustainable practices the majority of the respondents are saying extension of projects are the cause of unsustainability in building industry in Ghana.

Meanwhile, in their other factors like exploitation of indigenous heritage and culture is not deterrent to sustainable buildings in Ghana.

On the strategies implementation the respondents acknowledge enhancing materials recyclability as problem in sustainable building in Ghanaian development.

Meanwhile, the respondents did not include alternative financing mechanism as one of the most significant factor deterrent to sustainability development in Ghana.

5.2 SUMMARY OF FINDING AND DISCUSSIONS

The study shows that the factors that impede sustainable building in Ghana include inadequate preferred workforce in demand of sustainability. This shows that workforce in sustainable buildings are needed for effective implementation of sustainable principles in Ghana. From literature review there were two factors that drive sustainability in Ghana. These are grouped into internal and external. The internal factors are within the various stakeholders in public organization who have been set up to ensure that policies in sustainable construction are followed. The core duties of these organizations are to facilitate the activities of external factors by managing, monitoring and controlling projects undertaken by developers.

Again, the study found extension of projects duration as a negative effect of unsustainable practices in Ghana. This indicates that stakeholders must plan sustainable projects before the implementation.

Lastly, the study revealed materials recyclability as paramount in the promotion of sustainability in Ghana. This is fundamental in the implementation of sustainability practices in Ghana.

5.3 CONCLUSIONS

This research work aimed at looking into strategies for implementation of sustainable buildings in Ghana. The objectives were to look at the factors that impede sustainable development in Ghanaian building industry, negative effect of the factors, and strategies for implementation of sustainable development industry in Ghana.

In the research, the quantitative type of methodology was used, while questionnaires were distributed to (58) respondents made up contractor, Metropolitans, Municipals and Districts Assemblies (MMDA's) private developers, consultants and Environmental Protection Agency (EPA).

The research shows that sustainability construction in Ghana are not seriously promoted because most of our policies for implementation are redundant and are properly monitored for if effective delivery.

5.3.1 Some key factors that impede sustainable development were;

- Inadequate preferred workforce on demand for sustainability
- Resistance to change
- Inadequate public awareness on sustainable buildings
- Inadequate measurement tools Inadequate preparation and planning of human settlement
- Weak cooperation between stakeholders
- Inadequate administrative determination Inadequate on sustainable construction from client
- Unwillingness to introduce sustainable construction
- Lack of government support

5.3.2 The effect of the above impediments includes;

- Extension of project duration
- Air pollution
- Water pollution
- Excessive energy and resource consumption
- Deforestation

- Global warming
- Generation of solid waste
- Abandonment of projects
- High maintenance cost of construction

5.3.3 The strategies for implementation of sustainable construction development were:

- Enhance materials recyclability
- Using sustainable local materials
- Human resources development
- Promoting and protecting and promoting healthier safe working environment
- Assess the impact on health and the quality of life
- Enhance materials re-usability Enhance a participatory approach by involving stakeholders
- Increase material efficiency by reducing the material demand of non-renewable goods
- Avoid using materials that generate heat
- Provide buildings that meet what customers and users' needs. (example, well-being and value, provide greater-satisfactory)

5.4 RECOMMENDATIONS

In order to achieve sustainability in Ghanaian building industry;

- All stakeholders should re-consider sustainable construction policies in Ghana and use factors that ranked most significant to develop policies for sustainable construction in Ghana.
- There should be enforcement in the sustainable construction policies in place like illegal structures, developing in water way, materials use for construction are sustainable and sanction those who are found culpable.
- Materials which can be re-used and recycling should be encouraged as building materials in order to reduce wastes materials in the environment.
- Lastly, some of local building materials coconut trees, sawdust, cannel shells and elephant grass should be encouraged and if possible improve upon methods of constructional procedures to promote their uses.

5.5 LIMITATIONS

There are many other agencies like physical development planning, urban planners chiefs, etc. which should be included in this research, but due to limited time in producing this work they were not part of the study. Another impediment to this study was getting the statistical data of the respondent. This pushed the researcher to use snowball and convenient approaches to collect data for the analysis.

5.6 FUTURE WORK

Future works may include using used car tyres and coconut trees for construction of 2-storey building. This may also include chiefs who are custodial owners of land in Ghana and their part in sustainable building strategies implementation.

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APPENDIX 1: QUESTIONNAIRE

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF BUILDING TECHNOLOGY

QUESTIONNAIRE SURVEY

TOPIC:

“STRATEGIES FOR IMPLEMENTATION OF SUSTAINABLE DEVELOPMENT
IN THE CONSTRUCTION INDUSTRY IN GHANA” A *CASE STUDY IN
NKORANZA SOUTH AND SUNYANI EAST MUNICIPALITIES IN THE BRONG
AHAFO REGION.*

This is a study conducted by Mr Peter Kwasi Effah a student of MSc Construction Management with the Department of Building Technology, KNUST. This research questionnaire forms part of requirement set by the university for postgraduate students.

This study aims at developing strategies to enable the implementation of sustainable construction in the Ghana Construction Industry. And such can be achieved by soliciting information from professionals in the Ghanaian Construction Industry especially those working or have worked within the Nkoranza South and Sunyani East Municipalities in the Brong-Ahafo Region.

Information provided in this questionnaire is solely for academic studies.

Thank you

Mr Peter Kwasi Effah

Department of Building Technology, KNUST

020 247 2064

Please tick where appropriate

SECTION A: DEMOGRAPHIC INFORMATION

Please indicate where you belong?

- ☐ Contractor
- ☐ MDA's/Private Developer
- ☐ Consultant
- ☐ EPA

Please indicate your position in your firm?

Please indicate your highest academic qualification?

- ☐ PhD/MPhil/MSc/Pg Dip
- ☐ BSc/BA
- ☐ SHS/ Vocational
- ☐ JHS

How long have you been in practice?

- ☐ Less than and equal to 5years
- ☐ 6 -10years
- ☐ 11 – 15years
- ☐ 16 and more years

SECTION B: DETERMINING FACTORS IN SUSTAINABLE CONSTRUCTION

Please based on your experience, indicate your opinion to the various variables presented as the factors acting as impediment in the implementation of sustainable construction by kindly ranking them on a five point likert scale provided; 1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly agree

	Barriers to Sustainable Construction	1	2	3	4	5
1	Inadequate preparation and planning of human settlement					
2	Provision of appropriate permitting structures to enhance their contribution to the development, unproductive apparatuses to involve and deprived themselves					
3	Insufficient lawful structures in place					
4	Lack of strategic focus, such as on the needs and potential contributions of women					
5	Financial means for implementation are limited					
6	Inadequate administrative determination					
7	Low sanction to culprits found culpable					
8	Inexperience of policy implementers					
9	Low commitment of government agencies					
10	Inadequate enforcement					
11	Inadequate expertise from professionals					
12	Inadequate design and construction team					
13	Inadequate professional knowledge					
14	Inadequate data and information on sustainable construction					
15	Weak cooperation between stakeholders					
16	Inadequate technology					
17	Inadequate training					
18	Inadequate public awareness on sustainable construction					
19	Inadequate demand on sustainable construction from client					
20	Resistance to change					
21	Inadequate job security					
22	Inadequate Incentive					
23	Cost investment which is high					
24	Final cost higher					
25	Inadequate government support					
26	Inadequate measurement tools					
27	Improper monitoring					
28	Inadequate preferred workforce on demand					

SECTION C: NEGATIV EFFECTS ON CHALLENGES IN SUSTAINABLE CONSTRUCTION

Please based on your experience, indicate your opinion to the various variables presented as the effects on the barriers in the implementation of sustainable construction by kindly ranking them on a five point likert scale provided;

1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly agree

	NEGATIVE EFFECTS ON CHALLENGES IN SUSTAINABLE CONSTRUCTION	1	2	3	4	5
1	Air pollution					
2	Water pollution					
3	Deforestation					
4	Global warming					
5	Generation of solid waste					
6	exploitation of indigenous heritage and culture					
7	Health and safety risks					
8	Quality of a project is compromise					
9	Extension of project duration					
10	High cost of construction					
11	High maintenance cost of construction					
12	Land use pollution					
13	Excessive energy and resource consumption					
14	Soil erosion					
15	Unfair labour practices					
16	High turnover of labour					
17	low profit margin					
18	Increase litigation issues					
19	Abandonment of projects					

SECTION D: STRATEGIES FOR IMPLEMENTATION OF SUSTAINABLE CONSTRUCTION

Please based on your experience, indicate your opinion to the various variables presented as the strategies for the implementation of sustainable construction by kindly ranking them on a five point likert scale provided;

1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly agree

	STRATEGIES FOR IMPLEMENTATION OF SUSTAINABLE CONSTRUCTION	1	2	3	4	5
1	Increase material efficiency by reducing the material demand of non-renewable goods					
2	Reduce the material intensity via substitution technologies					
3	Enhance material recyclability					
4	Enhance materials re-usability					
5	Using sustainable local materials					
6	Providing Biogas facilities at a subsidized rates to residents					
7	Enforce building regulations and other relevant codes					
8	Reduce and control the use and dispersion of toxic materials					
9	Avoid using materials that generate heat					
10	Reduce the energy required for transforming goods and supplying services					
11	Support the instruments of international conventions and agreements					
12	Maximize the sustainable use of biological and renewable resources					
13	Reducing landscape sensitive damage					
14	Using of non-renewable resources in preference to renewable resources					
15	Consider the impact of planned projects on air, soil, water, flora, and fauna					
16	Consider life-cycle costs					
17	Internalize external costs					
18	Consider alternative financing mechanisms					
19	Develop appropriate economic instruments to promote sustainable consumption					
20	Consider the economic impact on local structures					
21	Enhance a participatory approach by involving stakeholders					
22	Promote public participation					
23	Promote the development of appropriate institutional frameworks					
24	Consider the influence on the existing social framework					
25	Assess the impact on health and the quality of life					
26	Provide buildings that meet what customers and users' needs. (example, well-being and value, provide greater-satisfactory)					
27	Implementing skills training and distribution of social costs of construction equitable and fairness					
28	Human resources development					
29	Promoting and protecting and promoting healthier safe working environment					

APPENDIX 2: SURVEY PICTURES



Plata 4.1: Saw dust at the middle of Sunyani East Municipality creating unconducive situation for the inhabitants in the area. This can be recycle in many form to produce building materials.



Plata 4.2: Damage car tyres damped at various road side in the two Municipalities



Plata 4.3: Damage car tyres re-used to construct 1 No 3-Unit classroom and a bedroom apartment in Nkoranza Municipal.



Plata 4.4: Stakeholders in building industry can improve on the local material which can be accepted for all.