Sustainability and Construction: A Study of the Transition to Sustainable Construction Practices in Nigeria

By

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ABSTRACT

Sustainability is one of the most important challenges of our time. In the 21st century, it has become a central issue for debate about development at local, national and international levels. The concept of sustainability is now seen as an integral part of policy reforms in many countries because of the potential for detrimental impacts of certain practices on the environment and society. Within the construction sector, there is a growing interest in the ethos of sustainable development. However, it is unclear if most countries in western Africa share the same inclination, owing to the particular development needs and the challenges that these countries face. This present research explores the extent to which the construction companies in Nigeria takes into account and apply sustainability principles in project management activity, with the view to developing a strategy for change to improve sustainability practices.

The present research was conducted through case studies to increase our understanding of the current situation. Nine projects from three multinational construction companies were selected for study in four main geopolitical zones in Nigeria to ensure the diverse social-cultural and geographical demographic areas were represented. Data was collected through a combination of survey, interviews and documents to acquire comprehensive evidence for the research. This research was conducted in two stages; first, a survey was conducted to gain broad insight into the current practices and the ambition of the participating company to improve sustainability performance. A total of 204 questionnaires were studied using descriptive statistical analytical techniques. The outcome of the survey, guided the series of semi-structured interviews with 31 representatives of the middle and senior-management team from three different stakeholders groups – the clients, contractors and regulatory institutions. The interviews were designed to get an in-depth insight into the rationale for the current practices, as well as the barriers and opportunities for promoting a sustainable construction approach. Interview data were coded and analysed using Nvivo 10 data management software.

The research findings illustrate the complexity of sustainable construction in Nigeria, and the data reveal that performance of socio-environmental sustainability is low in the practices of many companies. Low sustainability performance is attributed to low levels of commitment by key stakeholders in the construction sector, such as the clients, construction companies and the regulatory agencies to sustainable principles; rather, they focus on quality and timely delivery. Stakeholders' behaviour is intrinsically connected to their values, the nature of the construction system and their understanding of sustainable construction and this perception drives the operations and governance of construction activities in the industry. Furthermore, the inability of supporting institutions to develop and effectively implement sustainability regulations, coupled with political instability and security were also identified as barriers to sustainable practices in the industry. In view of the complexities of the Nigerian construction system, change towards sustainable practices

will require a systemic solution. This study identifies the various leverage points to improve sustainability practices in the construction industry. It utilizes dynamic multi-level system modelling for sustainability transition to create a methodology for a transition in construction practices in Nigeria, to migrate them the traditional ones towards a more sustainable approach.

Another point of leverage is the quality movement in the industry. The current quality management processes which have potential for more-coherent socio-environmental performance are limited at present because of the traditional focus on economic values. To explore this potential for improvement, the research findings were used to model a transition strategy by which the traditional, economic-led perspective of quality management can be broadened into one that is more environmentally and socially inclined. It describes how companies can adjust traditional quality management processes focused on economic values to become more-inclusive of social-environmental values. By adjusting the present economic-led quality management processes to embrace the latent socio-environmental values contained within it, the attainment of sustainable construction practices can be positively improved.

This study argues that the most significant point for change that would spread across the entire construction system is to renew the thinking upon which the present system is based. More thought and attention is needed to improve awareness and education of sustainable construction by focusing on the benefits of sustainable practices. This would result in a 'value shift' that would serve as a catalyst for change that would affect the entire construction system. Activities that will aid the shift include education, training, information on dangers of non-sustainable practices and the benefits of sustainability in construction, effective implementation of regulations, leadership commitment and development of capacity to support sustainable construction.

DEDICATION

This thesis is dedicated to God Almighty, who made it possible for me to accomplish this task. This work is also dedicated to my late parents Mr Pius and Mrs Catharine Esezobor for their love, care and invaluable advice which to date is shaping my daily life experience.

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Table of Contents

List of Figures

List of Tables

Chapter 1

1 Research Background and Scope

1.1 Introduction

The concept of sustainability in the construction industry has grown in importance in the last few decades, for example, following increasing awareness promoted by the United Nations World Commission on Environment and Development about the need to minimise the negative impact of development activities on the environment and society (WCED, 1987). The present research explores how construction organizations in Nigeria consider – and integrate –sustainability in their working practices, with the view to develop a strategy for change to improve sustainability performance. Apart from the general acceptance of the importance of sustainability, the concept embraces three main tenets: economic, social and environmental sustainability (Elkington, 1997; Silvius et al, 2013; Brennan et al, 2014). However, there is an increasing depth to the meaning and interpretation of the concept (Carew and Mitchel, 2007; Baredi, 2013). What is meant by 'construction' and 'sustainability' are both complex concepts, with variety of views in terms of scope and meaning. Generally, sustainability in construction refers to the application of sustainability principles in the building practices. It has several dimensions, which include dealing with economic, social and environmental concerns in the construction process and its results. Other dimensions such as the technical dimension (Hill and Bowen, 1997; Ashley et al, 2003; Pawlowski, 2008), and cultural and managerial considerations (Ofori, 1998; CIB, 1999; Langhelle, 1999) have been identified in the literature. However, Elkingtson's (1997) 'triple bottom line' concept of sustainability, which focuses on the economic, social and environmental dimensions, has remained dominant.

Despite the complex nature of the concept of construction and sustainability, and the differing interpretations, construction activities contribute significantly to global climate change and generate several other environmental threats. The sector is responsible for about one-third of global greenhouse gas emissions (UNEP, 2009), and accounts for the consumption of significant amounts of non-renewable natural resources (USEPA, 2009). To mitigate the negative impacts of construction, various strategies have been proposed both in academia and by other institutions to assess and guide construction activities. Zhang et al (2014); Hill and Bowen (1997) developed strategies and frameworks for sustainable construction to guide a shift from the conventional practices towards the path of sustainability. However, their work has been criticized for placing too much emphasis on environmental issues and overlooking the social and economic dimensions. Different international 'green' construction initiatives such as the Building Research Establishment Environmental Assessment Methodology (BREEAM) and the US green building council have introduced different assessment strategies to improve sustainable practices, but these initiatives have not been embraced globally. Sharifi and Murayam (2013) stated that these initiatives are pro-western: they focus mainly on environmental challenges within developed countries, with less attention to the economic and social dimensions of sustainability that pose significant challenges to developing countries (see Abdalla et al,

2011, for example). Several publications in the literature suggest that, so far, efforts to change construction practices from the traditional approach to a more-sustainable path appear to have yielded limited results (Sneddon et al, 2006; Halliday, 2008; Brennan and Cotgrave, 2014), especially in most developing countries (see Ebohon and Rhwemila l, 2000).

Dania et al, (2013) stated that developing countries like Nigeria are often faced with challenges and issues that are different from the advanced countries (see Adebayo, 2002; Du Plessis, 2005). These include rapid population growth, high levels of rural to urban migration, infrastructural and housing deficit, poverty, skill shortage, weak government institutions, political instability, and social inequality. In recognizing that developing countries require a different approach, Agenda 21 for Sustainable Construction in Developing Countries (SCDC) was introduced, which focused on the developing countries perspective (Du Plessis, 2002). However, this initiative appears to have produced limited results due to not enough detail incorporated in the Agenda 21 guide for SCDC. Dania et al, (2013) argued that the framework is generic, developed from a discussion document which was based on nine expert position papers. The guide appears to not fully consider the peculiarities of the situation in the sub-Saharan African countries, and the challenges faced by their construction sector. Building on Agenda 21 for SCDC initiative, Du Plessis (2007) proposed a strategic framework for change in developing countries. She identified the relationship between the drivers, enablers and stakeholders as key factors to enhance change, and expressed the need to develop certain enablers to help these countries adopt a more-sustainable ethos. However, her framework appears to capture a broad strategy for the adoption of sustainability, which is predicated on a viable and capable construction sector with the ability to respond to sustainability challenges. Given the various change initiatives and interventions that are available, literature and anecdotal evidence suggests that these efforts have yielded little results in most developing countries, particularly in Nigeria (Ebohon and Rhwemila, 2000; Halliday,2008; Du Plessis and Cole 2011; Diana et al, 2013a).

Hastings and Saren (2003) point out that adequate information that promotes the need for change and a good understanding of the surrounding situation is crucial for change. To achieve effective change in construction operations in Nigeria, a good understanding of the particular requirements of the industry there is vital. Despite global interest in sustainability since the late 1980s, and the numerous initiatives to encourage a sustainability agenda in the construction sector, the level of progress in Nigeria and most developing countries appears low (Ebohon and Rhwemila, 2000; Adebayo, 2002). Du Plessis and Cole, (2011), suggest that to achieve effective change it is important to intervene at a point where the sustainability concept could spread across the entire system. However, there are concerns as to whether Nigeria, and most developing countries, has the ability (technical and financial capability) and the commitment to implement a sustainable construction agenda.

1.2 Aims and Objectives

The aim of this research is to explore the extent to which sustainability is integrated in construction practices in Nigeria, with the view to develop a strategy for change towards sustainable practices.

The specific objectives include the following;

1. To review literature on sustainability and construction practices, and establish the meaning of 'sustainable practice' in different contexts.
2. To investigate current practices of construction organizations in Nigeria.
3. To determine the drivers and barriers of change towards sustainable practices.
4. To provide an understanding of the complexity of sustainability and construction in Nigeria and its impact on company practices.
5. To develop a strategy for change towards sustainable construction practices in Nigeria.

1.3 Rationale for the Research

The contribution of construction to global climate change and its potential for detrimental effects on the environmental is significant. It is important for actors in the industry to adapt processes that follow the principles of sustainability to reduce the negative impact of construction activities. In most developing countries, research has shown that sustainability principles are poorly embedded in the activities of construction organizations (Ebohon and Rhwemila, 2000; Du Plessis, 2007). Authors such as Baloi (2003) and Reffat (2004) argued that sustainability movement in most African countries is at its infancy and there is little regard for the long-term impact of construction development activities on either the environment or society. Baumgartner and Ebner (2010), in support stated that most construction practices fall short of meeting sustainability requirements (see also Halliday, 2008, p. 4). In Nigeria, the contribution of most construction organizations to sustainability goals is poor, particularly with regard to policy integration, social responsibility and environmental conservation (Babatunde and Low, 2015; Mbamali and Okotie, 2012; Luken and Hesp, 2007).

Either reactively or proactively, most organizations are looking for ways to integrate sustainability in their practices; this is evident in their corporate communications and annual reports (Lacy et al, 2010; Silvius et al, 2012). Recent studies reveal that the contribution of construction organizations to sustainability is directly influenced by the organization's corporate strategies, and that corporate support for sustainability influences how sustainability principles are addressed within projects (Labuschagne et al, 2005; Gareis et al, 2013; Lange et al, 2013). If companies understand how to integrate sustainability into organizational practices, it will likely improve their contributions to sustainable

development. However, due to the complex, broad, and interpretative nature of the concept of sustainability (Ciegis et al, 2009; Baumgartner and Ebner, 2010), integrating the ethos into organizational business practice has been a daunting challenge. Thus, an understanding of sustainable practices is necessary to enable appropriate action. From literature and anecdotal evidence, it appears sustainability is not being properly addressed in the construction industry in Nigeria (Babatunde et al, 2010;Nwokoro and Onukwube, 2011; Mbamali and Okotie, 2012). This could be attributed to the views and understanding of sustainable practices by stakeholders, which reflect how practitioners within the construction industry make sense of the concept of sustainability (Klein, 2015). Du Plessis (2005) stated that stakeholders' interest in sustainability, and their ability to respond through adaptive policies and practices, depends on their frame of reference with respect to their understanding, decision-making systems and the operations of the supporting institutions. The present study specifically explores various stakeholder views, and discusses typical practice to understand the reasoning behind stakeholders' actions or inaction toward sustainable construction practices.

Babatunde and Low (2015) stated that present construction practices in Nigeria, focusing on how the built environment is designed, constructed, maintained and managed, are based on long- established practices that are inherently unsustainable (see also Luken and Herp, 2007). There is need for change both in behaviour, policies and practice (Silvius et al,2013) to create a sustainable built environment. Nigeria is one of the fastest growing economies in Africa, with a vast number of on-going development projects; this provides the opportunity to follow a more-sustainable development path (Reffat, 2004; Mbamali and Okotie, 2012). In theory, sustainable construction concepts can be embraced simultaneously (Silvius et al, 2012), but in practice are much more difficult to adopt. The challenge is how to develop a practical approach to integrate sustainability principles into daily construction practices in Nigeria. Studies of the integration of sustainability principles into construction projects reveal that this topic is approached from a logical, conceptual and moral point of view, given that it is an emerging field (Silvius et al, 2013). However, this does not diminish the need to investigate and develop a practical sustainability approach. The present research explores the complexities associated with integrating sustainability in construction projects in Nigeria, with the view to developing a practical way forward in management methods and processes to improve practices.

1.4 Overview of Primary Research

This study was conducted in Nigeria, which has the largest economy and population in Africa (Dania et al, 2014; National Bureau of Statistics, 2014). The research utilised two stages of primary data collection to achieve its aim and objectives. These stages are described in sub-section 1.4.1 and 1.4.2 below, while 1.4.3 explains how the transition from traditional practice towards sustainable practices could be achieved.

1.4.1 The Study of the Degree to Which Companies Consider Sustainability in their Practices

The first stage involved a survey of the activities of construction companies to investigate their current practices. The survey focused on three multi-national companies in Nigeria, which are referred to in this study as company A, B and C.

The survey reported in the present research was conducted from the 14th of April to 5th of May 2014, among the three multi-national construction companies mentioned above. A total of three different projects were investigated within each company, and the size of the projects in terms of budget cost, range from 6 billion to over 10 billion naira. In all, nine different projects were investigated and a total of 270 questionnaires were distributed amongst the three selected companies, 90 questionnaires per company (30 were sent for each project under scrutiny). The survey questions were grouped into themes; economic, social, and environmental sustainability. Twelve questions were asked under these themes, three for economic sustainability, four questions for environmental sustainability and five questions for social sustainability. The questionnaires were distributed in the same way, to middle and junior management of all three companies. The survey questions were based on Silvius and Schipper's (2011) sustainability assessment model; this model offers a practical way to assess the broad and interpretative concept of sustainability. The assessment questionnaire was based on two leading concepts, the aspects or criteria for sustainability, and the level or depth of integration in company practices. It assessed the extent to which the aspects of sustainability, such as economic, social and environmental sustainability, were considered and integrated in projects.

The survey provided information on how participating companies consider and apply sustainability in their practices. Information was gained on the companies' sustainability performance and their desire or ambition to improve. The analysis of the survey indicates low sustainability performance with minimum desire by the companies to improve. This guided the rounds of interview questions to find out why the companies are unwilling to improve, and gain in-depth understanding of the rationale for the current practices.

1.4.2 The Study of the Rationale for Current Practices and Challenges of Sustainable Construction in Nigeria

Following the analysis of the sustainability assessment survey mentioned above (section 1.4.1), interviews of 31 members of the middle and senior management teams from the companies and regulatory agencies were conducted. The interviews focused on capturing the perception of the construction practitioners and also to get further in-depth understanding of the reasons for current practices, as well as identify factors that could hinder or enable sustainable construction practices. The management-level staff were targeted in order to ensure that the interviewees represented expert perceptions of the operation of their organizations. Interviewing this target group was important because the

individuals are responsible for strategy, planning, and decision making, and are in a better position to provide informed answers to the interview questions. A semi-structured approach to interviewing was adopted because it present an organized structure for questioning, but still allowed a sufficient degree of freedom and adaptability in getting information from respondents (Haigh, 2008).

1.4.3 The Study of the Complexity of Conjoined Sustainability and Construction in Nigeria and How Change Could be Introduced

The first data-collection stage provided information on the extent sustainability is integrated into the practices of the participating companies, and their desire or ambition to improve. It provided insight of the current situation regarding sustainability and construction in Nigeria. The second stage went on to look at the reasons for the current situation, and the challenges to the uptake of sustainable construction practices, and also identified the factors that could hinder and/or enable sustainable practices. The finding obtained from the first and second stage provided in-depth insight into the peculiarity of Nigeria's construction industry. This understanding was used to describe the complex situation associated with sustainable practices in Nigeria, particularly with regards to the operations and governance of sustainability and construction in Nigeria. The data provided insight into the perceptions of stakeholders and from this it was possible to identify the point of intervention for effective change.

The research findings were then used to develop an explanatory model for sustainability transition in the construction industry. The research also identified opportunity for change based on the priority placed on quality; the findings were used to model a transition strategy by which the traditional, economic-led perspective of quality management can be broadened into one that is more environmentally and socially inclined by incorporating more socio-environmental values into the quality management system. The perception and determination of stakeholders for quality in project management and delivery presents opportunity to integrate sustainable principles into the quality management system, without disproportionately affecting the economic interest.

1.5 Structure of the Thesis

This study comprises eight chapters, chapter one provides an overview of the thesis. It explains the effects of construction on environmental degradation and expresses the need for companies to adopt modified construction practices in order to achieve the goals of sustainable development. Before investigating how companies can integrate sustainability principles in their practices, it is important to gain an understanding of the meaning and interpretations of sustainable construction and how this process can be integrated in practice. Chapter two explores the various strands of literature on sustainability and construction to gain insight into the broad debates associated with sustainable construction and attempts to establish what constitutes 'sustainable construction practices'. It also

examines a variety of literature to determine how change from the current traditional practices toward sustainable construction can be achieved. It initially adopts a broad outlook on the topics of sustainability and construction, but then narrows down to the sustainability and construction practices in Nigeria, specifically, and explores different theories of change that could be useful to stimulate a positive shift from the present practices for environmental benefit.

Chapter three explains the research methods employed in conducting this study. The research utilized a combination of quantitative and qualitative research methods. The quantitative methods used involved the design and administration of a survey questionnaire on nine construction projects to determine the extent sustainability is considered and integrated in these projects, as well as the companies' attitudes towards sustainability improvement. Survey data were analyzed using descriptive statistical techniques. This qualitative approach involved the use of a series of semi-structured interviews to extract the viewpoints of key stakeholders for the rationale for the current practices, and also determine opportunity to introduce change. Another key element explored in chapter three was the issue of the philosophy underpinning the research and the data collection and analysis methods are identified and critiqued. The chapter also provides a description of the learning processes on the section concerning reflexivity. Chapter four presents the results of the primary research findings which were conducted in two phases. The survey shows data on sustainability performance of the companies investigated in the research and their desire to improve, while the interview provided data for the factors that influences stakeholders' behavior, practitioners' understanding of sustainable construction, and their motivation and values.

Chapter five provides an interpretation of the findings from the primary research data, it presents a narrative of the operations of construction and sustainability in Nigeria based on the primary data. It also outlines the complex issues associated with operations and governance of construction and sustainability in Nigeria and identifies the challenges and barriers to sustainable construction. It also explores opportunity to embed sustainability in the practices of the companies investigated. Chapter six analyses and discusses the findings from this research. It identifies the key themes that represent the barriers and opportunities to embrace sustainable construction practices. Chapter seven explores different transition theories to determine how to introduce change and presents a framework of how to initiate change in the construction industry. Based on the analysis of the findings, the point of intervention that is likely to produce effective change that could spread across the entire construction system is identified. This chapter also provides system modeling on how construction companies can make the transition from the traditional economic-led product-level quality-management approach to total quality management systems which embrace socio-environmental values in the operations and delivery of projects. This transition process does not require the development of a new system; rather it requires an

adjustment of the conventional economic-led quality management systems to embrace more socio-environmental values. Lastly, chapter eight provides a summary of the research outcomes, identifies limitations of the study, and provides recommendations for future research.

Chapter 2

2 Sustainability, Construction and Theories of Change

2.1 Introduction

This research focuses on ways to improve sustainability in the practices of construction companies in Nigeria. Accordingly, this study draws from three main bodies of literature, on sustainability, construction management, and change in order to gain insight into the current debates in the field of sustainability and construction practices, with the view to establish what constitutes sustainable practices. It examines the various definitions and interpretation of sustainable construction and explores sustainability transition theories and other theories of change to determine how change towards sustainable construction can be achieved in Nigeria. The concept of sustainability in the construction industry is complex; several studies have shown that individuals or societal action towards sustainability is based on both factual and values elements. Authors such as Carew and Mitchell (2008); Ciegis et al (2015) and Baredi (2013) also point out that sustainability in construction works is considered through context- and value-components. Amongst the various elements of sustainability and construction, values play a significant role in the motivation and actions of people and organizations. 'Values', here, refers to adhering to a prescriptive conviction about desirable behaviour and goals (De Vries et al, 2009), which is connected to the understanding and perception of different actors. The present chapter overviews literature to understand the construction practices in Nigeria to gain insight into the underpinning factors that influences the actions of construction organizations in the industry.

Although there is abundant literature on sustainability with empirical evidence of variation in the ways experts and non-experts conceive or understand the concept of sustainability, this variation appears to be connected to values and context perspectives of sustainability (Baumgartner and Ebner, 2010). Apart from the universal acceptance of the importance of sustainability, there are important differences between specific institutions, individual- and academic-approaches in respect of theoretical formulations, policy prescriptions and conceptualization of the subject itself. The term 'sustainability' has been the subject of much debate in recent times (Ciegis et al, 2015), and most of the debate in the literature takes the form of philosophical arguments in favour of a particular view or application of sustainability (Carew and Mitchell, 2007; Berardi, 2013). The existence of different perceptions of 'sustainability' is not surprising because the concept is comparatively complex and abstract, and it rests on both factual and value-based components. The proliferation of the definition of sustainability therefore, could be attributed to different underpinning value-based assumptions which would naturally contribute to the variation in the way sustainability is understood and applied (Carew and Mitchell, 2008).

Similarly, 'construction' has both narrow and broad interpretations and there is not yet an accepted universal definition for the meaning of 'construction'. However, construction activities and delivery systems are influenced and motivated by several factors such as what the desirable goals are. In other words, the priorities, requirements and desirable goals

define the meaning of 'construction' in different contexts. For instance, in situation where there is high development-pressure for building and infrastructural needs, construction is about meeting the development needs and this influences how the processes are managed and delivered. Irurah (2001) points out that the concept of 'construction' can be broadly interpreted at different levels: as site activities, as everything related to the construction business, as a comprehensive project life cycle, and could also be referred to as the broader process of creating human settlement. In its simplest form, construction is commonly refers to site activities that lead to the realization of building or other related project such as roads, dams etc. At this level, construction is view as a specific phase in the project cycle. While at a broader level, Du Plessis (2007) describes construction as the broad process of activities in creating human settlements and infrastructures that supports development; this includes extraction of raw materials and manufacturing construction materials and components, the management and operations of the built environment, the construction project life cycle from feasibility to deconstruction.

Despite the difficulties associated with the interpretation of 'construction' and 'sustainability', the concept of 'sustainable construction' was introduced to encourage change from traditional practices to mitigate the negative impact of construction on the environment and society (CIB, 2004). This has resulted in the development of several frameworks, strategies and models for change toward sustainable construction (Zhang et al, 2014; Du Plessis and Cole, 2011 and Du Plessis, 2007). Notable amongst these change initiatives is the collaborative work by the International Council for Research and Innovation in Building and Construction (CIB, 1999, 2002) to chart a sustainability trajectory for the construction sector. This effort produced Agenda 21 for sustainable construction a guide for implementing sustainability principles in the construction industry. However, it appears these efforts are yet to yield the anticipated change in the practices especially in developing countries (Ebohon and Rhwemila, 2000; Ofori, 2007). Authors such as Adebayo (2002) and Du Plessis (2005) point out the challenges facing the construction system and the development priorities in Nigeria, and how other sub-Saharan countries inhibit the application of sustainable processes. One of the biggest challenges for the construction sector in developing countries is finding a holistic approach to ensure construction is sustainable, as defined by their locally identified needs- and value- systems (Du Plessis, 2007). Thus, an understanding of the value system and motivation becomes vital in determining how behavioral change can occur. Therefore it could be argued that motivation is the connection between values and change.

Whilst this thesis is primarily about sustainability in construction practices in Nigeria, it is important to place the phenomenon within a wider historical and conceptual context. This chapter, therefore, outlines the broad context of the thesis. It explores the concept of sustainability and construction, and examines how sustainability is embedded in construction practices. It examines the various theories of change and sustainability transition in order to develop a more-effective approach to initiating change towards

sustainable practices by companies that operate in Nigeria's construction industry. Section 2.2 explores the concept of sustainability in more detail, while sections 2.3 and 2.4 provide a review of the concept of sustainability in construction and how it is applied in practice. Section 2.5 examines sustainable construction practice in Nigeria, the current construction practices, regulations and procurement system. Section 2.6 examines construction quality standards, and section 2.7 explores change- and systems-theories such as socio-technical transition theory, social practice theory, structuration and social marketing theory. The final section 2.8 provides a summary of this chapter.

2.2 The Concept of Sustainability

In order to understand the debate and diverse views about sustainability, it is important to recognize the evolution of the concept of sustainability in the literature (Williams and Millington, 2004). The concern for the wise use of natural resources and the planet emerged in the early 1960s based on the book 'Silent spring' (Carson, 1962). This concern became prominent following the publication of 'The Limits to Growth' by the club of Rome in the early 1970s, when the adverse consequences of human impact on the environment became widely recognized (Meadows et al, 1972). As a result of the publication of 'The Limits to Growth', more-serious enquiry into the limitations of the planet in dealing with the impact of population growth and level of consumption came to the forefront (Gowdy, 2007*)*. A theoretical framework was based on the notion that there is a mismatch between what is required of the earth, and what the earth can produce (Fitzpatrick and Cahill, 2002). This theory sparked debate which led to the first major international gathering to discuss sustainability at the global scale, resulting in the establishment of the United Nation World Commission on Environment and Development (WCED; Ciegis et al, 2009; Silvius et al, 2013).

WCED was mandated to determine ways to address the concern of resource depletion (Barlett, 2012). Indeed, the challenge of how to conjoin the demand and supply of resources to meet societal needs defines what is meant by the process of sustainable development (Ciege et al, 2009). However, the challenge produces diverse and debated meanings of 'sustainable development', because it can be addressed in different ways. Different schools of thought such as the 'weak', 'strong' and 'moderate' sustainability provide views as to how to address the challenge of sustainable development (Ciegis et al, 2009; Hopwood et al, 2005; Berardi, 2013).

Advocates of 'weak sustainability' argued that nature is predominantly seen as a resource to which humans have a right of dominion and that economic growth and development is a valid measure of progress. Therefore, expanding the stock of resources by creating substitutes for renewable resources and by effective use of existing resources through technology will solve the problems of resource depletion (Williams and Millington, 2004). By contrast, 'strong sustainability' theorists emphasize the need to reduce the demand humans place on the Earth's resources, based on the view that the Earth is finite and it is impossible

not to compromise the future unless the demand-side of the equation is altered by rethinking our attitude towards nature in development activities (Henderson, 1999; cited in Williams and Millington, 2004). While, 'moderate sustainability' theorists, combine elements of both the strong and weak sustainability schools of thought in their views.

Because of the standpoints discussed above, various views, definitions and interpretations of sustainability have emerged. Presently, there are over 100 definitions of the meaning of 'sustainability' in the literature (Berardi, 2013). The most popular definition of sustainable development was given by the Brundtland report (WCED, 1987) which states that "sustainable development is the development which meets the needs of the present without compromising the ability of the future to meet their own needs". However, the interpretation and application varies due to the vagueness of this definition: it does not provide specifics about the nature of the society and how we must conduct ourselves to be sustainable. Although, the Brundtland/WCED definition has received different interpretations especially in recent years (Ciegis et al, 2009; Berardi, 2013), the diversity of interpretation has often been referred to as a point of strength of the concept of sustainability. Based on the fact that sustainability concerns complex and sometimes poorly understood systems, and because it is value-based, the diverse conceptualization of sustainability offers a means to give voice to different stakeholder perspectives (Ciegis et al, 2009; Berardi, 2013).

The contemporary literature definition of sustainability refers to a balance or harmony of the economic, social and environmental concerns (Berardi, 2013; Silvius et al, 2013), however, disregarding any one of these aspects could undermine sustainable practices (Ciegis et al, 2015), and this is often the case as most projects or activities have specific drivers resulting to inevitable trade-offs. Elkington (1997), and Carew and Mitchell (2008) present the concept of sustainable development as a geometric shape encompassing three main areas: economic, social and environmental sustainability. This interpretation focuses more on impact analysis, and does not identify the long-term analysis (Ciegis et al, 2009; Silvius et al, 2012). Difficulties related to the definition of sustainability show that it is complex and has a multi-dimensional perspective which has to combine efficiency, equity, long and short-term analysis, intergenerational equity, values and ethics, economic, social and environmental aspects, local and global perspectives. In the next section, the various aspects of sustainability will be discussed.

2.2.1 Dimensions of Sustainability

The concept of sustainability has been broadly categorized into environmental, social and economic dimensions (Elkington, 1987; WCED, 1987), with increasing attention paid to cultural and political dimensions (Scoones, 2007). Despite the practical scope, the conceptualization of the different dimensions has disaggregated the concept of sustainability, leading to several misunderstandings (Baumgartner and Ebner, 2010; Keeys, 2012; Berardi, 2013). Sustainability means different things to different people. To the

ecologist sustainability is about biodiversity conservation and environmental preservation; the economist sees sustainability as economic growth or increase income without diminishing the opportunities for future income; while sociologist defines sustainability as development that preserves society, respecting human rights and equality (Ciegis et al, 2009).

Based on the broad nature of the concept of sustainability, the meaning and definition is not static because it embraces the complex interaction between science, politics, policy making and development. The challenge associated with measurement of sustainability adds another dimension to the complexity of the definition. If sustainability is to mean anything it must be measurable (Hamilton et al, 2006). Furthermore, the multiple domains of sustainability such as the economic, social and environmental dimensions (WCED, 1987; GRI, 2011), create additional levels of complexity and uncertainty to the meaning of sustainability. However, the necessity of considering different viewpoints requires acceptance of uncertainty and differences. Sustainability involves multiple actors, and the participation of people and their different expectations and interpretations of sustainable development cannot be avoided (Carew Mitchell, 2007; Barerdi, 2013).

Berardi (2013) identified some peculiarities and uncertainty affecting the definition and interpretation of sustainable development; it is time dependant, and involves several levels of space and scale, it involves multiple domains and is based on value components. Although the intergenerational approach was already presented in the Brundtland definition (WCED, 1987); requiring the adoption of a long-term perspective, however, how far into the future do we consider? The farther into the future that is considered, the more uncertainty emerges (Kemp and Marten, 2007; cited in Berardi, 2013). In other words, what is considered sustainable at a given time is dependent on the knowledge available at the time of evaluation, and may be considered unsustainable later because of changes in knowledge over time. Sustainable approaches need to be dynamic, involving adaptive flexibility to overcome unique problem contexts, part of which could be the available knowledge in any given time (Bagheri and Hjorth, 2007; Berardi, 2013). The space or scale perspective opens up its own problems. Brand and Karvonen (2007) argued that sustainability should be locally specific. Placet et al (2009), state that sustainability strategies should be customized to have more local interpretation and application than universal goals. However, because of the interconnectedness of the system, it evident that local action has an impact on at a global scale; therefore sustainability should require continuous evaluation at several levels.

Whilst recognizing the deep debate and ambiguities associated with the meaning of sustainability, some key element or principles of sustainability can be derived. For example, Dyllick and Hockerts (2002) and Keeys et al (2013) identified three key elements of corporate sustainability: (1) Integrating economic, environmental and social perspectives into organization's corporate strategy, (2) consideration and integrating long-term and short-term perspectives, and (3) consuming the income and not the capital. Gareis et al

(2013) define sustainability with the following principles: (1) economic, social and environmental perspectives; (2) short-, mid- and long-term perspectives; (3) local, regional and global perspectives; and (4) value-based perspectives. In view of these sets of element or principles, this thesis considers the following principle to define the concept of sustainability based on the views of Garies et al (2013); Silvius et al (2013) and others.

Sustainability concerns:

1. Life cycle analysis – looking at short and long-term goals.
2. Resource conservation – ensuring extraction does not exceed renewal/regeneration.
3. Economic, Social and Environmental concerns (the 'triple bottom line concept').
4. Local and Global perspectives – requiring coordinated effort across several levels.
5. Transparency and accountability – openness and responsibility for actions taken.
6. Personal value and ethics – the need to change our thinking in order to change our actions.

In the next section, the meaning of sustainability within the context of construction and project management will be established.

2.3 The Interpretation of Sustainable Construction

Similar to the interpretative difficulties associated with sustainability and construction, the concept of sustainable construction has been a subject of much debate in recent times, with differing interpretations and strategies for achievement (Berardi, 2013; Carew and Mitchell, 2007). The terms 'construction' and 'sustainability' are both complex concepts with a much debate about their scope and meaning. Placing these two terms together to form a new phrase 'sustainable construction' further magnifies the interpretation crisis (Du Plessis, 2007). It is however, unsurprising that the concept of sustainable construction has been a subject of much debate (Berardi, 2013; Carew and Mitchell, 2007). Diana et al (2013) argued that sustainable construction could be regarded as the construction sector's response to enacting sustainable development. Hill and Bowen (1997) provided a framework and principles for sustainable construction (SC) and stated that it should represent a healthy built environment, based on ecological principles and efficient utilization of resources. Ofori (1997) argued that the developing countries' perspectives were not considered in their frameworks, and that sustainable construction might not be applicable to them. Berardi (2013), and Conte and Monno (2012) argued that conventional frameworks and principles for sustainable construction are limited, because much attention is given to the environmental impact of construction activities, and it is mainly interpreted from the environmental perspective (see also ISO, 2008). With more attention placed on environmental impact of construction activities, it is not surprising that efficient use of energy, water and natural resources, waste reduction and pollution are often considered the parameters to assess sustainable construction (Kibert, 2012; Akadiri and Olomolaiye, 2013).

Du Plessis (2007) however, stated that SC involves a holistic process to install and maintain harmony between the natural and built environments as well as create settlement that affirms human dignity and also encourages economic equity. Berardi (2013) argued that SC is a path characterized by constraints and uncertainty due to the time, scale, domain and social constrains, therefore, it is difficult to have an agreed definition of SC. SC covers a broad range of concerns; it involves a balance between the various competing goals and requires simultaneous pursuits of economic prosperity, environmental quality and social equality (Silvius et al, 2013). This is referred to as the 'triple bottom line of sustainability' (Elkington, 1997). Various models or diagrams are used to illustrate the way these three bottom line (sub-systems) relate to one another, Mitchell (2000) and Dania et al (2013) represented the three sub-system in three progressive circles with the view that the environmental systems represent the ultimate limit, the social systems sat within the environmental systems, and the economic systems are seen as a sub-set of the social systems (see figure 1 below). In contrast, Silvius et al (2013) illustrated the interaction between the three sub-systems using a Venn diagram, with the central area of overlap representing concurrent social, economic and environmental sustainability. These depictions support the idea that the broad concept of sustainability could be more accessible through the subdivision into three inter-related subordinate concepts of environmental sustainability, economic sustainability and social sustainability (Carew and Mitchell, 2007). Figure 1 below shows the triple bottom line of sustainability.

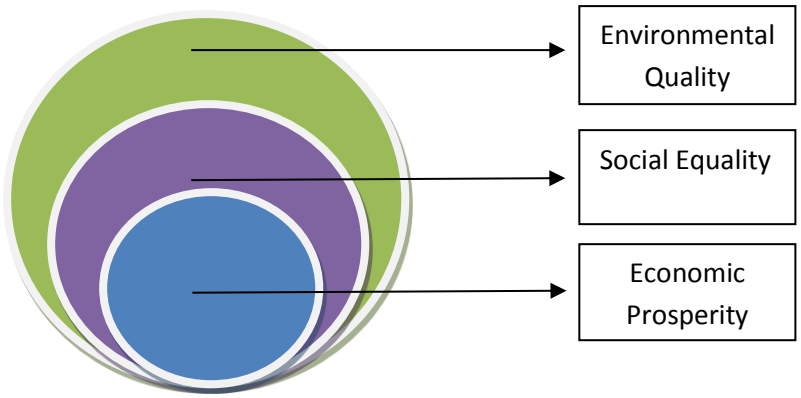


Figure 1: The Triple Bottom Line of sustainability

Despite the depiction of the concept of sustainability into these three inter-related subordinate concepts, there are still difficulties in creating an agreed definition for sustainable construction (Ciegies et al, 2009; Baumgartner and Ebner 2010; Berardi, 2013). Consequently, various assessment tools were developed and used to determine what constitutes sustainable construction (CIB, 2007; Cole, 2012). These assessment systems contribute to the increase in awareness of the objectives and criteria for sustainability, and

have become a framework of reference for sustainable construction practice (Berardi, 2013). Construction organizations are pressured to adopt proactive sustainable strategies through these frameworks in the lifecycle of the construction process (CIB, 2010; GRI, 2011; Akadiri et al, 2012). However, these assessment criteria are limited, as they focus mainly on the environmental perspective (ISO, 2008) with less emphasis particularly on the social dependencies (Berardi, 2013; Silvius et al, 2013). Given that sustainability involves a long-term evaluation, multi-scale impact and multi-domain criteria, a new paradigm of sustainable construction is emerging, and this represents a significant evolution from the simple environmental approach.

Pearce (2006) argued for the need to adopt a more holistic definition that will embrace the various elemenst of sustainable construction, this view is supported by Du Plessis (2005) and the UK Green Building Council (2009) which advocated for the need to have a universally understood and agreed definition for sustainable construction. However, this has been unsuccessful as the concept has continually being viewed from different perspectives (Du Plessis, 2005: Cooper, 2006; Ofori, 2007). Amongst the various definitions, different elements have been identified as what constitutes the concept of sustainable construction.

2.3.1 Elements and Dimensions of Sustainable Construction

There are different elements of sustainable construction with several definitions to describing it constituent parts. These elements are referred to in the literature as the dimensions. Authors such as Hill and Bowen, (1997) and Priemus (2002) have define sustainability from mainly the environmental perspectives. This has created the impression in the work of several other authors to seeing sustainable construction as being synonymous to good environmental practices in construction management. However, over the years the understanding of the concept has significantly developed. There is a general acceptance that achieving sustainable construction goes beyond dealing with the issues of limited resources and environmental impact management. Sustainable construction entails application of sustainable development principles requiring the need to address the social, economic and environmental elements of sustainability. The literature suggests that a number of additional element have been considered by several authors and this includes the political, values, cultural, management and moral elements (Du Plessis, 2004; Pawlowski, 2008; Silvius and Schiper, 2012). The table 1 below shows the different elements of sustainable construction

Table 1: Different elements of sustainability

	Environment	Social	Economic	Political	Value	Technology	Culture	Moral	Management
Pawlowski (2008)	•	•	•	•	•	•	•		
Hill and Bowen (1997)	•	•	•			•			
Persson and Olander (2004)	•	•	•				•		
Du Plessis (2002)	•	•	•		•	•	•		
Ofori (1998)	•	•	•		•		•		
Silvius and Schiper (2012)	•	•	•					•	•
CIB (1999)	•	•	•			•			

According to Gibson et al (2013), the considerations of these elements or dimensions is merely based on issue of priority, Ofori (1998) mentioned that identifications and selection of the specific elements in most literature is based on the development priority the context of the study. Placet et al (2005) argued that sustainability strategy for the selection criteria are significantly influenced by the priority of needs.

2.4 Sustainable Construction Practice

The construction industry provides the needed living condition for the sustainability and development of human life on the planet (Zhang et al, 2014). It contributes an average of about 10% of the Gross Domestic Product (GDP) in most countries, provides employment for millions of people in a variety of roles and facilitates economic growth (Dania et al, 2013). However, a wide range of adverse impacts can occur as a result of construction; it is responsible for substantial amount (about 30%) of energy use (EIA, 2012), produces 40% of greenhouse gas emissions globally (IPCC, 2007; UNEP, 2009), consumes large amounts of natural and non-renewable resources, and generate significant amounts of waste (USEPA, 2009).

The need to minimize the adverse effects of construction activities is increasing pressure on construction organizations to adopt sustainable strategies in their construction process (Akadiri et al, 2012). Different measurement tools for assessment have been developed to determine what constitute sustainable construction practice (CIB, 2007; Cole, 2012). Currently, available rating systems span energy evaluation systems to life cycle analysis, and total quality management systems (Berardi, 2013). Also, a multidimensional approach has been proposed as several building material ratings are evaluated separately before being considered as an actual building. However, most of the present assessment systems focus on energy performance and environmental perspectives with the social aspect of sustainable construction still a rarely investigated topic. Dempsey et al (2011) affirm that

construction that encourages social sustainability should adhere to ethical standards by ethical trading throughout the supply chain, provide a healthy and safe working environment, and conserve local heritage and culture.

The international council for research and innovation in building and construction (CIB, 2010) interpreted a vision of sustainable construction which was originally adopted after the international conference. Based on the interpretation, ten new principle of sustainable construction practice has been declared and is stated as follows;

1. *Apply the general principle of sustainability, and hence, promote continual improvement, equity, global thinking and local action, a holistic approach, long term consideration of precaution and risk, responsibility, and transparency.*

2. *Involve all interested party through collaborative approach, so that it can meet occupant's needs individual and collective social needs through partnership in design, construction and maintenance processes.*

3. *Be completely integrated into the relevant local plans and infrastructure, and connect into the existing services, networks, urban and suburban grid in order to improve stakeholders' satisfaction.*

4. *Be design from a lifecycle perspective, covering planning, design, construction, operation and maintenance, renovation and end of life, considering all other phases during the evaluation of performance at each phase.*

5. *Have its environmental impact minimized over the (estimated or remaining) service life. This takes into consideration regional and global requirement, resource efficiency together with waste and emissions reduction.*

6. *Deliver economic value over time , taking into account future lifecycle cost of operation, maintenance , refurbishment and disposal*

7. *Provide social and cultural value over time and for all the people. Sustainable construction should provide a sense of place for it occupants, be seen as a means of work status improvement for worker and be integrated to the local culture.*

8. *Be healthy, comfortable, safe and accessible for all. Health criteria include indoor air quality whereas comfort criteria include acoustic, thermal, visual and olfactory comfort. It must allow safe working condition during its construction and service life, and fully accessible to everyone.*

9. *Be user friendly, simple and cost effective in operation, with measurable performance over time. Operation and maintenance rule must be available for both operators and users at any time.*

10. *Be adaptable throughout it service life and with an end of life strategy. The design has to allow adaptation by changing performance and functionality requirements, in accordance with new constraints.*

Source: CIB, 2010

Summarizing the above principles/interpretation of sustainable construction practice, implies that sustainable construction practice refers to the methods or processes of implementing construction projects that involves less harm to the environment, is beneficial

to the society, and profitable to the company and economy (Akadiri and Olomolaiye , 2012; Tseng et al, 2013). To this end, it has to promote a long-term perspective in its economic values, a neutral environmental impact, human satisfaction and social equity. Berardi, (2013) argued that design and procurement, sustainability legislation, technological innovations, learning/training, and organizational structure and processes are the five main areas included in sustainable construction practices. This choice of preference is influenced by the different characteristic of each company. The sustainable construction practices adopted by the company are in line with the overarching strategy of the company.

The main idea of sustainable construction is finding or managing a balance between the needs of humans and their environment in such a way that critical limits are not exceeded on the environment as well as ensuring social equity and basic human right needs such as; right to development is not obstructed (Du Plessis et al, 2002). However, the relationship between humans and their environment depends on a number of factors. The first is the interpretation of quality of life, and secondly is the technological, political, economic and other systems adopted by the society in which people find themselves. These two factors influence the values of different societies, and how they interact with the biophysical environment. The biophysical environment also determines the choice societies make based on the limitation of its capacity or what the environment has to offer. For instance, in Du Plessis (2005) stated a need-driven environment there is a possibility that development initiatives will focus mainly delivery which is influenced by the level of development needs, without necessarily considering the issues of sustainability. This is of particular concern in a most developing country where there is little knowledge and understanding of sustainable construction practices. Absence of adequate knowledge and awareness is further complicated by the conflicting interest and interpretations of the meaning of sustainable construction practices. As such different society and organization view sustainable construction in different context. The following section examines sustainability and construction within the Nigerian context.

2.5 Sustainability and Construction in Nigeria

When attempting to describe sustainable development and by implication sustainable construction in Nigeria and in Africa generally. It is necessary to understand the developmental priorities as well as the cultural context within which building and construction take place in the continent. According to Du Plessis (2001), the main development challenge facing Africa can be found in the web of poverty, rapid urbanization, weak institutions, insecurity and resource scarcity. Africa is arguable the most urbanizing region in the world and the high population growth figure, particularly in Nigeria, is increasing the development pressure and competition for these scare resources (Diana et al, 2013). Therefore, in considering sustainable construction in Nigeria it is important to include the unique physical and social context. Du Plessis, (2005) point out that the African and Western worldview view of sustainable construction appears to differ; the most prominent issues on sustainable construction debates in the developed world, such as energy

efficiency, CO2 emission and indoor climate are far down the list of priorities in Africa. As far as Africa and most developing countries are concerned, government policies in areas of housing, economic, environment and spatial planning are discussed as factor affecting sustainable development which thinking has direct implications on the construction industry. These policies are concerned with poverty alleviation, job creation, capacity building, and quality and so on. But whether the methods adopted to enact these policies enhance the objectives of sustainable construction is highly debatable. According to Adebayo (2002), sustainable construction has not received sufficient attention in Africa even though it is an important aspect of wider sustainable development.

In Nigeria, the concept of sustainable construction is relatively new amongst practitioners (Dania et al, 2013). Although, several recent stakeholder summits have been convened, and a 'Green Building Council' is still being formed, the awareness and understanding of sustainability in construction amongst stakeholders in Nigeria is relatively low. Dahiru et al (2014) stated that, lack of knowledge and awareness are the most prominent factors hindering construction of 'green' building and the adoption of sustainable practices in Nigeria, followed by inadequate policies and legislation. Several studies such as (Ebohon and Rwelanila, 2000; Irurah, 2001; Adebayo, 2002) suggest that ignorance and lack of information on sustainable construction issues and solutions is a major obstacle to wider sustainability in developing countries (see also Du Plessis, 2002) The importance of knowledge and awareness of sustainable construction cannot be overemphasized, even in developed countries like the UK, where knowledge and level of awareness has played significant role towards the uptake of sustainable construction practices. Brennan et al (2014) in their study of the current state of the UK construction industry stated that construction companies are cautious in their activities, due to lack of awareness and uncertainties associated with adopting sustainable practices. In Nigeria, the knowledge, and level of awareness has significantly affected the uptake of sustainable practices. As Dania et al (2013) point out; Nigeria is lagging behind other countries in adopting and implementing sustainable practices within the construction sector.

In most developing countries including Nigeria, the business case for sustainable construction is still weak. Nigeria has been a signatory to the UN development goals that made reference to environmental sustainability in broad political terms; progress towards achieving these goals has been slow. The government of Nigeria had promised to strengthen several mechanisms such as the Ecological Fund, Environmental Impact Assessment laws and National Environmental Standards and Regulations for improved effectiveness. However, this effort have yielded limited results, as evidence suggests that Nigeria continues to lose forest cover at an alarming rate of about 3.5% per annum . The UN Bureau for Statistics 2014 report on the performance of countries and continents of the world reveal that Nigeria performed less than 50% in the entire Millennium Development Goals goal. Zainul (2010) point out that, the pace of actions towards sustainable application depends on the awareness and knowledge of stakeholders. The practicality of these goals and benefits of ensuring environmental sustainability appears not well established to the

professional on the ground. The understanding of the importance and benefits of sustainable construction would likely inform the values attached to sustainable practices. And this value influences the behaviour and actions of construction stakeholders. As Pitt et al (2009), and Brennan et al (2014) point out, construction clients are the key stakeholder to drive sustainable development practices. In Nigeria, the Government account for being the main client in the construction industry (Oxford Business Group, 2011), initiating change through demand by the client (Government) for sustainable practices would have been an effective approach to encourage transition from traditional practices. However, the values client attach to sustainable practices significantly influences their actions. Thus, the demand for sustainable practices by the clients and other stakeholders is relatively low. Greater understanding for the need and benefit of sustainable construction practices is imperative to create a value shift from traditional practice toward a more sustainable path (Brennan et al, 2014).

2.5.1 Nigeria Construction Practice

Organized construction practice in Nigeria started in the 1930's through direct labour project delivery system by the Public Works Department (PWD) and the Royal Army Engineer, which later transformed to the Nigeria Army Engineer. In late 1940's due to increase in the need for buildings and infrastructure, construction contracting was introduced in Nigeria with a few British and Italian companies coming into operation. Nigeria independence in 1960's further increased demand for construction activities, and most of the construction companies were overstretched. Following the oil discovery of oil in Nigeria in the 1970s, construction contracting saw an overwhelming upsurge in demand for building and infrastructure. Unfortunately, this period witnessed a high level of degeneration in the construction practices and building standards. Projects were poorly conceived, carelessly planned and shabbily executed, with a high rate of cost overrun, poor quality and widespread abandoned projects. As a result of the widespread abuse of the contracting system, the National Council of works in 1984 recommended a reversion to the direct labour system for capital project delivery. This practice initially produced some level of improvement in the way projects are delivered, however this practice was later abused with several cases of delays and cost overrun (Mbamali and Okotie, 2012). The challenge of construction practice in Nigeria is not based on the project delivery practice; rather it has to do with integrity, managerial and professional competence of the executors, and technological capabilities.

In Nigeria, the conventional construction practice involves three phases, first is conception and design phase; followed by a construction phase; and lastly an operation phase. The public sectors are the major client to the construction industry in Nigeria, and this sector handles construction projects in two separate phases by two separate teams, for the design, and construction phases. The design team consists of architects, quantity surveyors, structural engineers and service engineers who are either in-house professionals or consultants, while the construction team comprises major contractors and sub-contractors who are selected after the design is completed through a tender process. This practice does

not encourage integrated design, as construction experience is not integrated in the design phase, thus creating gap between the design and the finished project as well as delay of project execution. Although other procurement methods, aimed at reducing the gap and integrating design and construction phases better, such as management contracting, partnering design and build has been introduced (Ogunsanmi, 1997; cited in Mbamali and Okotie, 2012). However, Nigeria did not have building and construction standards until 2006, when the National Housing Council and Urban Development department started evolving the instigation of a National Building Code, with the view to provide a minimum standard for pre-design, design, construction and post construction activity. Until that time, the quality of construction and project delivery was at its lowest. In order to ensure quality, safety and proficiency in the construction industry, the Building Code was introduced. However, implementation of the building code has remained a daunting challenge.

In the last few years, Nigeria has attracted the largest Foreign Direct Investment (FDI) in Africa, and has recently been adjudged to be the largest African economy by Gross Domestic Product (Mitchell, 2013; National Bureau of Statistics, 2014). The construction sector has attracted a large proportion of both local and foreign investment and has posted an impressive growth rate of over twelve percent in the last few years (Central Bank of Nigeria, 2011). As Dania et al (2013) point out, there is much potential for further growth in the construction sector; this also provides opportunity for construction practice to follow a sustainable development path to avoid the need for corrective action presently experienced in developed countries (see Du Plessis, 2007). However, due to the large-scale infrastructural and building needs, and the enormity of the development challenges in Nigeria, such as poverty, rapid population growth, high rural-urban migration, skill shortage and relatively low level of understanding of sustainable construction, there is often confusion between developmental interventions and interventions that need to follow the principles of sustainable development. Consequently, construction delivery is based on specific cultural interpretations underpinned by economic and political interest (Du Plessis, 2007). Construction organizations are more concerned with delivery of projects on time, with little attention on social-environmental impact of their activities.

Alongside this developmental pressure, the challenge of proper coordination of construction activities makes it difficult to effectively implement regulatory policies. As Ebohon and Rwelamila (2000) and Dania et al (2013) point out, the structure of Nigeria's construction sector is fragmented and underdeveloped, limiting its ability to effectively integrate sustainable practices in the construction processes. The absence of unified construction standards until 2006 when the National Building Code was introduced, (Mbamali and Okotie, 2012), presents a difficult background to introduce, coordinate and implement sustainable construction regulations. Even after the introduction of the building code, implementation of this code to ensure quality, safety and proficiency in the construction industry has remained a daunting challenge. As Babatunde and Low (2015) point out; the absence of a National agency to coordinate construction activities is a challenge to the construction industry in Nigeria.

Similarly, the absence of clear sustainability strategy in the planning, coordination and operations of activities in the construction industry has not really helped. Tan et al (2011) point out that, with a clear sustainability strategy, construction operators are able to identify and select their specific sustainable construction practices to fulfill their commitment. Also important is the need to design a sustainability strategy to improve sustainability performance and enhance the link between the strategy and performance. Baumgartner and Ebner (2010) point out that many companies implement sustainability management practices and publish a sustainability report even without a clear overarching sustainability strategy, thus, the link between their sustainability management activity and the report is missing in many cases. Strategic management has evolved into a mature framework for managing businesses and construction operations (Stead and Stead, 2008). The importance of developing and implementing a sustainability strategy based on analysis of the peculiarities the surrounding situation has been emphasized in various literatures (Tan et al, 2011; Stead and Stead, 2008). It is therefore vital for operators in the construction industry (both the companies, practitioners and relevant agencies) to develop and implement strategies for good sustainability performance.

2.5.2 Sustainable Construction Legislation and Regulations in Nigeria

Regulations play a key role to direct and guide construction activities; however, implementation of sustainability-related regulatory policies appears to be a major challenge to embed sustainable practices in Nigeria's construction industry. Nwokoro and Onukwube (2011) stated that effective monitoring and compliance to regulatory laws is essential for the attainment of sustainable construction. There are several laws and regulations to safeguard the environment and promote sustainable construction practices in Nigeria. This includes the Environmental Impact Assessment policy, Health and Safety laws, Federal Environmental Protection Agency Act and National Labour laws for example. However, there are concerns as to the ability (both technical and financial) of the supporting institutions to effectively implement these policies. A major challenge is the enforcement of these laudable legislative provisions. Babatunde and Low (2015) stated that players in Nigeria's construction industry face challenges of inadequate regulations and poor policy-implementation; this has affected the uptake of sustainable practices amongst companies and construction practitioners.

According to Nwokoro and Onukwube (2011), the prevailing environmental regulations within the built environment in Nigeria are administered and enforced by the Federal Ministry of Environment, and laws include the Federal Environmental Protection Agency (FEPA) Act of 1988, National Policy on Environment (NPE) in 1989, and Environmental Impact Assessment [EIA] Act in 1992. The main aim of these laws is to ensure that the potential environmental impact of construction projects are foreseen and addressed before project initiation. It involves a systematic process of identifying, predicting and evaluating potential environmental impact of development projects. However, Fatona et al (2015) stated that these environmental laws have not yet evolved satisfactorily in Nigeria, despite the comprehensive guidelines and the sound legal bases for these regulations. In support of

this view, Ogunba (2004) argued that there are marked shortcomings in the current EIA practice in Nigeria, even though the concept, legislation and guidelines of the system were adopted from the well-established Western EIA system. In particular, the EIA system operated by the town planner will need restructuring if it is to evolve towards a positive direction as in other system elsewhere.

There are multiple EIA systems in operation in Nigeria, the EIA Act of (1992), was patterned after the USA National Environmental Protection Act, covering the sector of the economy, while the Town and Country Planning Act (1992) was adopted from the (1988) UK Town Planning Regulations. Ogunba, (2004) noted that the multiplicity of EIA systems in Nigeria is an indication of the uncoordinated attempt of policy makers there to imitate dissimilar EIA evolution in the UK and US. Evidence from literature suggests that simultaneous use of multiple independent EIA systems in Nigeria creates unnecessary duplication, and falls short of best practice (Fatona et al, 2015). Similarly, almost all regulation with reference to Health & Safety in Nigeria is adopted from foreign countries. Idoro (2008) stated that the Occupation and Safety Act of 1970 originated from America; the Personal Protection Equipment and work Regulation of 1992, the Management of Health and Safety at Work Regulations of 1999, the Manual Handling Operation Regulation, and the Construction Design and Management Regulation of 1994 originated from the UK. Authors such as Diugwu et al (2012); Olutuase (2014) and Umeokafor et al (2014) stated that management effort by the regulatory agency and contractor to ensure a healthy and safe work environment is yet to yield meaningful impact. Consequently, the overall health and safety standard in Nigeria's construction industry is poor. Nwokoro and Onukwube (2011) point out that the major challenge confronting these regulatory initiatives is how to translate the laudable provisions of the Act into an effective tool for managing the operations of construction activities (see also Idoro, 2008).

Several studies (such as Babatunde and Low, 2015; Fatona et al, 2015; Nwokoro and Onukwube, 2011; Mbamali and Okotie, 2012) suggest that most legislation fails at the implementation stage in Nigeria. According to Arimah and Adeagbo (2000), the factors responsible for the low implementation and compliance with these regulations includes institutional and administrative capability, apathy of construction practitioners towards compliance to development and planning regulations, and policy mismatch. They call for reappraisal of development and planning regulation that will take into account the present-day reality and local conditions in Nigeria. The review of Agenda 21 for sustainable construction for developing countries supports the view to develop policies and initiatives that embrace local realities: Du Plessis (2002) stated that the challenge of enforcement and implementation calls for the need to radically improve the capacity of government institution to play active role in developing and implementing policies and legislations that encourage sustainable construction.

Even so, the benefits and value stakeholders attach to sustainability-related policies and intervention is pivotal to how they embrace such initiatives. Studies conducted by Arce (2003), suggest that the ability of any policy or intervention, to be effective at a local level, must involve the willingness to tackle the issue of value contestation. Authors such as Tan et al (2011) point out that compliance with sustainability regulations will sacrifice profit/economic value. Warren-Myers and Reed (2010) in support of this view, argue that lack of transparency in the financial correlation between sustainability and economic value restricts substantial investment in sustainability, as stakeholders are unable to measure sustainability of building or understand the impact on value. However, according to HM Government and Strategic Forum for Construction (2008) better regulation will provide the right balance between regulations and socio-environmental protection without disproportionately affecting cost or deterring compliance. This raises the question of how present sustainability regulations and strategy relates to the priorities, practicalities and complexities of the Nigeria construction industry. Du Plessis (2007) argued for the need to develop plans at the local, regional and national level to implement sustainability initiatives due to the fact that prevalent generic sustainability strategy does not address and fit with the prevailing situation in most developing countries, including Nigeria (see also Ebohon and Rwelamila, 2000).

2.5.3 Construction Procurement Systems in Nigeria

The selection of the appropriate approach for the management of the total process involved in construction project delivery is vital to the overall project performance. Different procurement methods have been developed in view of the need to improve construction project delivery. Daniel (2006) point out that, the emphasis of procurement methods is based on the need to optimize all parameter in project delivery. Each project has its characteristics and requirements and it is important for the procurement method to address the technical features of the project, as well as the client and the contractor's needs for the project to be deemed successful (Alhazmi et al, 2000). Rwelamila et al (2000) stated that the construction procurement system in use significantly affects the focus and performance of projects; they argue that one of the primary reasons for the general poor performance of public projects in terms of construction sustainability is due to an incorrect choice and use of procurement systems. Different variants of procurement are available for meeting different clients' needs, the works of Babatunde et al (2010) and Ojo (2009) suggests that procurement methods for implementing construction projects in Nigeria includes design-bid-construct, design-build system, management contracting, direct-labour systems, and build-own-operate-transfer methodologies.

However, within the construction sector in Nigeria and most countries in sub-Saharan Africa, there are strong indications to suggest that the public sector procurement practices are mainly replicas of those used by their colonizers (Babatunde et al, 2010). While their colonizers have significantly moved from the traditional construction procurement system to innovative non-conventional methods, the Nigerian construction industry predominantly

has remained using the traditional procurement method (Ojo, 2009; Rwelamila et al, 2000). According to Kadiri and Odusamil (2003) the main variant for construction procurement in Nigeria are bills of firm quantities; bills of approximate quantities; drawing and specifications; schedules of rate, cost and labour. The works of Babatunde et al (2010) and Ojo (2009) suggests that both the traditional and non-conventional procurement methods are currently embraced in Nigeria, however, the traditional approach of contract procurement (design-bid-construct) is the dominant method for organizing and managing construction project processes. Their studies reveal that the choice of adopting the traditional procurement system is associated with consideration of the project completion at the estimated time and cost. While the non-conventional procurement system favours quality assurance. This method has been widely criticized for it separation of the design face from the construction phase, and it is arguably not effective for all categories of building projects.

Mohsini et al (1995) argued that the traditional procurement method is inadequate to meet the organizational challenges in the construction industry due to the uncertainty associated with ineffective communication and coordination. In support of this view, Rwelamila et al (2000) stated that the default traditional construction procurement system in use of most sub-Saharan African countries provides a poor relationship- management system of dealing with sustainability parameters resulting in insignificant focus on construction sustainability. Thus an appropriate procurement system is necessary that considers environmental assessment during the planning and design phase, the implementation of an environmental management system (ISO 2008) for the project during construction, operations and decommissioning, and socio-economic significance of the project. Rwelamila et al (2000) recommend establishing a standard flexible contract procurement document that embraces the multistage framework of sustainable construction proposed by Hill and Bowen (1997) and could be adjusted to deal with respective tasks. The capacity of the clients or their representative to adopt systematic approaches in the selection of appropriate procurement methods is also important when considering best practice.

As mentioned in section 2.5 and 2.5.1, construction contracting has witnessed an overwhelming upsurge in demand since the post-colonial era in Nigeria, due to the wide development gap for buildings and infrastructure (Mbamali and Okotie, 2012). The last decade however, has exposed the declining level of client satisfaction resulting from poor quality performance of the built facilities, together with the problems of time and cost over-run, this situation has necessitated radical change in the industry practice in order to improve quality of construction products (Idrus and Sodangi, 2010). To this end, quality has become the main criterion for the procurement and award of contracts. In view of the quality movement in the industry, construction procurement-systems in recent years have shifted their focus from delivery to both quality and timely delivery. Quality considerations have become a major criterion in the procurement and awards of contracts, and companies with the capacity to meet construction quality requirements appear have a competitive

advantage over others. The following section will examine the construction-quality management systems and explore how these connect to sustainability in construction practices.

2.6 Construction Quality Management and Sustainability

Crosby (1979; 1990) provided the most widely accepted definition of quality as 'conformance to requirements' and this idea has also been incorporated into the international quality standards (ISO 9001, 2008) However, the interpretation of quality remains highly contentious because it involves the fulfillment of both explicit and implicit requirements. Idrus and Sodangi (2010) consider quality as a subset of performance, while others seem to look at quality in terms of conformity to established requirements and suitability for desired purpose. Srdic and Selih (2011) argued that quality in construction involves the ability of the processes and products to conform to the established requirements, and that quality should be assessed at three levels - the viewpoint of the project (structure), processes, and the construction product levels. The concept of quality is multidisciplinary in nature, thus different approaches may be required for analysis and assessment. It involves a collaborative process in the entire project cycle, as the performance of each phase in the process will affect the performance of the next phase (Hillman Willis and Willis, 1996). Mars (2001) points to the need to make quality considerations a major criterion in the construction procurement system in order to deliver or improve an expected standard. Within the context of the present research, quality performance is viewed in terms of the product, process and the product components dimension of project delivery.

McCabe et al (1998) identified four main stages of quality management, including inspection; Quality Control (QC); Quality Assurance (QA) and Total Quality Management (TQM). He argued that QA and especially TQM bring about improvement and aim to reduce and ultimately avoid any occurrence of problems in the project process and products. Table 2 provides elements of QA and TQM in construction.

Table 2: Elements of QA and TQM in construction

Quality Assurance (QA)	• Quality systems development • Quality planning in advance • A comprehensive quality manual • Use of quality costs • Improvement of non-production processes • Failure mode and effects analysis • Statistical process control
Total Quality Management (TQM)	• Policy deployment • Involvement of suppliers and customer • Involvement of operations • Process management • Performance measurement • Team work • Employee involvement

According to McCabe (2014) TQM often follows the implementation of QA, it could be described as a normal transition process, although it needs to be carefully managed. For organization to develop TQM, it must start with its own existing processes (Dale and Boaden, 1994). This may indicate that some areas of the organization need no more than already exist, but rather improve on or adjusting existing processes beyond the simple QA requirements. McCabe (2014) alluded to this point in his statement that for companies to improve performance there is need for the broadening of outlook and skills as well as an expansion in creative activities from those that are required in the standard quality assurance processes. As suggested by José Tarí and Molina-Azorin (2010), TQM expands quality management beyond products into behaviours. It provides opportunity to create ways people could collaborate more effectively to ensure high-quality outcomes every time, with a continued desire for improvement. Though attempted by various western companies to implement TQM, it has not been successful; Zink (2007) warned that utilization of TQM instruments focused on product quality without understanding the need for fundamental cultural change to achieve TQM accounted for the unsuccessful attempts at TQM by most organizations.

Construction quality performance can be viewed from the both project-and corporate-levels, of which the project level is where the processes to produce a physical structure is carried out and these processes are part of the corporate practices/culture (ISO 10006, 2003). The availability and implementation of certain quality-improvement tools and techniques identified at both corporate and project levels can help in the assessment and evaluation of project quality performance. Table 3 shows quality dimensions in construction performance as identified by Srdic and Selih (2011).

Table 3: Quality dimension of construction

Construction project performance (Quality of structure)	Degree to which quality is satisfied in all stage of the project life cycle. Involves conformance to quality of design, execution, the component and the products to drawings, specifications and appropriate rules/standards. Includes meeting the client/stakeholders requirements.
Construction process performance (Process level)	Technical and managerial competence, integrity and promptness with which the design, planning activities and construction processes are carried out. This involves the need to specify and monitor the desired quality level for the output.
Construction product (component) performance	Framework for identifying and selecting construction related products. Compliance with relevant quality and sustainability standards assures product performance.
Design Quality Practices	Framework for guiding quality-related actions in addition to the means of measuring how well these actions are carried out. These are reflected in the quality management practices of the organisations.
Total Quality Systems	Framework for guiding quality-related actions by the entire set of employees and a means of assessing how well these actions are carried out. These are reflected in the quality management systems of the organisations.

Source: Srdic and Selih (2011)

The main quality requirement from the construction project (structure) point of view is the functions, durability and aesthetics of the finished construction work. This ensures that design and structure is in accordance with the appropriate standards, that the construction components conform to the relevant specifications, and that the execution of construction work meets the relevant standard. This is coupled together with the requirements of individual stakehoders, as well as achieving the conventional project goals such as quality, budget and scope. Srdic and Selih (2011) stated that integration of sustainability-performance assessment into the quality requirement provides opportunity to improve project sustainability and presents a cost-efficient management approach, while meeting the required construction projects goals. Braune et al (2007) point out that, in the European Union, the main strategy for evaluatiing and improving environmental performance of products, including construction products, are Environmental Product Declarations (EPDs). These provide credible information of their environmental impact of the products (ISO 14025, 2006; ISO 14043, 2000) and contractors can decide which is the most-sustainable product to use.

Srdic and Selih (2011) in their work proposed an intergrated quality and sustainability performance assessment model using EPD and a quality-conformity approach as a tool to

improve construction sustainability. This approach involves integration of quality and sustainability assessment at the building (structure) project level and at the project process level. It involves utilization of established quality-management systems with standard environmental-management systems at the project and organizational levels, while conforming with the EPD at the product/ procurement level. According to Zink (2007) corporate sustainability based on stakeholders' approach and Total Quality Management (TQM) are closely related due to utilization of TQM philosophy, and that sustainability would be the future-oriented concept for TQM.

Having examined quality management and sustainability, and the numerous debates on the concept of sustainable construction, together, with the issues associated with sustainability and construction in Nigeria, and the current construction practices, the next section looks at the various theories of change in order to gain insight into possible approach to initiate change towards sustainable practices in the country.

2.7 Theories of Change and Sustainability Transition Models

Lewin (1951), a social scientist, viewed behaviour as a dynamic balance of forces working in opposite directions; he introduced a three-stage change model upon which other theories were built. The first process of changing is to unfreeze the existing situation or *status quo* (also known as the 'state of equilibrium'). Unfreezing is necessary to overcome the strain of individual resistance or the pressure of group conformity, and this could be achieved by either increasing the driving forces on the *status quo*, or by reducing the restraining force that negatively affects movement from equilibrium, or a combination of both (i.e simultaneously increasing the driving force for change and reducing the restraining force). Kritsonic (2005) points out that activities that enable unfreezing include identifying the problems and recognizing the need to change. It also requires building trust and motivating participants. The second stage is to introduce changes or intervention and move the target to new level of equilibrium. The process involves learning and adaptation, collaboration, and the benefits and disadvantage of change are also explained at this stage. The final step is refreezing after change has been implemented and the new process is incorporated into the routine, and institutionalized through the formal mechanism of policy and procedure to stabilize the new equilibrium. These three steps sum up the process of change. However, various concepts emanated from the implementation of this series of steps.

There are several theories of change, with each representing different ideology with its own assumptions about the nature of the environment, human- and social-organization. Most prevalent in the literature are teleological theories (planned change or scientific management), and evolutionary (adaptive change) theories. The main idea behind the evolutionary theory is that change is shaped by environmental influence and is a slow process; this theory is deterministic, and people have minor impact on nature and the direction of change process. Whereas the teleological theorist argues that change is planned and implemented when there is need for change and in this school of thought, the key

aspect of change includes planning, assessment, strategy and collaboration for organizational development and improvement (Van Den Ven et al, 1995; 2005). These two categories of model have contrasting assumptions and represent dichotomies such as materialist/idealist, subjective/objective, and social/technical, with planned-change theory having the first characteristic and adaptive-change theory the second. These two schools of thought have been scrutinized by their authors resulting to both accepting contingency and control as shaping the process of change (Czarniawska and Sevon, 1996, p.14). Several other theories evolved out of the effort to reconcile the problematic assumptions of the planned- and adaptive-change models, these, amongst others, include dialectical theory, life-cycle theory, socio- cognitive theory, paradox theory, chaos theory for example.

The above theories have various criticisms, for instance, socio-cognitive concepts seem to apply principles of logic from the objective-observer position, with emphasis on ability to learn and control, without considering the notion of reflexivity and reality of participant and their social interaction (Stacey, 2000, p. 38; Burnes, 2005). Also, little attention is placed on the dynamic environment with simultaneous contradictory forces, which makes learning and behaviours unpredictable. Change as a phenomenon has to do with interaction between people in an organization, not just interaction between abstract entities. The concept of change is about the assumption of the nature and reality of people, and systems. It is questionable that the majority of change theory is provided from the objective-observer position that stands outside the phenomenon of interest as opposed to the inquiring participant. Change could be informed by reforms of incumbent processes or the introduction of entirely new systems accommodating divergences of emphasis, and competing perspectives on the benefits and drawbacks of practice. This complexity and dynamic characteristic associated with the process challenges the straightforward managerial understanding of transition theory application (Smith et al, 2010). Drawing from the above theories, and applying these concepts to sustainability transition, evolutionary theory provides a range of concepts and mechanisms that are useful in making existing theorizing about transitions more precise and complete (Safarzynska et al, 2012). It offers suggestions for extending current theoretical frameworks of sustainability transitions. Berkhout et al (2004) warned that the transition to sustainability involves change which should be carefully managed for effective performance in place of current sustainability rhetoric.

2.7.1 Socio-technical Transition Theory

Geels (2005) refers to a socio-technical system as a web of interconnected elements such as technology, user-practice, regulations, institution infrastructures, market, maintenance, and supply network. The functionality of the system is predicated on the effective interaction of the different elements of the system. For instance, technology can fulfil its functions only if it works in association with human agents and social structure. Technology advancement and innovations towards sustainability can only be effective if people understand how to use them. Socio-technical transition involves change in both socio-technical systems due to

the fact that technological adoption requires social learning and adaptation at many levels (Ravetz, 2006). This theory posits that transition occurs through many pathways (multi-level), and it requires widespread learning and behavioural change.

Socio-technical transition refers to the co-evolution of social and technological systems and the dynamic by which these changes occur (Geels, 2011). According to Smith (2005), this process is characterised by a set of dynamic pressures on a dominant system (regime). These processes occur in a multi-dimensional space comprising institutional and socio-cultural rules, and economic requirements; it is about a deep-structural change that involves an alteration in the overall configuration of established systems such as technology, market, policy, infrastructure, consumer practice and scientific knowledge (Elzen et al, 2004; Grin et al, 2010). Smith et al (2005) and Geels (2005) conceptualize the overall dynamic pattern of socio-technical transition using a multi-level perspective change that involves a technological niche, a socio-technical regime and a socio-technical landscape. The main point of the perspective is that transitions take place through the alignment and interaction of a dynamic system at all three levels. The dynamics are not mechanical and linear, but come about through the interactions of social groups with different interests, strategies and values.

The multi-level perspective (MLP) has emerged as the middle range framework for analysing socio-technical transition to sustainability which combines ideas from evolutionary economics, science and technology and structuration and neo institutional theory (Geels, 2010; Geels and Schot, 2010). The MLP transition results from the interplay of interaction developed at three analytical levels; the niche, socio-technical regime and the socio-technical landscape. Each level comprises a combination of elements that appears more stable in terms of actors and alignment between elements at the socio-technical regime and landscape level (Kemp et al, 1998; Geel, 2005). The regime refers to the set of rules that coordinate the activities of the various elements and accounts for the stability of the existing socio-technical system. The regime rules include: shared beliefs, user-practices, capabilities and competences locked in the cultural, political, scientific, and market domains which serve as both the medium and outcome of action (Giddens, 1984). The niches are smaller units of protected space that support emerging innovations; they are vital for transition because they provide the seed for systemic change (Schot et al, 2008). While the landscape is the wider environment that influences the niche and regime dynamics (Kemp et al, 1998), it includes the technical and material background that sustains society, as well as economic patterns, demographic trends, societal values and political ideologies.

Change is dynamic and could occur in different forms. The multi-level perspective transition has been criticized for being overly focused on a bottom-up approach to change, and for underplaying the role of agents in transition. Berkhout et al (2004) stated that undue emphasis is placed on regime change, beginning from the niches upwards, overlooking those changes that operate downwards from the socio-technical landscape. Similarly, Genus

and Coles (2008) argued that more attention should be placed on the role of actors such as power and politics to influence change (see also Smith et al, 2005). Berkhout et al (2004) call for clarification on how the concept level be applied owing to the lack of clarity in the operationalization and specification of the regimes. This view was also supported by Genus and Coles (2008), they raise concern about the operationalization, specification and delineation of the MLP and regime in particular. Also the landscape level has been criticized for accounting for different kinds of contextual influences. Despite these criticisms, Geels (2011) however, argued that there is no one right way to investigate socio-technical transition, and asserted that MLP is suited for addressing special characteristics of the transition topic.

Geels (2011) stated that transition research on sustainability focuses on development of sustainable practices and technologies and how society can adopt this practice when compared to the traditional methods of operations. A common challenge to adoption of sustainable construction is that construction is part of a complex system that includes institutions, culture, physical infrastructure and economic infrastructural underpinning. Emphasis on policy development and technological innovations often far exceeds the capacity of society to adapt its institutions, economy and culture. Stirling (2011) alluded to this by stating that the explanatory powers of the socio-technical transition model diminish, if focus is on the model and not the learning process. The fundamental challenge of transitioning towards sustainability entails harmonising the pace and direction of change at a multi-level perspective (socio-technical). Addressing this requires a thorough understanding of the complex interactions between social and technological systems, learning and change.

2.7.2 Social Change Theory

The apparent environmental challenges such as climate change have been attributed to the unsustainable patterns of human activity, and there is demand for large-scale changes to everyday life across various sectors of society (UNEP, 2007). Promoting pro-environmental behaviour and sustainable practices has become an important policy response to such challenges, especially in developed countries (e.g. SCR, 2006; DEFRA, 2008). Several human behavioural models have been constructed to guide and direct more pro-environmental behaviour (Lucas et al, 2008), with a variety of assumptions. Amongst such models are the individual, social marketing and practice-based models. The main assumptions of the individual change model rests on the notion that, if the necessary cognitive components can be identified and modified, behavioural changes will cascade across contexts throughout all areas of an individual's lifestyle. However, in recognizing that individuals do not exist in a social vacuum, and that, in some cases, the surrounding context overrides all of the cognitive factors included in the models (Stern, 2000), adjustments have been made to incorporate various proxies for context such as social norms, surrounding infrastructures and social networking (Barr, 2003; Martin et al, 2006). In recent time, the contextual sensitivity of such proxies has been enhanced in social marketing models which seek to

remove the perceived-contextual 'barriers', and then carefully tailor messages to selected audience segments with the view to create new social norms that will motivate individuals to adopt new or desired behaviours (see Hargreaves, 2011).

Advocates of social marketing theory for change argue that an organised effort to persuade others to accept, modify or abandon certain ideas, practices or behaviour might result in change. The ultimate goal of social marketing is behavioural change; it is about communicating certain ideas, concepts and beliefs to bring about change in behaviour. These ideas must be beneficial to those that needed to change their current beliefs, practices and behaviour. This theory emphasises the importance of applying marketing knowledge, concepts and techniques to enhance or meet social needs. For example, the marketer puts lots of effort into understanding consumption behaviour, in the same way social marketing theory emphasises the need to understand human behaviour, and apply this understanding to address social behaviour both at individual and key stakeholders' level. Shove (2004; 2010,) argues that the approach is fundamentally flawed and presents a whole range of non-sustainable social conventions. Several critics have expressed that the approaches highly individualistic and fail to appreciate the extent in which other factors such as the ways in which the variety of social relations, material infrastructures and the particular circumstance are connected to the performance of social practices (Hobson, 2003; Nye and Hargreaves, 2010)

In contrast to the conventional rational and individual approaches to behaviour change, social practice theorists argue that behaviour is shaped by practice and is not based on individual reasoned decisions which are influenced by beliefs, values and attitudes (Hargreaves, 2011). The principle behind social practice theory is that the source of change in behaviour lies in the development of the practices themselves. It de-centres individuals from the analysis and rather turns attention to the social and collective organizational practices. In other words, social practice theorists emphasize that it is through engagement with practices that individual comes to understand the world around them and makes sense of self (Warde, 2005). It does not look at individual actions, rather it looks at why they behave the way they do, and what drives that behaviour. Social practice theory focuses on what influences and drives the actions and not the actions or behaviour. Shove (2010) and Reckwitz (2002) stated that the practice itself, rather than the individuals who perform them, or the social structure that surround them, is the core of analysis. The concept centres on practice which is the middle ground between individuals and the structure they operate in (Giddens, 1884). Hargreaves (2011) argued that practice theory provides a more-holistic and grounded perspective of behavioural change when considering the planning and delivery of environmental initiatives.

In view of the above, patterns of actions or inactions towards sustainability, according to Warde (2005) are not seen as the result of individual altitudes, values and belief, but rather as embedded and occurring as part of social practices. The standard practice of an

organization drives the daily action of its members/employees. Through constant repetition of actions in line with this standard practice over a period of time, behaviour patterns develop, which are shaped to conform to practice. Reckeitz (2002) points out that, the individuals themselves are removed from the centre-stage but rather are seen as the carriers of the social practice, thus undertaking the activities and task that the practice required. Patterns that emerge through practice are not based on persuasion and education of individuals to make different decisions, but rather on continuous and transforming practices (Southerton et al, 2004). As Warde, (2004) puts it, the source of change in behaviour lies in the development of practices themselves. Therefore, it could be argued that behaviour of companies and stakeholders in the construction sector is not unrelated to the engagement with the long-established traditional practices.

A major criticism of the social practice theory is that it centres on the concept of practice and it is difficult to define exactly what practice means (Shove et al, 2005). It is argued that there is no unified practice approach as some approaches focus on the various elements that make up practice; others focus on the connection between these elements (Warde, 2005). While some theorists focus on the position of practice as a bridge between individual lifestyles and a broader socio-technical system of provision (Spaargaren et al, 2000). Hargreaves (2011) favours a practice approach that focuses on the various components and elements that make up practice, and argued that to generate more-sustainable practices will require challenging and breaking the links between elements of unsustainable practices and replacing them with sustainable practices (see also Pantzer and Shove, 2006). According to Hargreaves (2011), social practice theory links strongly with material infrastructure, legal and power relations and is well suited to intervene and create behavioural change.

2.7.3 Structuration Theory

The core assumption of this theory is that behaviour and structure is intertwined, social structures are the medium of human activities and also enable those activities. In other words, social structure does not only constrain or restrict behaviour, but creates the possibility for human behaviour, and these behaviours or activities also direct social structure. Structured activities can be arranged in terms of rules and resources, these rules govern our interaction or activities with the system; the system is an extension of these activities. This theory argues that new behaviours are developed based on a different structure over a given time space. This theory emphasises a duality between the agent and structure.

The structure of a society affects the way individuals and/or organizations within that society operate. It implies that activities of construction organizations are influenced by the social structure of the society. The structure of the construction industry directs the activities of the agents or professionals. If the operations in the construction industry could be re-structured by reviewing the rules/practice to meet the goals of sustainability in relation to the available resources, this theory argues that new behaviour would be

patterned in. It is therefore important to look at the organizational dynamic, and understand the structure and conduct of the construction industry, to get insight into why practitioners within construction sector behave the way they do. This understanding will help to develop strategies and ways to introduce change.

2.8 Top-down and Bottom-up Approaches to Change towards Sustainability

Lauer (1982) points out that many factors are involved in social change and no single factor can adequately account for it. Social change here, refers to a significant alteration of the social structure, and structure within this context means the 'pattern of social action and interaction' which include the norms, values, and other cutural phenomina (Giddens, 1984). Scholars such as Hargreaves (2011) and Bamberg, (2003) have defined change as the variation or modification in any aspect of social processes, patterns or form. Also, change could mean modification in established patterns of inter-human relationships and standards of conduct and this requires the cooperative effort of all stakeholders. For any intended change to occur in a society, the people must be convinced that such change is both possible and desirable. This requires a systematic ideology that reflects feasibility and desirability. This idealogy would interpret the past, make the present meaningful and portray an ideal future (Lauer, 1982)

Literature abounds with an array of tools and processes to initiate, and measure progress towards sustainability (Bell and Morse, 2013; 2003). These processes range from the conventional top-down approaches where leaders and sustainability experts simply design and choose what they see as most relevant to facilitiate sustainability performance. Such approaches have led to development of processes and requirements such as sustainable construction regulations, environmental sustainability indexes, Agenda 21 for sustainable construction, and other sustainability related polcies (GRI, 2011; CIB, 1999; 2002, and UNEP-TETC, 2002). Traditionally, development of sustainability-related change-plans and management has been the domain of sustainability experts and leaders, which is passed down to managers in the construction industry to guide their practices. The plans and vision of the management team and leaders is cascaded down and enforced. These approaches have been increasingly criticized for failing to actively engage local communities and practitioners who are at the front line, thus, operational realities may affect implementation of these plans (Fraser et al, 2006).

The bottom-up approach to change involves all stakeholders and allows to drive change; it embraces the benefit of detailed knowledge. Fraser et al (2006) alluded to the point, stating that this approach to change involves collaboration of experts, leaders and local community and all stakeholders and is likely to provide a database that reflects local values on which specific management decisions can be made. This would also generate community support for policy change. The process of engaging and involving all stakeholders provides valuable opportunity for community empowerment and education. Fraser et al (2006) noted that the failings of the top-down approach has encouraged the formalization of the bottom-up

stakeholders' involvement in the socio-environmental management processes. Sustainable construction strategies that involves active engagement of the local community and key stakeholders in decision making and development of relevant plans are likely to be more effective. Several scholars have argued for the need to develop mechanisms that bring together experts and all stakeholders in developing methods to measure the need and progress of sustainability (Du Plessis and Cole, 2011; Pitt et al, 2009; Fraser, 2006). Smith and Raven (2012) argued that civil society can contribute/intervene to sustainability transition at three levels. First, through development of novel and sustainable alternatives, second, through various efforts to challenge the '*status quo*' at the regime level, and third, through long-term action to change the landscape of societal values.

Chapter 3

3 Research Methods

3.1 Introduction

The present research centers on an empirical study to find out how to improve sustainability performance in construction projects. It investigates the extent to which construction organizations in Nigeria consider, and apply, sustainability in their practices, with a view to determine how to improve the level to which sustainability is embedded in daily practice. In doing so, this study takes the critical realist standpoint to understand the current situation and to explore the factors influencing the present construction practices. In view of the fact that the concept of sustainable construction is subjective, this study is based on interpreting the different elements and factors that reflect the present situation of construction and sustainability in Nigeria. This line of enquiry is useful to gain deeper understanding of the structure and elements of construction practices and it is appropriate in understanding the causes and context within which construction takes place in Nigeria, and its implication on company's practices.

In view of the complex and dynamic nature of the concepts of sustainability and construction, this study adopts the systems approach to examine the factors that influence the company's actions and their connection to the present construction practices. This system approach was also used to examine the relationship and interaction of the systems and structure of activities in the construction industry, and its implications on the company's behaviour. In assessing the companies' socio-environmental practices, this study utilizes the sustainability-maturity assessment model to explore the extent sustainability tenets are embedded in the companies' practices and the company's desire to improve. By analyzing the assumed complexities at the systems level, it provides opportunity to explore and identify the rational for the current practices and the effect on companies' behaviour, and the consequences. The system level analysis was also useful in investigating the barriers and opportunities for sustainable practices, as well as, in identifying how companies could adjust their processes to improve sustainability performance.

This chapter describes the method used to conduct this research; it first lays out the research philosophy in section 3.2 and the various methodological choices in dealing with this research problem in section 3.3, and the ethical issue related to this research topic in section 3.4. It then goes on to discuss the research design and methods used to conduct this study and it offers a critique of the limitations of these methods in section 3.5. Sections 3.5.1 to 3.5.3 provide justification for the method used, and describe the processes for applying them. The methods were applied in a way that identified limitations are minimized and their strengths utilized. Section 3.6 explores theory building and systems modeling process, while section 3.7 focuses on reflection of the present researcher's experience in conducting this study, and section 3.8, provides the summary of the research methodology.

3.2 Research Philosophy

The philosophical approach adopted for this study is based on insight from critical realism. Todorov et al (2009) stated the theoretical paradigm for any observable circumstance: reality or objects should reflect or express all elements and aspects of the phenomenon. Making sense of the behavior and practices of construction organizations from multiple perspectives provides the researcher with the opportunity to gain rich insight into the various contexts, elements and factors that create the present reality. This is useful to get deeper understanding of the phenomena under investigation. According to Easton (2010), the fundamental tenet of critical realism is that we can use a causal language to describe the world, and that objects or realities are not context free. This offers a more-suitable approach to understand all aspects of sustainability, because the concept is complex, it varies according to context and dependent on factual- and value-based components. Critical realism assumes a combination of realist ontology, and interpretative epistemological view. A critical realist paradigm assumes realities exist, however, there is no way this can be proven or disproved, but how we come to know about this reality is subject to our interpretation. This epistemological standpoint provides opportunity to understand the different interpretations of sustainable construction and how it connects to the environment within which construction organizations operate, and how this links to the current reality under study - current practices in Nigeria.

This critical realist line of inquiry is useful to gain deeper understanding of the structure and elements of the phenomena – sustainable construction, which presents opportunity to identify stakeholders' values, or the drivers and barriers of the various elements connected to sustainable practices in Nigeria. As Sayer (2000) points out, 'in both everyday life and social science we frequently explain things by reference to causal power'. The critical realist paradigm is more appropriate to mirror the language and procedures that are routinely adopted in this research, and the explanations that are created in the study of sustainability and operations of construction organizations in Nigeria. Geoff Easton (2010), in support of this view, stated that critical realists argue for the use of causal language within their thinking. A critical realist paradigm is relatively tolerant with respect to different research methods, when compared to positivism and interpretivism. Accordingly, this research utilizes mixed methods for gathering data on selected case studies, which introduces both testability and context in this research, and provides opportunity to capture or conceptualize knowledge from different perspectives (Mingers, 2008). Sayer (2000) stated that particular research-method choices should depend on the nature of the object of study and what one wants to learn about it, however, critical realism endorses, or is compatible with, a relatively wide range of research methods. Critical realism is particularly well suited as a companion to case research. Easton (2010) argued that it justifies the study of any situation, regardless of the numbers of research units involved, especially if the process involves thoughtful in-depth research with the objective of understanding why things are as they are. The critical realist paradigm is most suited for this study because it presents different ways in which knowledge can be generated (Van Der Walt, 2006), and also

provides grounds to link research questions in a multi-level analysis and systematically cross-reference findings in-depth. The following section describes how the research objectives will be met through appropriate methods.

This study focused on addressing issues relating to how construction organizations and practitioners could change their behaviour, to better embed sustainability in their practices. In dealing with the research problem, the research acquired knowledge by studying peoples' actions and perceptions and interpreting them. In view of the fact that data contained in this study is diverse with subjective actions demonstrated through their perceptions, it was necessary for the researcher to adopt a research philosophy that acknowledges that there are no 'right' or 'wrong' perspectives. However, the research does not only describe peoples' perspectives, but goes on to direct the information obtained from this study to create an interpretation or new sets of concepts useful to address the identified issues relating to how construction companies and practitioners can change and improve their current practices. By understanding the casual factors for the identified issues, an attempt to find practical solutions for which companies can effectively embed socio-environmental sustainability into the current economic driven practices can be created.

3.3 Nature of the Research Problem

In designing the methodology for this research, a number of problems were encountered. First the research topic is multidisciplinary, involving the fields of sustainability and construction. On the one hand, sustainability is a broad concept with different interpretations and methods of application. The concept has multi-dimensional perspectives which have to combine efficiency, equity, values and ethics, economic, social, political and environmental studies. On the other hand, construction is also a complex concept, with variety of views about their scope and meaning. The absence of an agreed or unified definition for sustainability and construction further magnifies the interpretative dilemma, due to the fact that concept of sustainable construction is based on factual and value components (Carew and Mitchell, 2007). Berardi, (2013) alluded to this by stating that the interpretation of sustainable construction remains contentious in spite of the numerous papers and conferences on the subject (see also Du Plessis, 2007). The interpretative and multidisciplinary nature of this topic presents a challenge to examine how practitioners in Nigeria could integrate and improve sustainability in their construction practices which is the core of this research. Morlacchi and Martin (2009) point out that the concept of sustainability and construction is an intrinsically interdisciplinary problem, and a pluralistic field. It is therefore important to broaden its analytical scope, and this adds complexity to this research. To deal with the multidisciplinary nature of this research topic, a review of a broad range of literature involving different disciplines was conducted. While literature and previous research exists on the separate disciplines, there is limited research that integrates them into a whole as this research seeks to do.

In view of the problems of interpretation due to the broad nature of the concept of sustainability and construction, this study adopts the 'triple bottom line' approach to sustainability. This involves consideration of the economic, social and environmental perspectives, to simplify the complexity surrounding the interpretation and application of sustainability in construction. Brennan et al (2014), Silvius et al (2013) and others point out that sustainability is generally presented to incorporate three main tenets: economic, social and environmental sustainability (see also Elkington, 1997). This research therefore focuses on assessing the three main tenets of sustainability to check performance of the companies investigated. In doing this, the study utilizes a sustainability assessment questionnaire to examine the level at which environmental, social and economic concerns were considered and integrated in the construction processes of the companies investigated. It provided information on the current practices relating to sustainability and construction. This approach was useful to gain insight into the current situation in Nigeria and also provides the company's performance on the different aspects of sustainability, which was helpful to identify specific areas for improvement.

Another problem lies in the issue of identifying practitioners and organizational values as part of an effort to gain an understanding of the rationale for the current practices and what it means for construction companies and its stakeholders to operate in a more sustainable way. This research attempts to identify the values that underpins and drive the current behaviour, with a view to exploring how it can be developed further in such a manner that addresses existing interest and at the same time embraces sustainable construction issues. Since sustainability is about factual and value components, an understanding of the values that influence the action and commitment of the key stakeholder presents the opportunity to identify ways to embed sustainability tenets without disproportionately affecting the core values and interest of stakeholders. Berry (1999) describes values as the ideals, principles, and philosophy that underlie individual or organizational strategies in their day-to-day decisions. Clear and compelling core values are typically at the root of a company's actions and commitment to their daily practices. However, values are intangible, and cannot be directly detected and monitored. Identifying and interpreting values has its inherent difficulties, because issues of values are internal and cannot be easily and accurately interpreted unless it is clearly expressed. Kim (2011) stated that the techniques to evaluate values are largely based on the study of human and organizational actions and behavior (see also Kachel and Jennings, 2010). Though the concept of values is subjective, within the context of this research 'values' refers to a prescriptive conviction about desirable behavior and goals. This research seeks to infer values from the actions, commitment and behaviours exhibited within and among construction stakeholders. This position is supported by authors such as Sinkula et al (1997) and Dowling and Pfeffer (1975), who indicate that corporate values are implied by an organization's business orientation, evidenced by its activities and internal behaviours. Similarly, Khazanchi et al (2007), state that organizational values are evidenced by practice. This suggests that values are largely contained within actions and

behavior. Also, various researchers (such as Verplanken and Holland, 2002; Finegan, 2000; and Scott and Hart, 1989) propose that values give meaning to, and regulate, behaviour.

Addressing change toward sustainable practice in companies involves dealing with analytical challenges around normativity, directionality, innovation, and social mobilization. It may require broadening of its analytical scope to include additional dynamics related to civil society, social movements and client behavior. In addressing this, a social technical transition system was utilized to explain how change can occur in the practices of a construction organization and generally within Nigeria's construction sector. Though this theory appears effective in dealing with issues of transition to sustainable practices, due to the complex nature of level of change required in Nigeria's construction industry and how it connects to the actions of construction organization, the social technical transition systems seems not well established to deal with the peculiarity of the situation of construction and sustainability in Nigeria. Social technical transition processes are effective in structured and functional systems, but this is not the case in Nigeria's construction sector. The absence of a proper structural and functional system that supports the operations and governance of sustainable construction in Nigeria implies that more than social technical transition processes will be required for change to occur in the companies' operations and projects delivery. Dania et al (2013); Hussin et al (2013) and Ebohon and Rwemila (2000) stated that the structure, conduct and performance of the construction sector are a necessary prelude to understand the capacity to enhance sustainable construction processes. It was therefore necessary to examine and apply a variety of change and sustainability transition theories to determine how change can occur in the practices of construction organization and by extension in Nigeria's construction sector. The combined use of a number of change theories was useful to develop a systemic framework for change in Nigeria's construction sector and a practical strategy to embed social-environmental values in companies' practices.

3.4 Ethical Issues

The research was conducted according to Birmingham City University research ethical framework (2010), with particular interest on the ethical consideration of faculty of Technology Engineering and Environment (2010). The research also abided by the British Sociological Association's Statement of Ethical Practice (BSA, 2004). The activities involved in this research do not include practices that directly or indirectly imposed risk or serious harm to both the researcher and participants. The research required verbal and written interaction with human subjects within the construction industry in Nigeria. Informed consent of the respondents was sought beforehand, by explaining, in meaningful terms to the research respondent what the research is about, why the research is being undertaken and how the outcome would be used or disseminated. The subjects were aware of their right of refusal and their rights to privacy and anonymity before and during any stage of the research. They were also aware that the data they provided would be used for Birmingham

City University research purposes. They were also provided with formal assurances over any concerns about the privacy of their identities and those of their organizations.

The researcher is fully aware of the faculty code of conduct regarding bribery, fraud and related risk, and this code was fully observed at all times during this research. The focus of this research was to determine ways in which multi-national companies in Nigeria can better integrate sustainability in their project management practice with the view to improve sustainability performance within Nigeria's construction industry. Based on the focus of this study there was limited risk for fraud and bribery. The research involved gathering data from different organizations regarding their practice, it is vital that all data are keep secured because some of the data could reflect strengths and weaknesses of these organizations that are already in competition with one another. The researcher ensured full confidentiality of data, and that appropriate data storage techniques were used, throughout the period of this research. All documents were appropriately stored and destroyed after completion of the PhD research programme. Maximum effort was made by this researcher to ensure that research enquiries via survey and interviews were conducted only in regard to the information that was being sourced. The research subjects were encouraged to give responses in a direct rather than an inferred manner, in order to minimize the possibility of data being interpreted inaccurately. This researcher took care to limit his involvement so as not to influence the outcome.

In line with the charitable requirement of the University, the outcome of the research will be useful to improve sustainable practice within the construction industry in Nigeria. Regarding how the research fit with the University priority; knowledge and insights from this study will be useful to map decision on how to better integrate sustainability in practice within Nigeria's construction industry to reduce negative impact of non-sustainable practices on the environment and society, as well as contributing to global sustainable development goals.

3.5 Research Design

Most of the researches on sustainability and construction in the developing countries have tended to focus on identification of barriers or challenges to sustainable construction practices (Hussin et al, 2013; Inuwa et al, 2015). However, little research provides insight as to how these barriers might be overcome in order to embrace sustainable practices, especially in the behaviour and practices of construction organizations in Nigeria. Since this study sought to provide such insight, it investigated the factors that influence the behavior of construction stakeholders, with the view to understanding the rationale for their actions, and from this it was possible to develop a strategy for change towards sustainable practices. In order to get detailed insight of the current situation, this study was conducted through a case-study approach. Yin (2003; 2013) points out that, a case study approach is appropriate to investigate contemporary phenomenon within a real-life context, and is useful to get in-depth understanding of the investigated phenomenon. This fits with the aim of this study –

to gain in-depth understanding of the current challenges and determine how to initiate change towards sustainable practice within the context of Nigeria. Flyvbjerg (2006) suggests that a case study approach is ideal for seeking practical, context-dependent knowledge. Although case study research has been criticized for difficulty in making generalizations from a few case studies (Bell, 2010), generalization is only one of many ways people can gain or accumulate knowledge. It is argued that case study research can be generalized based on the criteria for selection through the concept of relatability (Flyvbjerg, 2006).

As part of the complexity associated with the sustainability such as the local and global perspective, socio-cultural, economic, environment and value domain, it was vital to consider these factors in selecting case study. Nigeria is divided into six geopolitical zones, with each zone having different subcultures which influence their beliefs, values, work attitude and perceptions. To make certain of the representation of the diverse social-cultural and geographical areas, projects were selected across the four main geopolitical zones in Nigeria (North Central, South West, South East and South South). This enables the researcher to investigate the influence of socio-cultural differences to sustainable applications and also provided a rich contextual basis for interpreting the data. Nine public infrastructural and building projects from three multi-national construction companies in Nigeria were selected and investigated, based on the notion that government has the capacity to handle sustainability-related costs and is expected to support sustainability initiatives. Yin (2003, p.55) recommended some conditions for which a particular case study should be selected, these include the type of questions, time available for the study and the degree of focus of the contemporary issues. The following criteria were used to select individual case study subjects.

1. The type of questions – an important condition is that respondent must be in a position to give informed answers to the research questions. Projects handled by multi-national organisations were selected comprising professionals that were knowledgeable on sustainability issues.
2. Type and financial size of projects – infrastructural and building projects with budgets ranging from 12billion to 25billion Naira (£50million to £100million), which were sponsored by the federal or state government were selected based on the fact that government has the capacity to handle sustainability related cost and are expected to follow the UN sustainability initiative which they are a signatory to.
3. The time available for research – selected case studies were run concurrently within the period of this research. Projects with average delivery time of three years, either from inception or before completion were selected.
4. Degree of focus of this study – this research centres on the techniques to integrate sustainability principles in the management methods and process in construction project. The focus of this study is more on sustainability integration during the construction phase (pre-delivery phase) and not post-delivery phase which involves the operation and management of the completed project. Selected case studies were live projects with an average delivery time of three years

To obtain and process relevant data for this research, a combination of data-collection methods was adopted. Data were collected through survey, interviews and documents to get comprehensive evidence to address the research problems. This research was conducted in three stages. First a review of appropriate documentary sources was carried out to gain insight into the current debates and best practice in the field of sustainability, construction, and change. These provided the researcher with adequate understanding of the concept of sustainable construction and how it applies to practice. Specific literature was selected and reviewed from the enormous amount of sources in this multi-disciplinary field to get explanatory tools, familiarity with the language base and adequate insight to deal the research problem. At the second stage, a survey was conducted to gain insight into the current practices and the ambition of the participating company in its endeavours to better integrate sustainability with its practices. The survey served as a scoping review to gain insight into the construction practices in Nigeria. Data from the survey guided rounds of interviews with the middle-and-senior management of the companies, and other stakeholders; this provided in-depth insight for the rationale for the current practices. From this, the factors that drive the actions of construction organizations and how change can be introduced were identified. Sections 3.6, 3.7 and 3.8 provide more information on how this combination of data collection methods was utilized to deal with the research problem. Johnson et al, (2004) stated that a combination of different methods to collect data provides a rich contextual basis for interpreting and validating research findings (see also Gorard and Taylor, 2004). Figure 2 below shows the order in which the methods were applied and the following sections discuss how these methods were used to address the research problem.

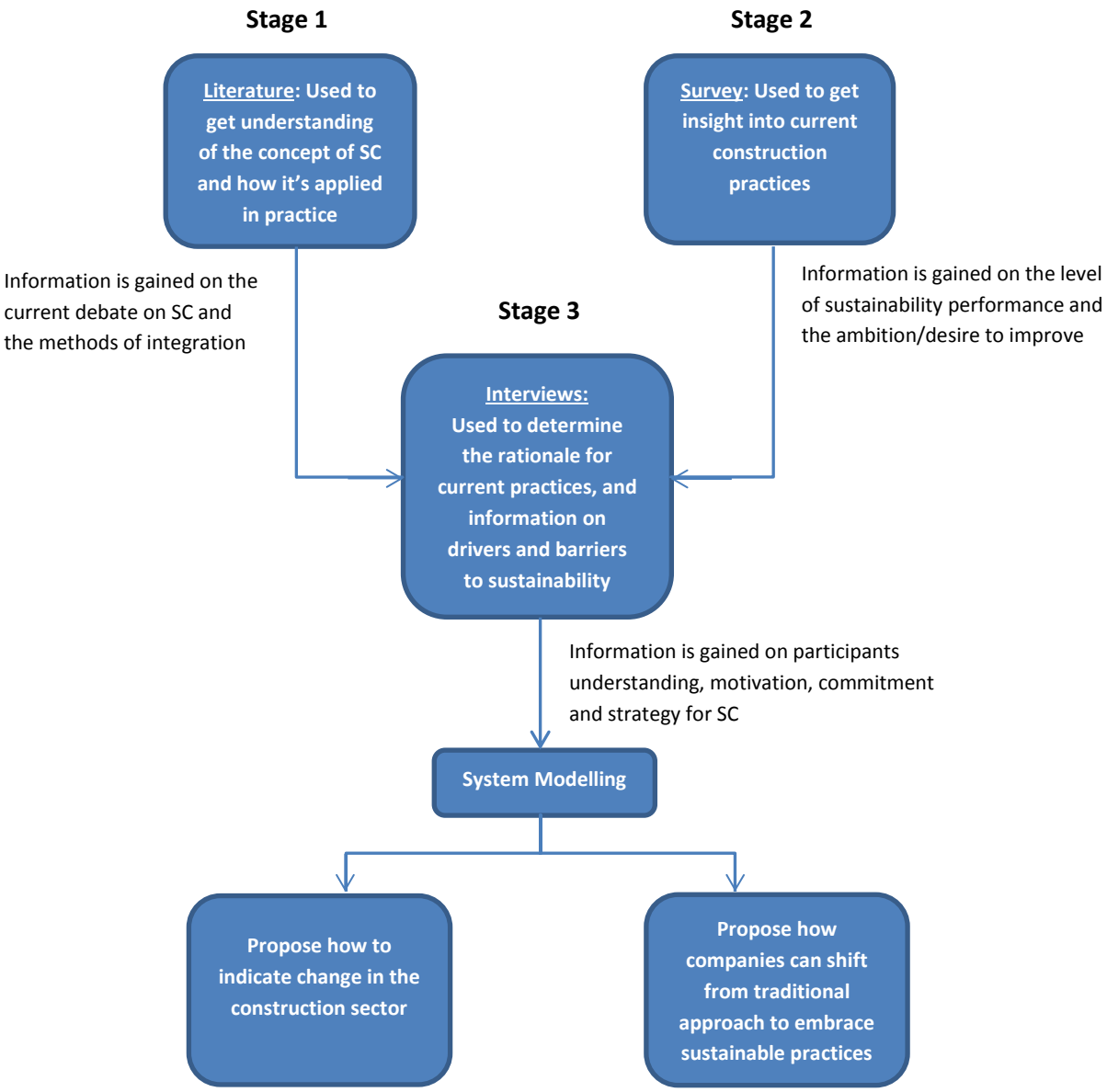


Figure 2: Framework for the research method

3.5.1 Stage 1 – Literature Review

The research topic is multi-disciplinary, involving the field of sustainability, construction, change and its associated domains. Though, there is abundant literature in the field of sustainability and construction. However, there is no narrowly focused body of literature on the subject. Thus, to get insight on how to deal the research problem, substantive and thorough literature review on sustainable construction was conducted. Boote and Beile (2005) argued that a researcher cannot perform significant research without first understanding the literature on the subject. In order to advance a combined understanding, literature on sustainability and construction, in different contexts, were selected and reviewed to get insight into the current debates, understand the strength and weaknesses of previous studies, and what it might mean to address the research problem. This idea is supported by authors such as Smith et al (2008) and Boote and Beile (2005) who stated that good research advances our collective understanding and not understanding previous research clearly puts the researcher in a disadvantaged position. Researchers cannot devise

appropriate research methods if their understanding of the phenomena they are investigating is rudimentary (Boote and Beile, 2005).

Since this research is focused on how practitioners and organizations could improve their sustainable construction practices, literature and theories of change were identified from the pool of research about change to get insight into how to initiate and sustain change. Various change theories such as socio-technical transition, structuralism, social practice theory and other change models where identified and reviewed to understand the techniques and processes for creating and managing change. This literature provides insight on how to initiate and drive change, and also identified important 'points of leverage' to initiate effective change. Richardson (2003) points out that for researcher to be able to identify and deal with a research question, they must be able to find a perspective that is progressively more explanatory and insightful. To do this they must become more-sophisticated theoretically without being superficial. Conventional models for change towards sustainable construction in the literature can be viewed from three main sets of policy paradigms: policies and regulations, provision of incentives, and innovation and assessment systems. These approaches to change require a structured and functional agent to be effective; however, the challenge of weak and ineffective institutions in Nigeria's construction sector makes this approach ineffective. Socio-technical transition models provide significant information, particularly with reference to how change can be initiated from multi-level perspectives. In dealing with the research problem, socio-technical transition models in combination with other change theories such as practice and exchange theory were used to provide explanatory tools and the language base to develop a strategy for change.

3.5.2 Stage 2 – Survey of the Current Practices

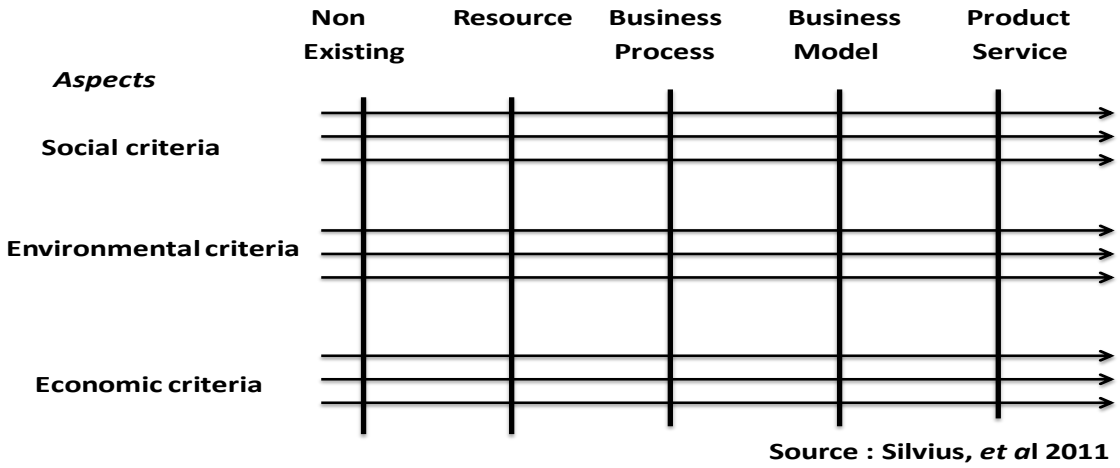
As mentioned in section 3.5, in trying to address the research problem, a survey of the construction practices was conducted to gain insight into the current situation and the ambition or desire of the participating company to better integrate sustainability principles. The survey data provided information on the extent sustainability is considered and applied in the practices of the participating companies. Findings from the survey serve as a scoping review to gain understanding of the current practices; particularly regarding the level construction practitioners in Nigeria consider and apply sustainability in their practices. Survey questions focused on the project strategy for investment evaluation, procurement, health and safety, training and education, natural resource consumption, energy, and waste management. To make the broad concept of sustainability more assessable, the study adopts Silvius and Schipper's (2011) sustainability assessment model and the GRI (2011) framework. This framework presented a practical approach to assess how participating companies integrate and apply sustainability into their projects and project management practices. It assesses the level to which the different aspects of sustainability are considered in the project. This method is also useful to help translate the abstract and interpretative

concept of sustainability into organizational capability and raise awareness for potential areas of improvement.

The sustainability assessment model is based on two leading concepts. First is the concept of the 'Triple bottom line' of sustainability (Elkington, 1997; GRI, 2011), the model considers how economic, social and environmental aspects are integrated in the project under scrutiny. The second concept is based on the 'depth of vision'; this approach recognizes that sustainability can be considered at different levels (Silvius et al, 2012). The model assesses the extent sustainability is considered at the resource, process, and the product levels. For example, resource level assessment will involve using resources that produce the same functionality but have less negative effect on the environment, for instance using hybrid cars instead of normal fuelled cars.

The result of each project under investigation is presented in three separate 'pillars': economic, social and environmental sustainability, to address contextual differences and the ambition or value an organization may have. Figure 3 below shows the model of assessment that combines the two concepts

Figure 3: Sustainability maturity assessment model



Source : Silvius, *et a*l 2011

The sustainability assessment model provides a practical way to integrate the abstract and complex concepts of sustainability into organizational capability, and creates awareness for areas of potential improvement (Silvius et al, 2012). The model assessment questionnaire provides insight on what sustainability means to a project and project management, and how an organization can contribute to sustainability. By using this assessment questionnaire, the researcher can assess the level to which different aspects of sustainability are considered in each project and gain a rich understanding of the project current practice and the aspiration or level at which improvement is desired (Hulspas and Maliepaard, 2011; Silvius et al, 2013).

3.5.3 Analysis of Survey Data

Since sustainability is based on context and value components, the survey questions are divided into of three sections: questions one to seven from the first two sections provided information regarding the respondents, the project that is assessed and the organizational context, while the third section consisted of the actual assessment questions. In order to gain first-hand knowledge of the companies' practices and their desire or ambition to improve, the actual sustainability assessment questions were grouped into three themes: economic, social, and environmental sustainability. For each theme (i.e. 'sustainability aspects') an assessment of the current situation and the desired situation was asked, this provided useful information on the current practices and guidance for areas of improvement. A total of twelve sustainability assessment questions were asked; three on economic sustainability, four on environmental sustainability, and five on social sustainability. In order to address concerns of environmental sustainability, questions on natural resource usage, energy, material selection, and waste reduction were asked. Similarly, questions on labour practice, community and society engagement, health and safety, training and education, and anti-competitive behaviours were asked to acquire information on social sustainability issues. (See Appendix A for the full question)

The respondents were asked to select what they perceive as the actual situation and a desired sustainability performance from the options provided. Options A to C represent a progressive level of considering and integrating sustainability in construction practices (A – business resource, B – business processes, C - product level, D - don't know and E - others). Below is an example from the survey questions

Materials - *Based on which criteria are materials for the project selected?* [respondents were invited to tick the relevant boxes for actual and desired]

	Actual situation	Desired situation	
A.	[ ]	[ ]	Based on technical and functional requirements and their cost
B.	[ ]	[ ]	Materials are also selected based on the energy consumption and/or pollution incorporated in the materials because of their production process.
C.	[ ]	[ ]	Materials are also selected based on their reuse capabilities and value.
D.	[ ]	[ ]	Don't know
E.	[ ]	[ ]	Others

Based on the responses, it was possible for the researcher to determine and present in a graphical format the actual situation and the desired sustainability performance of the companies. In all a total of 270 survey questionnaires were distributed, 235 were returned and 31 were incorrectly filled in, while a total of 204 were useful and analysed. Using descriptive statistical analysis, the extent to which participating companies integrate sustainability was presented in percentages.

3.5.4 Stage 3 – Semi-structured Interviews

Beyond conducting the written survey, it was important to understand the rationale for the current situation in the construction sector. To achieve this, the present author was interested in capturing the perceptions of people who are responsible for applying operational practices. Interviews were conducted to get in-depth insight into the reasons behind the current practices, what drives these actions and the possible barriers to embedding sustainable construction processes. The interviews typically began with the interviewees being asked questions about themselves and their organization, in order to confirm that the interviewee occupied a management role that made them suitable to provide useful data. This was followed with questions about their understanding of sustainable construction and their company's strategy with regards to their environmental and social practices and policies in order to understand the degree of importance companies attach to sustainability.

A semi- structured interview format was used as it encourages interviewees to respond freely within their own frame of reference and the researcher can respond and clarify as needed (Luton, 2010). Saunders et al (2006) suggest that interviewing is the most common and versatile way of collecting primary data about people's experiences by which the interviewer can probe for responses and examine issues such as motives and feelings. Interviewing is not without its challenges: interviewee's selection and access influences reliability and validity of the data and the perspective portrayed (Burgess, 2011). In this study for instance, contradictions between different stakeholder groups were discovered. The researcher found that the contradictions were due to the nature of the interview environment and the level of freedom the interviewee possessed. Where sources of data contradicted each other, or respondents were suspected of being less than truthful, comments were checked against hard facts and alternative accounts to validate the data (Miles and Huberman, 1994). In establishing the difference between strong and weak data, so that stronger evidence could be given more weight in the conclusion. The circumstances of data collection were used to differentiate between strong and weak data, for example, data collected in an informal setting was taken to be stronger than that collected in an official or formal setting where the interviewee had limited freedom, also, data collected where the respondent was alone with the researcher was perceived as stronger data than that collected in the presence of others (Miles and Huberman, 1994, 2002). In addition to this, data collected from knowledgeable informants who were close to the research issue and enjoyed talking about the events and processes were also considered as stronger data than that which was extracted from reluctant respondents or those who were obviously disingenuous. There could be a risk of bias and inaccuracies due to poor recollection on the parts of both the interviewee and the interviewer (Yin, 2003). A lot of responsibility is therefore, placed on the researcher to establish an effective relationship with the interviewee in order to yield valid and detailed data that is minimally affected by human complexities (Haigh, 2008).

Different interview types exist; according to Yin (2003), the most common categorizations are informal, structured and semi-structured interviews (Yin, 2003). In the informal or conversational interview, the researcher does not ask pre-set questions but rather generates questions spontaneously (Turner, 2010). While this has the advantage of flexibility, it creates the risk of inconsistency in the questioning process and raises the risk of researcher bias in the sense that questions could be generated on the spot to lead the interviewee towards providing a 'desirable' response (Turner, 2010). Structured or standardized interviews require the interviewer to stick wholly to pre-set questions (Cresswell, 2012). While this aids consistency, it leaves limited room for gaining additional, unanticipated insight, and a rigid set of questions may not be understood equally by all members of a diverse respondent group (Cresswell, 2012). Semi-structured interviews involve the use of pre-set but open-ended questions in order to allow for expansion on points raised by the respondents, and they also leave room for additional questions to be asked when necessary (Gall and Borg, 2003). Due to its relatively balanced approach, which provides more consistency than the informal interview but still allows a sufficient degree of freedom and adaptability in getting information from respondents (Haigh, 2008), the semi-structured interview format was selected for use in this research.

The interview respondents were staff from three different construction companies and two different government regulatory agencies. Senior- and middle-management level staff were particularly targeted to ensure that respondents had expert perceptions of construction, good knowledge of the company's operations, and were able to provide adequate information of the organization's strategy, and construction processes. A profile of the interview respondents is provided in Table 4 below. The name and organisation of the interviewees is withheld, however, an identity code was allocated. For the rest of this research, interviewees will be referred to by their identity code.

Table 4: Profile of interviewees

Interviewee	**Position**	**Experience Years**	**Organisation**	**Role & Responsibility**
PD1	Project Director	16	Company 1	Develop project plans and ensure implementation meets contract objective. Ensures that the construction project complies with all building codes and other legal or regulatory requirements.
PD2	Project Director	15	Company 2	

PE1	Project Engineer	14	Company 1	Analyse and resolve construction issues on site. Develop and maintain work schedule. Provide technical advice.
PE2	‘’	11	Company 1	Manage construction projects, setting out site and organising construction activities.
PE3	‘’	13	Company 1	
PE4	‘’	10	Company 2	Supervise construction staff, ensure project meets agreed specification.
PE5	‘’	12	Company 2	
PE6	‘’	11	Company 2	
PE7	‘’	13	Company 3	Provide technical advice. Ensure compliance with required standards. Oversee construction activities and prepare site reports.
PE8	‘’	14	Company 3	
PE9	‘’	11	Company 3	
PM1	Project Manager	18	Company 1	Responsible for setting out the construction strategy and time scale. Coordinate and collaborate with other specialists.
PM2	‘’	15	Company 1	‘’
PM3	‘’	14	Company 1	‘’
PM4	‘’	16	Company 2	‘’
PM5	‘’	13	Company 2	‘’
PM6	‘’	10	Company 2	‘’
PM7	‘’	14	Company 3	‘’
PM8	‘’	13	Company 3	‘’

PM9	”	15	Company 3	”
OM1	Operations Manager	12	Company 1	Control the contract programme; collaborate with the PM to coordinate the mode and the method of strategy.
OM2	”	14	Company 2	Manage and coordinate project activities, and implement relevant requirements.
OM3	”	10	Company 3	Control supply chain and manage project operations.
OM4	”	12	Company 3	Manage site operations.
OM5	”	11	Company 3	Assess all sub-contractors and operative and oversee project supply chain. Conduct project reporting.
QS1	Quantity Surveyor	10	Company 1	Provide cost analysis, prepare contract and tender documents, and collaborate with PM to manage site operations. Assist in establishing client requirements.
QS2	”	11	Company 2	
RO1	Regulatory Officer (Electrical)	13	Agency 1	Supervise electrical works and ensure regulatory standards and requirements are met.
RO2	Regulatory Officer (Civil Engineer)	11	Agency 1	Monitor and advise on civil engineering issues. Supervise contractors and ensure appropriate standards are maintained. Undertake technical and feasibility studies and site investigation. Implement regulatory policies and practices.

RO3	Regulatory Officer(Head of Admin)	12	Agency 2	Consult, negotiate and monitor contracts and agreements. Evaluate, review, analyse and recommend management existing policies and procedures.
RO4	Regulatory Officer Environmental Management	14	Agency 2	Implement and monitor environmental strategies that promote sustainable development.

The main focus of the interviews was to investigate how companies embed sustainability in their practices, determine the rationale and motivation for the present practices, and any other factors considered significant by the interviewees for the current behaviour. The interviewees were asked questions relating to how the practitioners and the companies apply sustainability principles in their daily practices and the extent to which sustainability is embedded in their processes. The interview respondents were asked specific questions under the three main tenets of sustainability – economic, social and environmental sustainability. They were also given the opportunity to talk about any other ways they felt the current situation affect their organisations and how it can be improved up on. The questions prepared for the interviews are shown in Table 5 below; although due to the semi-structured nature of the interviews they were not always asked verbatim and in the numerical order presented in the table.

Table 5: Semi-structured interview questions

Questions	**Desired Information**
Individual and organizational perspective 1. What is your understanding of sustainable construction? 2. How do you consider sustainability in your practice? 3. How serious does your organization take the issue of sustainability and why? 4. Does your company have sustainability strategy? 5. Does your company have any form of sustainability reporting? 6. What do you think are the barriers to the uptake of sustainable construction practices? 7. How can this situation be improved?	Find out their understanding, commitment and strategy for sustainable construction. Barriers to sustainable practices.
Environmental sustainability 8. What environmental practices does your company observe and why? 9. Does the project have any specific policies regarding	To determine the company's environmental business practices and their motivation.

consumption of natural resources? 10. How does the project promote the smart use of natural resources? 11. How does the project try to minimize waste and why? 12. Does the project have any policy for material selection, if yes why? 13. What are the criteria for materials selection and why? 14. Does the project have any specific policy regarding energy consumption? 15. How does the project promote efficient use of energy? 16. Is the project design to promote biodiversity?	
<u>*Social sustainability*</u> 17. What social practices does your company observe, and why? 18. Does the company/project have specific standard or policy for labour practice? 19. How does the project address health and safety concerns? 20. Does the company provide training for staff and workers? 21. Do you take social responsibility towards the society or community you operate in, if yes why? 22. How does the company deal with anti-competitive behavior such as bribery and corruption?	Determine companies' social business practice and their motivation.
Economic sustainability 23. What are the criteria for investment is based on long, short or medium term? 24. Do you consider options for future change and flexibility in the project? 25. What criteria does the company use to select suppliers and subcontractors and why? 26. How important are your company's environmental and social performances when compared to its economic performance?	Determine the level of priority attached to environmental and social responsibility as against economic interest.

From the questions, the researcher was able to identify the internal and external factors that influence the current practices of the construction organizations in Nigeria. Based on the responses given by participants from the companies, it was important to get the views of the client and the regulatory agencies to get a clearer picture the situation. Interviews were conducted with the client (Government) who also doubles as the regulatory agency to understand the rational for their behavior and their level of commitment and motivation towards sustainability. In all, 31 interviews were conducted, at which point 'saturation' was

considered by the researcher to have been achieved – new data fitting into categories already devised from old ones without introducing any new category (Charmaz, 2003). With respondents' explicit consent, interviews were recorded and transcribed. Interview texts were coded to enable patterns to be identified from the data. The following section describes the data analysis process.

3.5.5 Analysis of Interview Data

In addressing the research problem, it was important to identify the current challenges and the reasons for this situation. Coding techniques were used in finding underlying ideas and concepts from the interview transcripts, related ideas and concepts that represent these challenges were identified, and grouped together in categories. Different ideas and themes emanating from the data were connected to one another to explain the rationale for the current situation and opportunities presented to improve. Strauss and Corbin (1998) stated that coding involves conceptualizing data, expanding it in terms of its different properties, and relating the concepts that emerge in order to build theory. This procedure is commonly identified from literature sources as useful for the organization and interpreting qualitative data into relevant theoretical information (King, 2004; Robson, 2011).

There are a number of processes involved in coding. First it involves discovering concepts and their properties from data, and then placing them into categories. This process, according to Strauss and Corbin (1998), is referred to as 'open coding' (see also Neuman, 2005). This is followed by axial coding, which relates categories to their subcategories based on the identified properties of concepts (Strauss & Corbin, 1998). Axial coding involves reassembling data following the open coding and to form more-precise and complete explanations about phenomena (Hunter & Kelly, 2008; Coffey & Atkinson, 1996). According to Strauss and Corbin (1998), open and axial coding are both used to conduct a highly detailed, 'line-by-line' examination of data before proceeding with further analysis. This then followed by selective coding, which involved integrating the categories developed from the open and axial coding to form of theory, which is then refined (Silvester, 2004; Strauss & Corbin, 1998). However, the reliability of the coding process is dependent upon the 'ingenuity and insight' with which the researcher selects concepts and categorizes them.

Interview data were audio-recorded, transcribed into text, and processed using NVivo 10, a qualitative data analysis software tool. The texts were read carefully to reveal patterns that ran through them. Codes were created for the patterns, and all data with a similar pattern and ideas were detected and grouped together under the code or node for that pattern. Next, related codes were grouped together under the same category or parent node. This concluded the axial coding process. The parent nodes were then pieced together in order to generate a statement of finding through inductive reasoning. Flick (2009), Alvesson and Skoldberg (2009), Howitt and Cramer (2008), and Fereday and Cochrane (2006), comment that extraction of a theoretical proposition or other output from empirical data in this

manner is commonly described as 'induction'. The study adopts the inductive approach to deal with the research problem.

3.5.6 Coding of Interview Data

In order to determine the rationale for the current situation, the barriers to sustainable construction and the challenges to embed sustainability into the current practices were identified through coding. Open coding was first carried out; this mainly involved reading through the interview transcripts to draw out concepts about the barriers and challenges to sustainable construction practices and their effect on the behavior and action of practitioners. This was followed by axial coding which was useful for sorting data further by making a distinction between the various barriers to sustainable practices and the sub-categories, and identifying their respective effects. The interview data show that participants pay significant attention towards identifying challenges to sustainable construction practices. Data patterns related to these barriers were thus coded on the basis that they constituted an important part of the participants' perceptions regarding the rationale for the current practices. Based on the participants' views, the barriers were sorted into the following categories: knowledge, worldview/perception, values, and regulatory issues. The knowledge barriers comprise their level of awareness and interpretation of sustainable construction. The worldview category consists of the construction and client's requirements, uncertainty about the benefit of sustainable construction, and the perceived abundance of natural resources. Regulatory barriers include those barriers perceived by the participants to be caused by industry regulation, legislation and enforcement. The value barriers include issues of commitment and lack of political will, inequality and institutional capabilities.

Following the open and axial coding for the barriers to sustainable construction, it was necessary to determine factors that could drive sustainable practices to address the second part of the third objective of this research (see chapter 1, section 1.2). In order to do this, open and axial coding were used to identify and categorize elements of the current practices that could be adjusted to embrace sustainable construction practices. From the interview transcripts, the concept of economic value and quality management were derived as the drivers for sustainability in the sector's construction practices. Economic drivers include processes adopted to reduce waste and energy consumption for cost-saving reasons, as well as development and implementation of health and safety policy within companies to reduce accidents and cost of compensation. The quality-management category includes the strategy for maintaining and improving quality standards in construction project delivery. After the conclusion of the open and axial stages of coding, selective coding was done in order to derive information from the various categories of data. The effects of barriers and the benefits drivers to sustainable practices were inferred, particularly the benefit of adjusting the present driver – quality management practices to embrace sustainability as against developing entirely new approach to integrate

sustainability into the construction processes. The coding process for the interview data is outlined in Table 6 below.

Table 6: Process for coding interview data

Theme	Open and Axial coding		Induction (selective coding)
	Category	Sub-category	
Barriers to sustainable construction practices	Level of understanding	Various knowledge and understanding related barriers	Implications of these barriers to the present construction practices
	Investment Evaluation	Various investment and risk barriers	
	Political Will	Various commitment and practice related barriers	
	Coordination and Regulations	Various regulatory and Enforcement related barriers	
	Client requirement	Various client requirement and specification barriers	
	Education and research	Various education and research related barriers	
	Sustainability strategy	Various strategy related barriers	
Opportunity for Sustainable practices	Quality	Various quality related practice	Benefits related actions for social and environmental practices Adjustment of current practices to embrace sustainability
	Economic value	Various economic value related practices	

3.6 Theory Building

The literature review section 2.6 of the present thesis raised the question of what is involved in the transition from a traditional system (quality focused construction delivery) to embrace more sustainability practices. The analysis of the research data provides information on traditional construction practices in Nigeria and the challenges associated with adopting sustainable construction practices. It also presents the opportunity to embed

sustainability principles into quality management strategy, and the implications of this action to the company's sustainability performance and quality improvement. Based on this information, it was possible for the research to propose how construction organization in Nigeria can develop from the current practices to embrace sustainable construction practices. The research utilizes dynamic multi-level explanatory model for sustainability transition to create a cognitive structure of how construction practice in Nigeria can migrate from a conventional, economic-centered delivery approach to a more socio-environmental approach. Dynamic systems models and diagrams in general, provide a powerful means for communicating different understandings of the world and of the potential outcomes of actions taken (Ison, 2010). They are quicker than words in pointing out the multiple interactions among various entities within a system, and in making clear the key features of an interpretation of a given system (Morris, 2009).

Apart from systems models, other ways of representing the transition of a current process from an economic perspective to a more socio-environmental focused perspective include static sustainability models such as the Sustainability Venn Diagram, Concentric Circles, and Three Pillars of Sustainable Development. However, while these representations are useful in highlighting the relationships that exist among the economy, environment, and the society, they suffer from a number of limitations. Lozano (2008), mentioned that they lack the ability to represent the process of change over time. They are also prone to over-compartmentalization of the links between economic, environmental and social issues. For instance, the Sustainability Venn Diagram typically regards the overlapping area of all its three circles as the only indicator of 'full' sustainability, with the intersection between any two circles regarded as only 'partial' sustainability, and any element that falls within only one circle viewed as completely unrelated to sustainability (Dalal-Clayton & Bass, 2002). Dawe and Ryan (2003) argue that the Three Pillars Model portrays economy, social and the environment as parallel 'legs' of the sustainable development 'stool', when humanity can have neither an economy nor social well-being without the environment. They argued that the environment is not simply one leg, but is the floor upon which the stool must stand; it is essentially the foundation from which the other two pillars proceed and should thus be considered at a more significant level than them.

Mitchell, (2000); Lozano, (2008) and Dania et al, (2013) represented the three sub-system in three concentric circles conforms to Dawe and Ryan's (2003) view in the sense that the economy is a sub-system of society, and the environmental system represents the ultimate limit of the sub-systems. This gives an impression of an order of dependency which connects all three dimensions, indicating that the economy cannot exist but as an extension of wider society, which in turn requires a stable environment to occupy. However, such a representation falls prey to the assumption that there are sufficient resources with no external factors (e.g. conflicts, war , political unrest and natural disasters) leading to disruptions in the supply of these resources to society, and it also completely refutes the idea of balance among the three sustainability components (Lozano, 2008; Ehrenfeld, 2005).

None of these models adequately captures the company perspective of sustainable construction practices as determined from this present research. Based on the research evidence as well as literature reviewed in Chapter 2, construction companies traditionally exhibit a strong bias for the economic dimension and show only limited accountability for the society and the environment. Contrary to viewing the economy as a subset of the environment, construction organizations appear to be more inclined towards viewing the economy as their world and social and environmental matters as being subsets of that world.

In view of the above, the present research seeks to utilize an explanatory system model that recognizes the significance of economic issues to the behaviour and practices of construction companies, whilst simultaneously highlighting the intersections between the economy, environment and society, thus making sure that wider social and environmental issues are not overlooked. The model is constructed out of key research outputs concerning the major issues and challenges associated with current construction practices, as well as factors that can mitigate the challenges and create transition pathways towards sustainable practices.

3.7 Reflexivity

The present researcher desired to see practical change in construction practices that are beneficial to the development of construction processes and output in Nigeria. However, the researcher's understanding of the problems in Nigeria's construction sector, and the peculiarity of the challenges with the governance environment and systems in which construction organizations operate, means that the level of change required may take some time to come about, owing to adherence to long-established practices. The distance between where sustainability practices are in companies and the construction industry, and where it should be in terms of commitment and attention to social environmental concerns is quite far apart, thus a lot has to be done to achieve sustainability transition and goals. A complete cultural change in the construction sector may be necessary, and this is not automatic; it requires a gradual process to undo the long-established traditional practice of the construction processes in Nigeria. The financial institutions, legislative organizations and academic institutions may need to reorient their priorities to embrace sustainability concerns and put strategies in place to achieve this, since it will require active and functional institutions to encourage and enforce sustainability goals in the construction sector.

This research does not just discuss the moral positioning of companies and construction process in Nigeria, but actually engages with how change can occur and the difficulties associated with that. In doing this, the researcher moved from a purely mechanistic approach to solving problems to a more qualitative way of thinking and addressing research problems. Upon the commencement of the study, and under the guidance of his supervisors, the researcher was made to realize that a vital goal of research is not to quickly and automatically start looking for a solution to a problem, but instead to understand the

nature of the problem. The researcher also became more aware that indeed there may not always be such a thing as an absolute or real solution to a problem, and that reality itself is merely a construct of people's subjective perceptions. Essentially, this process has helped the researcher to develop his thinking. This study has enabled the researcher to develop his skills and experience in the area of social research.

The opportunity presented by the current improving quality ethos in the construction sector in Nigeria, especially with the quality control and management practices of main construction companies, provides a leverage point to introduce change towards sustainable construction practices. Given the movement for quality in the construction industry, embedding socio-environmental values into the quality management systems will facilitate the attainment of sustainable construction. By adjusting the current conventional economic-led product quality management practices to embrace more-environmental and social values will position construction processes towards the path of sustainability.

As noted during the interview sections detailed below, interviewees sometimes strayed outside of the scope of the questions asked, despite the interviewer's best efforts to ask questions in a clear manner. Responses from interviewees moving outside the questions appeared to frequently occur in the interview sections. Though, several reports in the literature largely portray that a good relationship between the interviewer and the interviewee, and a careful development of the interview questions, is wholly sufficient to ensure a concise response on the interviewee's part. However, based on this researcher's field experience during data collection, this viewpoint did not always manifest itself in actual interviews, and its non-manifestation seems to occur at a considerable frequency. It is thus recommended that future studies on qualitative research methods should focus more on this counterintuitive element in order to better prepare researchers to handle this when it occurs. Also, the respondents in the course of answering a particular question sometimes gave responses to other questions as well which this researcher had not yet asked. This activity meant that the interview questions through the semi-structured interviews were not always applied in the exact manner in which they were prepared, but had to be readjusted to fit the direction in which each individual interview was heading. This highlights the challenge of using pre-set questions outside of a structured interview format. However, care was taken by this author to ensure that all intended areas of inquiry were ultimately addressed by the respondents.

It was also not explicit as to whether interviewee responses to the questions represented the perspective of the company or was based on individual perspectives. While transcribing the data, the interviewee appears to switch between individual and company perspectives in their responses. The researcher had to extrapolate the views of interviewees from the company perspective based on the notion that the action of individuals in a company is guided by the corporate policies and practices.

3.8 Summary

Primary research was done to investigate how construction companies can improve their sustainability performance. Literature within the field of construction, sustainability and change was reviewed to understand the meaning of sustainable construction and what constitutes sustainable construction practice. To deal with the research problem, several change theories were reviewed for insight into how to introduce change. As part of the primary research, surveys were conducted in order to gain knowledge about the current practices of the company investigated and their sustainability performance. The surveys served as a scoping review to gain insight into the current practices in the construction industry. Through the use of interviews, knowledge was also gained about the rationale for the current practices, the barriers and opportunity for change and the possible ways to introduce change. Finally, system modeling was utilized to explore how change can be introduces and consolidated. The next chapter focuses on the findings obtained from the primary research.

Chapter 4

4 Findings and Analysis

4.1 Introduction

This chapter looks at the findings obtained from the two stages of the primary research. As mentioned in the previous chapter, based on the multi-disciplinary nature of the research problem, in addition to the challenges of interpretation and value perspectives of sustainability and construction, it was important to first get a broad picture of the current situation, and then get in-depth insight into the complexity associated with sustainable construction in Nigeria. In doing so, the first stage of the primary research involved a survey to gain broad insight into the current practices of the companies investigated. The survey provided data on the sustainability performance of the participating company, and it also identified the level to which the companies desire to improve. Findings from the survey were useful in assessing the current practices of the participating companies and in exploring their desire for change.

The second stage of the primary research involved interviews with the middle- and senior-management teams of the participating companies and key regulatory agencies. Interviews were conducted to get in-depth understanding of practitioner's knowledge and interpretation of sustainable construction, how and to what extent it is embedded in their organizational daily practices, and the rationale for the current practices. The interview attempts to identify the values that underpin organizational behaviour and actions. Since sustainability is about factual and value component, an understanding of the factors that influence the current behaviour of the companies and other key stakeholders is necessary to identify opportunity for change. Findings from the interviews provided data on stakeholders understanding of sustainable practices, the factors that motivate their actions and the level of commitment by main actors such as companies, government and regulatory agencies towards sustainable practices.

Overall, the first stage of the primary research provided broad insight into the current practices and explores the potential for change in the companies' practices, while the second stage yielded in-depth data on participant's perception of sustainable construction, how it is applied in the company's practices, and the rationale for current practices. From the primary research data, the barriers to sustainable practices: companies' motivation; and the opportunity for embedding sustainability in the construction processes were identified. This chapter features four main sections, the first section 4.1 provides introduction to this chapter, the second section 4.2 presents a brief background of the company and report on the survey findings, the third section 4.3 focuses on the interview results, which is broken down further to focus on the main barriers to the sustainable practices, which include level of understanding, clients' requirements, coordination and regulation, political will, education and training, and strategy issues. The fourth section 4.4 discusses the opportunity to embed sustainable practices, while section 4.5 provides a summary of the research findings.

4.2 Survey

Company Description

The survey was focused on three multi-national companies in Nigeria, company A was originally set up in Nigeria as a subsidiary of a German construction company in mid-1960s, and the company played a significant role in creating Nigeria's infrastructures since then. The company has played and is still playing a major role in the development of the country, with a project portfolio spanning across infrastructure, building, industries and facilities services. A wide range of projects such as key roads, ports, dams, railways, industrial buildings and facilities have been constructed and delivered successfully. The company has it head office in Abuja with key operational hubs throughout Nigeria.

Company B is a part of an international holding group of companies operating in the Middle East and west Africa; the company is also a technical partner with a number of leading construction design and consulting firms across globe, and has been operating in Nigeria for over 35 years' with experience in delivering civil and infrastructural projects across the nation. The company has it presence in about 20 states in Nigeria with head office in Abuja.

Company C is a subsidiary of an International Holding, whose headquarters is in Switzerland. The company is a transnational construction and development group, with subsidiaries in several countries of the world. It commenced operations in Nigeria in 1956, with a project portfolio that spans building, roads works, dams and various water projects. They are responsible for the construction most of the prestigious universities in Nigeria and executed the majority of the water projects in southern Nigeria. The company head office is in Abuja with branch offices in Lagos and Ibadan.

4.2.1 Survey Findings

This report outlines the findings and analysis of the survey conducted on 14th April to 5th May 2014, amongst the three multi-national construction companies mentioned above. In order to get a broad insight of the current situation, the survey questions were based on two leading concepts, the aspects or criteria for sustainability, and the level to which it is embedded in construction process. A total of three different projects were investigated within each company, and the size of the projects in terms of budget cost, range from 12 billion to over 25 billion naira. As mentioned in chapter 3, section 3.5.2, to simplify the complexity with the interpretation and make the broad concept of sustainability more assessable, the sustainability maturity assessment model by Silvius et al (2011) was utilized to assess the participating companies' sustainability performance and their desire to improve. The survey questions were based on the three main sustainability themes – economic, social and environmental sustainability.

In order to get first-hand knowledge of the companies' sustainability performance and explore their potentials to improve, for each theme (e.g environmental sustainability), an assessment of the current and desired situation was conducted based on the feedback. The survey data provided useful information on the extent economic, social and environmental

sustainability are embedded in the participating company's practices, this was useful to determine the company's sustainability performance and guidance for improvement. Findings from the survey serve as a scoping review to gain broad insight into the current practices. The output of the survey assessment is represented below in Figure 4; it provides a summary of the percentage score for the economic, social and environmental sustainability. In the graph, a 100% score on a certain aspect, for example, environmental sustainability indicates that all the participating organizations in this study scored 100% on all four questions of the environmental perspective. This score therefore suggests that the environmental perspective is fully considered by all participating organizations based on the assessment model. A 50% score indicates that only half environmental perspective is taken into account on the participating companies' practices.

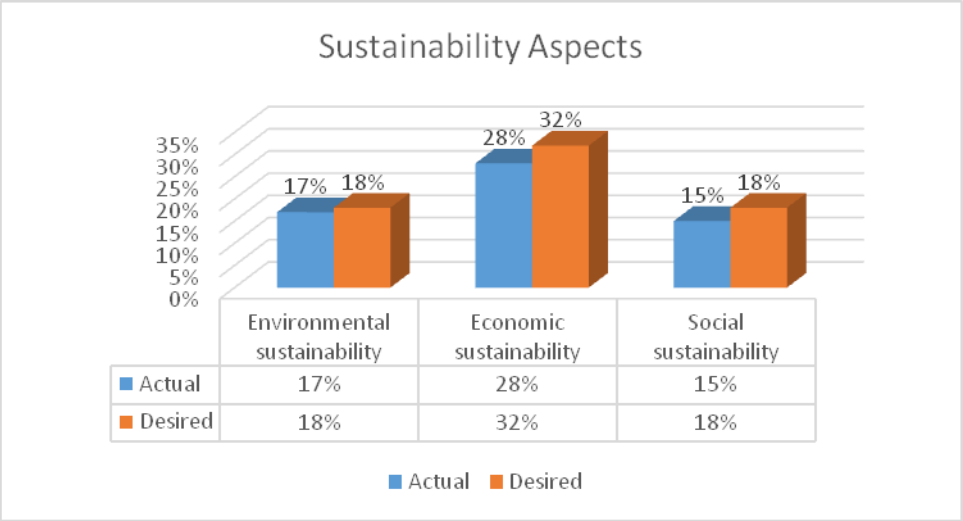


Figure 4: Percentage score for Environmental, Economic and Social sustainability

The above score in figure 4 shows the percentage score for all the participating company on all the assessment questions. The findings indicate that actual score for environmental and social sustainability is relatively low, with the score of 17% and 15% respectively. This low score could be attributed to the lack of sustainability strategy, as the responses from the participants suggest all participating companies do not have specific sustainability strategy.

4.2.2 Potentials for Change

In order to assess the companies' potential to improve sustainability in their processes, Table 7 below provides a report of the scores for the actual and desired situation for the economic, social and environmental sustainability of the participating companies based on the sustainability maturity assessment model. The report is useful to develop action plan to improve and monitor progress. It explores the company's actual performance, their ambition level or desired change, and identifies the area of improvement.

Table 7: Percentage score for actual and desired performance

	Company A		Company B		Company C		Total	
	Actual	**Desired**	**Actual**	**Desired**	**Actual**	**Desired**	**Actual**	**Desired**
Environmental								
Resource	19	20	21	22	18	19	19	20
Process	16	16	17	17	15	16	16	16
Product	15	19	15	21	13	16	14	19
							17%	**18%**
Economic								
Resource	34	30	32	30	28	24	31	28
Process	36	40	34	36	32	35	34	37
Product	20	32	21	30	16	31	19	31
							28%	**32%**
Social								
Resource	16	18	23	24	15	16	18	19
Process	15	16	15	15	15	15	15	15
Product	14	17	10	14	12	15	12	15
							15%	**16%**

From the above table, the survey report shows that differences between the actual and desired situations for the environmental sustainability is 1% (actual 17% and desired 18%), similarly social sustainability showed about 1% difference (actual 15% and desired 16%). While the economic perspective shows about 4% desired for improvement (actual 28% and desired 32%). This suggests the companies demonstrate minimum ambition to improve in their socio-environmental practices as the 1% difference appears negligible compared to the 4% desired improvement on economic sustainability. The report indicates that companies are more susceptible to improve economic values, than embedding socio-environmental values in their practices. Not surprisingly, economic sustainability shows a relatively higher performance with the actual and desired scores, because companies exist to make profit.

The survey results from this research were compared with data collected through the study in 2010 that utilized Silvius and Schipper (2010) sustainability assessments model. The work (Silvius et al, 2013) investigated sustainable performance of 56 projects from 46 organizations across Europe, Asia and United States. Table 8 below, provides a summary of the results from Silvius and Schippers (2010) investigation.

Table 8: Conducted in Europe, Asia and USA

	Actual	**Desired**
Environmental Sustainability	**25%**	**38%**
Economic Sustainability	**34%**	**41%**
Social Sustainability	**22%**	**29%**

(Source: Silvius and Schipers, 2013)

The results from the 2010 survey (see table 8) showed a marked difference of 13% in the actual and desired situation for environmental sustainability (actual 25% and desired 38%), and about 7% difference for social sustainability (actual 22% and Desired 29%). In comparing the results in table 8 with the outcome of the survey from this study (see table 9), the

negligible 1% difference for both environmental and social sustainability indicate that Nigerian companies showed considerably less interest in both the actual and desired situation for their social and environmental practices.

Table 9: Study conducted in Nigeria

	Actual	Desired
Environmental Sustainability	**17%**	**18%**
Economic Sustainability	**28%**	**32%**
Social Sustainability	**15%**	**16%**
Overall Total	**20%**	**22%**

The data also suggests that the potential for participating companies to improve in embedding socio-environmental sustainability in their practices is low, except for economic interests. The difference between the overall total for the actual and desired situation for both the economic, social and environmental sustainability for the companies investigated is about 2%, this difference could be attributed to the economic aspect which has a higher ambition for improvement with about 4% difference between the actual and desired situation (see table 9 above). Overall, the survey provided a broad insight of the current situation: the data suggest sustainability is poorly embedded in the practices of the companies investigated, with social sustainability being the least considered. From the survey, companies in Nigeria showed considerably less interest to improve the extent to which socio-environmental values is embedded in their practices, as the survey result indicates about 1% desire for change. These results modify the direction of this research to requiring a more detailed study of the thinking, decision making and context for the current situation. It was anticipated that the research will progress from the survey, however, the survey result necessitated the more in-depth understanding and this requires in-depth interviews to understand the rationale for the current situation and opportunity to improve sustainability in the companies' practices.

4.3 Interview Findings

As mentioned in the above section and in chapter 3 section 3.5.3, following the survey, it was important to understand the reasons for the current situation. In doing so, interviews were conducted to gain in-depth understanding of how sustainability is considered and applied in the operations and practices of the companies. The interviews focused on identifying the rationale for the current practices, the barriers and opportunities to embed sustainability into the construction processes as well as any other factors considered significant by the interviewee for the current behaviour. A total of 31 representative of the middle and senior management team from the company, client and regulatory institution were interviewed. Information on the profile of the interviewee is provided in Chapter 3, (Table 4). Data from the interview were categorised and coded using Nvivo 10 software; chapter 3 sub-sections 3.5.5 and 3.5.6 describe the coding process. Figure 5 below provides a structure of the findings on the barriers to embed sustainability into construction practices.

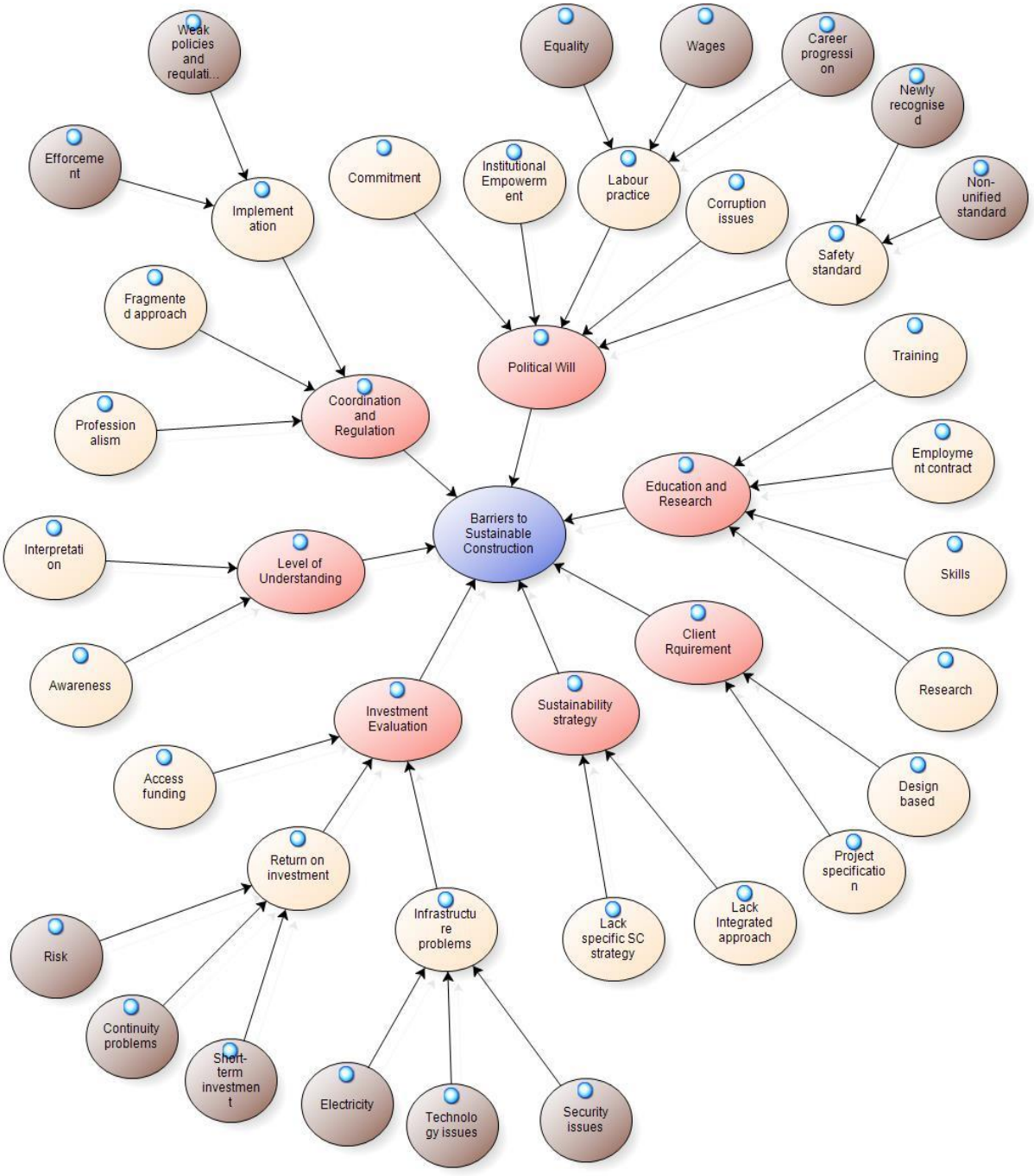


Figure 5: Barriers to sustainable construction

4.3.1 Level of Understanding

Level of awareness: As part of the challenge to sustainable practices, the interview data shows the level of awareness of sustainable construction amongst participants is low. The majority of the interviewees appeared unfamiliar with the term 'sustainable construction'. The participant's response to the question on their understanding of the concept of sustainable construction suggests the level of awareness is relatively low among the main actors in the construction industry. According to PM2:

'Generally Nigerians don't know much about sustainable construction. Ours is to deliver project or building following the traditional approach which has been tested and trusted' (PM2).

PE1 said:

'Sustainable construction emm [.....] emmm [.....] how do you mean sustainable construction, can you please explain what you mean by sustainable construction. Please can you explain further so I can understand where you are looking at it from' (PE1).

Also, RO4, expressed that:

'*Sustainability is really not a part of our culture, no one really talk about it here as people carry on with their jobs without considering this issue'* (RO4).

As PM9 put it:

'First I think there is need for more enlightenment to create better awareness amongst staff' (PM9).

In support of this, PE7 commented that:

'There is need to promote and increase awareness in this area within the construction industry, regular training the project managers, site supervisors and department heads would be very desirable' (PM7).

According to PM4:

We have sustainable strategy and this is often considered at the initial stage of the project, when we take brief and concept formulation. But there is a major challenge in getting clients to cooperate because it's not exactly part of our culture, and there is no government policy or agency promoting this' (PM4)

PM3 stated that:

'The need has not been emphasized. For example ,only recently government institution responsible for enforcing the issue of health and safety is working to ensure that companies complies with governments requirements in this area, this is to make sure that workers are being protected because the rate of accidents in the site is becoming too high' (PM3)

Also, PM1 commented that:

'Most the workers will tell you I can't put on the helmet its making me feel uncomfortable, if I use the hand gloves I can't hold the tools firmly, the boots is not allowing me to move freely, all these are the kind of complain you get from the workers. This is due to ignorance and their level of awareness, because it is actually met for their own safety' (PM1)

The level of awareness appears to be a major challenge to embedding sustainable practices in the company's construction process. The interviewees acknowledged the need to create more awareness on sustainability issues within the construction industry. Following specific questions on health and safety concerns, comments related to the issue awareness include the following:

'Before now people don't even talk about health and safety in construction apart from the oil and gas industry, the awareness is gradually coming into the construction industry, but is still very low' (PM1)

'Health and safety concerns in construction sector is only recently being advocated, it has been overlooked over the years in this country. Unlike in the other first world countries where this issue is taken more seriously, people are not really concern about it' (PD1)

'More recently there are increasing attempts to organize lectures and training. We now have safety officer and safety department and workers are made to understand the significant of safety' (PM5)

Other comments relating to the participants understanding of sustainable construction include:

'*Sustainable construction, sustainable construction […….] cans you shared more light on what you mean by sustainable construction'* (PE7).

'*In this part of the world we are yet to really understand what sustainable construction is all about [……..] we still adopt the traditional method and that is how we deliver our projects'* (PM1).

'Sustainable construction is not a very common practise in Nigeria. We seem not to know much about it here' (PD1)

Interpretation: With regards to the interviewees' interpretation of sustainable construction. The common assumption or interpretation of the concept implies that sustainable construction is about quality and durability. According to PM5:

'*We take seriously issues of sustainability, sustainability to us mean quality. We emphasis on quality because we believe that if we do a good job we will get good recommendations'* (PM5)

PM5 further commented that:

'*Sustainable construction is very important, a project that is sustainable last long, it good for the company reputation due to the quality and the client is happy it will last long and stand the test of time'* (PM5)

Similarly other interviewees' say sustainability is about:

'*Emm [….] I think it's about good quality work. Though there is no definite approach to achieve this, however we adopt best practice to deliver projects'* (PM9)

'*Well if I understand that very well, by sustainability you are referring to being able to take a project for it to be sustainable. For me, sustainability is key in construction. Because when you undertake a project and it is sustainable, it is a two way thing. First for the client, the project will last and stand the test of time, and for the contractor it will be a point of reference due to the quality'* (PM2).

QS2 and PD1 stated that:

'Sustainable construction is about being able to sustain the construction activities to meet current development' (QS2).

'But I think it about protecting the environment as we carry out construction activities' (PD1).

Apart from QS2 and PD1 who stated that sustainability in construction is about continuity and environmental protection, the majority of the interviewees interpreted sustainable construction to mean quality.

4.3.2 Client requirements

The interviewees reported that project design and clients' specifications are key factors that drive the approach companies adapt to planning, execution and delivery of projects. According to OM1, PD1, PM5, PM9, OM1, PM1, PM2 and PM3, projects are design to meet the needs and requirement of the clients, and most of these designs are fixed. Contractors and practitioners deliver projects based on approved designs; the following extracts illustrate this point:

'We try as much as possible to implement our project in line with the specifications of our clients and in most cases they determine what we do. Our main client is the government, and they specify standards and principal requirement. If the client require the project to address sustainability concerns we try as much as possible to execute the project according to their needs' (OM1).

OM1 further commented that:

'Change and flexibility is really a challenge in project delivery, this is one of the problems in contracting in this country; the project idea is to deliver according to design and specification. We deliver what we are required to and if the design does not provide room for flexibility we don't consider it …. But if it does we deliver what is required' (OM1)

'Majority of our projects and designs are fixed' (PD1)

*'We only implement in line with the approved design, if sustainability reporting were contained as part of the requirements we would be happy to provide it'(*PM5).

PM5 stated further that:

'There is no much room for flexibility in implementing construction projects in Nigeria. Projects are mainly implemented in line with design and specifications. We do exactly what we are required to do, we only considers flexibility if it is contained in the project policy document. Majority of the times the designs are fixed and as such we don't undertake much changes' (PM5)

'We only construct and deliver projects based on what are specified in the approved design' (PM9)

'It is not customary for client to require integration of sustainability issues in the project, but we normally undertake environment impact assessment before a building design is approved and once the design is approved we build according to design' (OM1).

'Not quite, our project and design is fixed' (PM1)

'We have policy for material selection; we select materials that certify our need based on the design' (PM3)

The majority of the interviewees acknowledged that if the client requires sustainability to be embedded in the project delivery processes, the company will adapt its processes to meet the client's requirement. Unfortunately this appears not to be the case; the interviewees stated that clients do not demand sustainable practices. The excerpts below illustrate this point;

According to PD1:

'*We just make sure that projects implementation meets our initial set out aims and objectives. Once expected projects outcomes are achieve we are fine'* (PD1)

'We are not compelled by any regulatory authority to do any reporting for our sustainability performance, and our clients do not require us to do it as well. Though we would have happily complied if we were required to do it' (OM1)

'Having said that anyway, when our client and consultants includes issue of sustainable construction practices as part of the requirements and specifications contained in a project we try as much as possible to meet these requirements as specified' (PM5)

'No we don't have any form of sustainability reporting. We don't have it, because the client does not require it or we are not made by the client (Government) to produce it. If the client requires it, it would be done' (PM2)

4.3.3 Coordination and Regulations

Information acquired from interviewees showed that inadequate enforcement of existing regulations and improper coordination of construction activities across the industry are among the main factors that account for the current behaviour of construction companies and key actors in the industry. This appears to be amongst the major barrier to the uptake of sustainable practice within the construction industry. Interviewees reported that inactive regulatory agency, ineffective enforcement, weak policies as well as, the fragmented and non- standardized construction process are among the major barriers to embedding sustainability in construction practices. To illustrate this, one of the interview respondent, PM1, stated:

'For the company, we work according to the rules. On the issue of the environment, the federal ministry of environment is there to regulate issue concerning the environmental impact assessment, environmental rehabilitation plans and all that. But these organizations are passive themselves, very passive. Only recently they are trying to be active, but I still consider them to be passive because they are practically not enforcing anything. Those in authority don't see the need to take enforcement seriously, they believe the country has more than enough natural resources, for this reasons, it gives the company room to practice and do whatever they like' (PM1)

Also, PM1 identified the need for proper coordination by expressing that;

'*The whole environmental issues or concerns are not just working, everybody does what they like. All these organizations are not working together to ensure that construction activities or environmental issues are properly addressed*' (PM1)

Improper coordination and regulation of construction activities appears to encourage non-professional practices. According to RO2;

'You discover that a lot of sharp practices are being done, [.....] I have even seen mechanical engineer designing electrical work or even a draft man who will design buildings[....]this thing are for somebody who is certified and has experience, when you see this thing you know that there is a problem in the industry, but for somebody who is not detailed you think everything is alright' (RO2)

PM1 add that;

'But this not how it should be, for us to be really into this, we have to enforce some standard[……]some rules that would differentiate who should be practicing and who should not be practicing' (PM1)

Implementation: The prevalent view among interviewees is that sustainability related policies and regulations are not implementation and enforced. OM2 mention that;

'Government policies and enabling laws to support sustainable construction are not enforced, which give room for professional developers to conduct their practice in ways that does not support the principles of sustainable development. (OM2)

Also, PM4 commented that;

'There are no specific regulatory agencies and or institutions that measure and enforce the issues of sustainability in the construction industry here. Organisations do what they deemed fit and they are not controlled in anyway. Even where some sustainability related laws exist they are not often enforced effectively' (PM4)

In support of the above point, OM1 stated that;

'One of the biggest challenges to implementing health and safety issues in Nigeria is that there is no existing government policy or active institution that promote and enforces compliance to safety issues' (OM1)

Similarly, other interviewees remarked:

'*In my opinion, the regulatory authority is ineffective. The standards are there, but in most case they are not implemented. The authorities are not really interested to regulate these processes'* (PD2)

'*In undertaking their environmental impact assessment and environmental rehabilitation plans, guard lines are often not thoroughly followed trough. Many construction companies often take advantage of these poor enforcements by the environmental agency. They cut corners and do not follow international best practises'* (RO1)

'*As far as I concern, the way we are doing our things here, we just do things, and we don't look at all these various aspects. Even when some of these things are considered in the process of conceptualisation, people hardly give them any attention during implementation'* (RO2)

'*But the government institutions in charge of regulations and enforcing compliance in this area are grossly inefficient'* (PD1)

Inadequate enforcement of environmental policy was found to be beneficial to construction organisation, as it provides opportunity to save cost of acquiring raw materials. PE3, pointed out that:

'*The construction companies benefit from these poor enforcements and implementation of existing environmental policies by not complying with existing procedures because they want to make more money'* (PE3)

PM1 added that:

'To the company it's okay because they are profit oriented, and the more the body or authority responsible for enforcing environmental issue are not enforcing it the more money they can make by going around these issues' (PM1)

PM5 said:

'There is no standard for health and safety, and companies are no regulated so company spends less for health and safety issues. There are little checks or control mechanisms by government institution hence companies do what they deemed fit' (PM5)

PM3 identified the absence of strong legal frameworks backing environmental policies in the construction industry as one of the factors encouraging present practices, as compared to the mining sector. The following illustrate this point:

'*A handful of government agencies such as the federal ministry of mines take this issue very seriously. They compel companies to sign agreements with project community before the implementation of any project. We do same in the construction industry, but I don't think there is any existing legal framework for this. Majority of Nigerian companies don't do this, but a few like us do our best in this regards'* (PM3)

OM3 said:

Environmental impact assessment laws are not often enforced in Nigeria, particularly at the state and local governments. Although some of the federal agencies do enforce this laws but most of them don't take it seriously' (OM2)

Weak sustainability policies: Weak and poorly defined regulatory policy, particularly in relation to the implementation and enforcement of sustainability principles in construction was identified among the obstacles to the adoption of sustainable practices. According to PM8:

'*In situation where there are no laws that expressly ensure that development should have sustainable outlook in Nigeria, there is no much that we can do as professionals'* (PM8)

PM8 stated further that:

'*One of these variables first and foremost, would be the government policies and the enabling laws which would safeguard any form of development over time into the future. But due to the fact such policies and laws is not really enforced, that give room to developers and certain professionals to practice in forms that would go against the principles of sustainable development. For example, ordinarily any form of development project should undergo what you call environmental impacts assessment before a project begins, but you find out that in Nigeria EIA laws are not often enforced*' (PM8)

PM4 stated that:

'*The fact that there is no strong government policy or active institution to monitor and enforce compliance on this issue has not helped'* (PM4)

RO4 in support of this added:

'To be honest with you most of these things only exist in paper but in practice the situation is different' (RO4)

PM9 commented that:

'Sustainability is not expressly enforced in the project management process' (PM9)

PD1 expressed that:

'We try to minimize waste by a variety of ways. We do take steps on our own in doing this. You know in Nigeria there is no specific government policy or agency driving reforms in this direction' (PD1)

Transferability Challenges: With regards to issues that boarder around sustainability policies and interventions strategies, most of the participants reported that most of the construction organizations try to adopt policies and practices from the developed world to deal with sustainable construction concerns. However, it is unclear as to what extent the foreign standard and policy framework fit with the peculiarity of the local construction situation and realities. According to OM2:

'Yes we are amongst the main players to introducing Green Building council to Nigeria. We adopt the policies of our partner organization in the UK and United states' (OM2)

RO3 said:

'*We try to adopt the America and the UK Green building council frame work'* (RO3)

PD1 commented that:

'As a multinational organisation, we are very concern about the issue of sustainability in our construction projects. We try as much as possible to follow international best practices in this area' (PD1)

Also PE7 commented that:

'We us tested standards and procedures. We adopt already established foreign standards and procedures of work and ensure that we don't deviate from it rather we continue to improve on those practices. We employ professionals in areas where we don't have the manpower to look into such aspect of the work' (PE7)

According to PM4:

'We don't have policy for selecting materials. However, we try to adopt the America and the UK Green building council frame work for material selection' (PM4)

PM6 added:

'Designers and contractors are compelled to adhering to the existing standards as contained within the code of practice. In Nigeria, the British and America standards is what we imbibed' (PM6)

PE7 stated:

'*We follow the German standards*' (PE7)

Also RO3 expressed that:

'We make sure that the design follows that standard which are enshrine in the code of practice. We majorly follow the British and American standard. So people monitor these things' (RO3)

Fragmented approach: Interviewees reported that traditional construction approaches which involve the separation of design from construction are still the common and dominant practice in the industry. PM9 stated

'Most times we are not involved in the project inception, and design stage. The design is completed before the awards of contract, we only construct and deliver projects based on the approved design' (PM9)

PM1 said:

'We only do construction. However, we don't just accept the design. We cross check to ensure that your design is fine and everything is ok. We review the design to ensure that all is okay, you know we are human and even the consultants make mistake' (PM1)

PE1 comment that if his company design and build a project, it provided opportunity to better consider and integrate sustainability at both the pre-construction and the construction phase. However, this is not always the case. According to PE1:

'We as a company have gotten to a stage where sometimes we design and build. If for instance we are designing for a project, we do visibility study and identify where natural resource such as flora, streams, and natural features etc. we try in integrate these resource into the design as much as possible. However this normally occur if we are the once designing and not in cases where the design has already being done and given to us' (PE1)

The lack of unified construction standard across the various tiers of government - federal, state and local authorities - negatively affects the promotion of a sustainable outlook in the construction industry. Interviewees reported that there are differences in the regulatory policies across the various agencies, and the absence of a National agency to coordinate construction activities was implicitly identified as a challenge to sustainable practices. PM4 commented that:

There is no specific agency that organises and coordinates construction activities in the industry, the level of accountability is low and there are no supporting laws to guide and address issues of failures in certain areas. (PM4)

PM1 added that:

'Ministry of labour is working towards creating unified standards where all construction companies would have to fall in, to make sure that workers are being protected because the rate of accidents in the site is becoming too high' (PM1)

PM3 states that:

'As far as am concern, issues of environmental concerns are still at the back burner as every organization appeared to be doing what they like. They is no framework for coordinating various construction organization in taking necessary action to ensure that construction activities or environmental issues are properly addressed' (PM3)

RO4 said:

'*Like I said before, state and local government are not very effective in ensuring compliance and their standards varies slightly'* (RO4)

Interviewees also reported that building standards and environmental laws are not evenly applied across the state, federal and local government level. According to PM4;

'*Even where some sustainability related laws exist they are not often enforced across the various tiers of government. For instance, the environmental impacts assessment policy is not strictly followed by construction industries in the country. This is very common within the local and state levels of government in Nigeria, but at the federal level a couple of government institutions that I know are very strict on enforcing compliance'* (PM4)

RO4 expressed that;

'*But we at FCDA we are still relatively better than other agencies, particularly those at the state and local government levels'* (RO4)

Also RO2 said:

'Even during the process of execution of these projects, people are so selfish today that they compromise these standards because of personal gains even if such action is going to affect the future generation. It is most unfortunate but that is the reality. The instance am giving you is what is happening in FCDA, but then FCDA's experience a lot better than other institution. Projects handle by FCDA are often better, compare to other institutions' (RO2)

PM13 identified the differences between the Abuja Federal Capital Territory (planned city) and cities in other states to illustrate this point:

'Now when you are talking about Abuja, I think the standards are very well kept […] but Abuja is insignificant compared to other places, these standards are not very well kept elsewhere. Let me give you an instance, we talking about sustainable construction hmmm[...] do you know that the bulk of Nigeria are still utilising certain types which I know by world standards it is a serious crime to manage, when you have most people living in cities that do not have well planned and structured water system everybody having borehole, how many people understand upstream and downstream?, having your sewage at the downstream and having your bore hole at the upstream, so how many cities apart from Abuja have the fine sewage treatment plant' (PE2)

With regards to issues of corporate social responsibility (CRS) towards the project community, it was report that there are no set out laws or requirements for CSR, it is based on the discretion of the companies and they do what they deemed fit. PM1 commented that:

'On our own, we are doing our best to provide social responsibility towards the community we operate in. […] in all our quarry activities we take social responsibility towards the community where the quarry is sited' (PM1)

OM1 stated that;

'The company doesn't engage with the local community. It is expected that the client determines the need of the society and include this in project design and once approved the company implement in line with project specifications' (OM1)

According to PM2;

'We do but not on a large scale, most of the time if the company will not benefit from it they won't do it. Community engagement is not our standard practice. The client is expected to determine the need of the society and when project design is approved the company delivers according to specification' (PM2)

4.3.4 Political Will

Commitment to sustainability: With regards to the level of commitment toward sustainable construction practices, the prevalent view among the respondents is that the level of commitment towards sustainability agenda is low. The participants acknowledge the lack of commitment from the government and those in position of authority to address sustainability concerns in the construction industry. PM7 stated that;

'The general lack of interest by the authorities to pursue sustainable practices is a major problem' (PE7)

PE7 further stated that:

'*The government need to enforce it. Unfortunately the political will to make it happen is not there. The government and those in authority are uninterested in addressing the issues of sustainable construction. For example, we as a multi- national company, we have bilateral agreement with the government on issues that boarders around 'technological transfer' to improve construction practice in Nigeria. But the people to enforce it are uninterested. There are no active institution to support this process and there is little we can do as a company to make this happen'* (PM7)

According to PM9:

'Government should be willing to encourage and enforce sustainable practices. Presently, the desire to make this happen is weak or not high up in the agenda' (PM9)

PM1 expressed that:

'Those in authority do not see the need to take enforcement seriously, they believe the country has more than enough natural resources, for this reasons, it gives the company room to practice and do whatever they like' (PM1)

PM8 commented that:

'As a professional architect who has been trained and who is also registered to carry out the practice of architecture in Nigeria, naturally sustainable development in our practice would be of utmost important but like I mentioned earlier on, there are lot of variables that actually go a long way in determining how sustainable any form of development would be. Nigerian is still a developing Nation, so many of our institutions are as develop as they should be, or as to what should compare to other parts of the world. For that reason sustainable development becomes difficult to attain in our environment. So even where the practitioners and professionals in the construction industry know what they should do, certain variable might make it difficult' (PM8)

In support of the above, PM4 also expressed that:

'For those of us in the construction industry, a couple of us are trying our best to consider issues of sustainability in construction. But the Nigerian environments does not promote it and remains a very big challenge' (PM4)

PM4 stated further:

'The issue of technical capacity to ensure high level of compliance is not the issue here. Because these government agencies in charge of enforcement have very well educated, skilled and trained professionals and administrators. But the issue is would they actually do their job with the required commitments to achieve results. Majority of them can easily be compromised and this issue of corruption is another big challenge' (PM4)

RO3 said:

'What I can tell you from what I know, is that, apart from the professional consideration of these issues, there are times when political factor and self-interest play a major role on how project is allocated, when and how a project should be implemented' (RO3)

The prevalent view among interviewees suggests that the companies operate in line with the available regulatory policies. As PM9, put it;

'In terms of polices, we work within government regulation on natural resource extraction. There are various agency that monitor these processes, but unfortunately they are not really visible, enforcement is relatively low' (PM9)

PM4 added that;

'There are no specific strategies, at the design stage we liaise with the client and work in line with government development policy. However, as far as I know, sustainability target or requirements are not explicitly stated in the procurement and development policies' (PM4)

OM1 said:

'It is not customary for client to require integration of sustainability concerns in the project, but we normally undertake environment impact assessment before a building is approved and once the design is approved we build according to design' (OM1)

PD1, commented:

'But the country as a whole, do not take issues of sustainability too seriously. It's really not part of the system unlike in the advance country' (PD1)

Other comments related to this issue include:

'It's not part of value system for people to imbibe this practice in their daily task' (PD1)

'Emphasis is more on quality of materials for achieving design purpose than issues of sustainability. Given that we have abundant natural resource, we are much more concern about delivering project on time and according to specification than worrying about issues of resource depletion' (OM1)

In view of the lack of commitment and political will from the government and the main actors, construction companies, practitioners and other stakeholders show apathy towards sustainable practices.

PM3 stated that:

'Issues of sustainability are not taken too seriously here when you compare it to the appropriated standards. Events on site suggest which strategy we adopt and communicate this with worker as necessary' (PM3)

PM3 added further:

'As far as am concern, issues of environmental concerns are still at the back burner as every organization appeared to be doing what they like. There is no proper framework for coordinating various construction organizations in taking necessary action to ensure that construction activities or environmental issues are properly addressed' (PM3)

Labour Practice: With regards to a company's ethical and labour practices, some of the interviewees acknowledged that there is inequality and a limit on available opportunities amongst staff. The company's management showed low commitment towards caring for its employees, especially the local staff. Accordingly, employees appear not to demonstrate genuine care and concern in their daily work routine. PM2 pointed out that:

'*With reference to issues of promotion, career growth and development, because the company is not an indigenous company there is a level that local professional cannot exceeds, except you are from their country. This is inherent in their practice'* (PM2)

PM4 commented that:

'We try to comply with the minimum wage threshold set by the government. We do not pay below the minimum wage for unskilled workers but we pay more than the National minimum wage for skilled workers and the working hours is often 8hrs in a day' (PM4)

According to PM5:

'Regarding career growth and promotion within the company, there is a limit for local professionals, although this is not writing on paper, but preferences are always giving to professionals from their country' (PM5)

OM1 expressed that:

'Unlike in the advanced country, we do not have gender equality and equal opportunity policies in place; a decision regarding these is largely depended upon personal reasons and benefit. In terms of Promotion, local professional cannot advance above certain level because the company is not an indigenous company' (OM1)

Also OM1 commented that there is minimum care for the welfare and safety of staff, especially the local staff. Health and safety concerns in the work environment are undermined due to the general working culture in the industry, only recently effort towards health and safety concern is being address internally within the company due to high rate of accidents. According to OM1:

'There are effort recently to develop and enforce safety rules within the company due to high rate of accident and it costing us mush to pay compensation' (OM1)

PM5 added:

'More recently there has been increasing attempts to organize lectures and training. We now have safety officer and safety department and workers are made to understand the significance of safety' (PM5)

PM1 pointed out that:

'Although this process is just starting we believe with time they will get to understand the importance and the need for safety equipment. We intend to enforce it by telling them if you don't wear it or come to work with it you might be dismissed, because by their not putting on safety equipment is also putting us in problems' (PM1)

Also PM8 stated that:

'The major challenge that we have are actually cultural, we have workers who do not believe in all of this, and some of them even thinks' it hinders what they do' (PM8)

PM 4 commented that:

'There is a very big challenge in this area. You know that issue of health and safety are alien to our culture, and people find it very difficult to comply' (PM4)

Institutional empowerment: As a result of the low commitment by the government and the main sustainability actors, it appears the institutions saddled with the responsibility to pursue sustainability agenda are not adequately empowered. OM2 pointed out that;

'*There are professionals in the enforcement agencies who should know what to do in terms of the professional standards. However, I am unsure if they are willing to do what they need to do. In my experience, in terms of professional expertise they are there, but I am not sure of their desire to really enforce these things. I think there could be a number of reasons, one of this could be lack of adequate empowerment to enforce this laws'* (OM2)

PM12 further expressed that:

'Addressing these concerns (sustainability issues) is very important, particularly at the inception phase. As an Architect (Design Manager), it vital to imbibe sustainability principles into design because it set the scene for other processes. However there are many factors that we need to consider to adopt sustainable practices, even when practitioners know what to do, some of this factors make it difficult to imbibe sustainable construction principles into practice. For instance, so many of our institutions in Nigeria are not developed and do not encourage sustainability as compared to other countries in Europe and America, thus, becomes difficult to adopt sustainable practices in this environment' (OM2)

RO2 mentioned that;

'We are not adequately empowered, there is no adequate training and up to date technology to address this issues. Even when you are empowered, but the problem is that if you yourself have

compromised you would not be able to hold them to account, and that's a common problem here' (RO2)

PM7 mentioned that:

'Sustainability is about taking care of now and the future, those in government need to think about the interest of the nation and its future. Unfortunately, there is so much selfishness, greed and personal interest at play against issues of national interest' (PE7)

PM4 said:

'But the Nigerian environments does not promote it and remains a very big challenge' (PM4)

PM9 added that:

'There is need to reform and encourage the necessary institution to effectively address sustainability issues. Although there some effort lately, but more need to be done particularly at the state and local government level' (PM9)

<u>*Corruption*</u>: Apart from the challenge of institutional empowerment, participants also identified corruption as a major barrier to the adoption and implementation of sustainable practices. The following excerpts allude to this;

'Corruption is a major challenge in this country and its impact on construction is much, but I can say we are surviving. We try to have good relationship with everyone and try to be fair in our operations. What I can tell you is that we don't compromise our standard in terms of the quality of work. We do not allow bribery and corruption to compromise the quality of our work because we have a reputation to protect' (PE7)

'Majority of those in power often abuses their official positions to influence policy directions to serve vested interest' (PD1)

'In fact if you ask me, the projects that are considered to be very important or the ones government are ready to spend money on are those that concern those in power (authority) which will benefit them directly. Choices of where to site construct projects are usually based on sentiments, with lots of selfish interest. Decision of type of construction and where to site projects is either based on religious or tribal interest. Even during the process of execution of these projects, people are so selfish today that they compromise these standards because of personal gains even if such action is going to affect the future generation. It is most unfortunate but that is the reality' (RO2)

'First we have to fight corruption, until we kill corruption every other thing will not work' (PM1)

'Doing business in Nigeria could be challenging when it comes to corruption. It's almost impossible to operate successfully without compromising by giving bribe at one point or another. But in my company we do not allow these activities to affect the standard or quality of the project' (OM1)

'It is like a worm in our society. Corruption is got different layers in this country, with regards to construction; there are some that deliberately corrupt the system from the top leadership for personal interest and benefit. For example withholding and circumventing fund that is budgeted for the effective running of government institutions. Others create unnecessary difficulties in getting certain permit to deliver project to encourage you give bribe for them to carry out their duties. We

have been force to encourage government officials to do their duties, but what I can tell you is that we will never compromise our professional ethic in the name of bribery and corruption' (OM2)

'There are instances where we have been approached to compromise our professional ethics that we would never do, anything that we have to do that would compromise the safety or sustainability of the project we would not do. Or we would go against our professional ethics we won't do that. However, we have also been in situation were by, we encourage government official to do what they have to do' (PM8)

With regards to how companies and construction practitioners try to address the challenges of corruption. RO2 pointed out that:

'People don't care here, since it is government property nobody really cares. It unfortunate, no accountability, and you know most of this foreign construction companies, they are aware of that so they take advantage and they are collaborators with our people' (RO2)

RO2 stated further that corruption activities start from the top management and it is deeply entrenched in the society. According to RO2:

'It is based on instruction; it is now left for your own personal conscience to see the things that you can leverage on. For me as a civil servant [....], the truth of the matter like I said is we work based on instruction. There is high level of corruption. Even though in most cases we may not be happy with what is happening, especially when you know that selfish interest are being considered more than public interest' (RO2)

PM8 said:

'It's a very tough world, particularly in the sector that we found our self in the country, it's very tough, what I would say is this; I think there are two sides to corruption. There is that side that deliberately want to corrupt the system, and not do want it to prosper, […] because it enriches some personal pockets, that is one aspect of corruption. The other aspect of corruption would be that those who probably, especially at the governmental level would need to give you the necessary permit, they would foot drag and cause unnecessary delayed to compel you to give bribe for them to carry out their duties and responsibility, and that puts developers in a very tight situation. At the end of the day it is a moral question for every developer, there is no template in dealing with a situation like that' (PM8)

PD1 stated:

'It's almost inconceivable to do business successfully in Nigeria without getting involved in one corrupt act or the other. As a company we do not encourage corruption but some time we just do what we have to by looking at the bigger picture' (PD1)

PM4 commented that;

'For us there is a limit to which we can compromise. We try as much as possible to uphold good morals and our professional ethics. We as much as possible try to protect issues regarding sustainability and quality in the project that we implement, no matter the pressure. But we have also been in situations where we are forced to just do what we have to do to be successful' (PM4)

PM4 added:

'This is a notoriously very difficult phenomenon particular in a setting such as Nigeria where corruption is wide spread. Although we do not openly encourage giving and taking of bribe but there are times one is compelled to do it because that is the only way to get things going. Some government officials often tend to frustrate and sabotage peoples work and efforts if you fail to cooperate by no giving them bribe some times. That could also account for some of the reasons why some of these policies discussed earlier are not properly enforced. Some officials are more concerned about taken bribes than ensuring compliance' (PM4)

According to PM3;

'Corruption is a major issue in Nigeria, its wide spread across every level of government. We appeared to be helpless in the area, but we try to establish a good relationship amongst stakeholders and give the best price in our quotations, give competitive price then the rest is left for the ministry. You see corruption is a very controversial concept, so individuals try to deal with it in their own different ways' (PM3)

'From my experience I will say in order to survive you have to give. The company does not allow or encourage staff to indulge in it, however it happens' (PM2)

4.3.5 Education and Research

The interview data indicate that staff development programmes, such as training and education to acquire up to date skills and techniques to deal with sustainable construction issues are not a common practice within the construction sector. Interviewees mentioned that adequate training is hardly provided in their companies. OM1 pointed out that:

'Organizing training and education programme for staff is an exception but not the norms. They sometime organize training when there is need to acquire skills in certain areas like software skills for a particular project for instance. But it's not a customary practice for the company to organize training for its staff' (OM1)

PD1 added:

'Although staffs do receive some training that would allow delivery on a particular project but not the type of professional training that issues a certificate after such exercise' (PD1)

RO2 stated:

'As far as I am concern, we are not being trained as it is supposed to be for us to acquire that competitive skill that will make you to be able to deliver what you are expected to do at any time' (RO2)

In support of this, RO4 commented that:

'Even in cases where trainings are provided they are often not too relevant to what we do. Some vests interest simply organises such trainings to satisfy their selfish interest. Many of us are very far behind our counterparts in other well development countries in the area of professional software utilisation. In summary, my take is that we are not trained sufficiently enough to be on top of what we do particular when making comparisons with what is obtainable at other parts of the world' (RO4)

PM3, PD1, R04, PM2, RO2 and PM9 identified skill shortage as a challenge and acknowledged their company occasionally provided training if absolutely needed. The excerpts below illustrate this:

'Skill shortage is a major constrain to implementing sustainability strategy. Corruption is also a major constrain' (PM3)

'Even the majority of foreigners that comes here to work do not have the requisite skills' (PD1)

'*How can we be providing training when we ourselves do not receive adequate training? We don't get trained like we are supposed to'* (RO4)

'This only happens if maintenance and training is part of the contract, on completion of project training provided before final handing over' (PM2)

The problem is training; the majority of those monitoring and implementing it are not well trained' (RO2)

'Yes we provide training when necessary. It is not part of the employment contract anyway' (PM9)

Also PM9 identified the need to educate young professionals about sustainability issues. According to PM9:

'Another area is to educate upcoming professionals, particularly in our higher education institutions' (PM9)

The prevailing view amongst interviewees suggests that, the rationale for a company's reluctance to organise training and development programmes for their staff is due to economic interest – cost implications, and the fear that staff will leave after acquiring the requisite skills ('expertise flight'). According to PM1:

'The thing is just for economic reasons; sometimes they tell you if you train them now, some other companies will take them off you. This is also because of poor wages, if you train some body and the person is now aware of his/her potential and some other company is offering a better opportunity/pay they are bound to leave' (PM1)

PM3 commented that:

'Many companies including ours complain that after spending much money to train employees and staff, they often leave to take job offers somewhere else. Majority of them employees often take advantage of their enhanced skills status to seek greener pasture elsewhere. For this reasons some company don't want to even train anybody. They only provide what I will call introduction. For example, they will show staff - this how it's done here and this is how I want you to do it […] that's it. But to send staff somewhere to obtain quality training where they will issue certificate, we don't do it and most of the construction companies don't do it' (PM3)

Interviewees acknowledged that staff training and development is not the responsibility of the companies. The terms of employment in the employee contract do not cover training and development for staff. There are no specific laws on this, and so the employment agreement does not encourage training and staff development programmes due to the cost

implications. Thus training is only provided if it is in the economic interests of the company. According to PD1:

'*From our experience over the years, companies are always on the receiving side of employment contract policies. Because workers just leave whenever they want, in most cases, after spend so much resource to train staff they simply look for job with a better offer elsewhere. So as a result of this, many companies do not like training their staff*' (PD1)

PM3 commented that:

'We have employment contract agreement law in place. But the agreement does not cover this area. Even if it does, there is nothing much we can do to enforce it as the Nigeria legal system appears to another problems that we try to avoid as much as possible' (PM3)

PM1 stated that:

'The contract agreement in this company does not cover such issues. Clauses like that are not in it, however, if you know the value of your worker, particularly the one you have trained you should be able to give them good incentives to encourage them to stay with you' (PM1)

PM7 said:

'We show them what we want them to do, and how we want it done. We don't have specific staff development programme or regular training with any form of certification. We provide practical training on the job' (PM7)

PM5 added that:

'There is no formally established standard for training its workers' (PM5).

4.3.6 Investment Evaluation

With regards to a company's investment strategy and the rate of returns, the participants acknowledged that sustainable practices will have an impact on the cost of construction. The interviewees reported that funding and infrastructural challenges are a major concern. They stated that, challenges such as inadequate electricity, weak and ineffective local financial institutions, and return on investment influence the companies' investment strategies and actions.

Access to Funding: With regards to funding, interviewees reported that lack of incentive and the difficulties of getting funds locally to execute projects is a barrier to the adoption of sustainable practices. According to PM9:

'One of the problems with development in Nigeria is access to finance, and most developmental projects in Nigeria often get to a stage where finance become a very difficult issue' (PM8)

'Funding is a major problem, the financial institution don't support long term investment and interest rate is ridiculously high' (PM9)

PM4 and PE1 commented that;

'*High interest rate and lack of local bank commitment is a major challenge*' (PM4)

'If they decide to work on their own, there is no structure that supports them to maintain and keep high standards, they cannot access loan to start up a mini- business in line with their training' (PE1).

PM3 also stated that;

'Our banks are warehouses; they provide minimum support to investors' (PM3)

PM2 expressed that;

'The issue of delay payment has been a serious concern, however, actions to address this has been productive so far and we hope it will continue' (PM2)

Infrastructural Problems: In addition to the funding issues; PD1, PM1, PM8 and OM1 made reference to electricity problems as part of investment challenges that impact on cost and investment plans. According to PD1;

'Sufficient energy from the Nation electric grids remains a very huge challenge in Nigeria, whereby most of our energy supply comes from private generators' (PD1)

PM1 stated:

'We run every site on generating sets, because the country has epileptic power supply. Our policy is practically to run every site on generating set' (PM1)

PM8 expressed that:

'Power is such a very big issue in Nigeria; we have epileptic power supply in Nigeria, this has led to a situation where the company now look for alternative supply of power for a greater percentage of the day, and in some cases throughout the project' (PM8)

OM1 commented that:

'The company produce their own energy and use it to meet their needs regardless of possible negative impact on the project community. In saving cost, they make use of smaller power generating sets at night when power consummation rate low and heavy generator during the day to meet the energy demand. The regulatory agencies are often less concern about the resultant pollution and waste' (OM1)

Absence of adequate infrastructure such as provision of utilities such as electricity creates additional problems to sustainable construction processes. Interviewees reported that it is difficult to monitor or reduce pollution and waste associated with electricity production, due to individual contractors generating their own power. Accordingly, the level of pollution and waste is not checked or regulated due to the peculiarity of the power supply in the Nigeria. According to PM1:

'There is no way we can minimize waste or pollution in this regards, because the generator has to be working 24/7, you can't rely on national grid otherwise you be in the process of doing some important things just then electricity goes off and you will have to start all over again' (PM1)

RO3 remarks that the regulatory agencies don't not check or regulate waste and pollution rate due to the cost implication for the companies. As RO3 put it:

'To begin with, they don't waste energy because somebody is paying for it. If they use energy that is not needed nobody pays for it' (RO3)

RO3 added further:

'What I can tell you is that we ensure that our contractor uses modern equipment that produces less emission and are environmental friendly by creating competition amongst our contractors (through withholding their payments when they fail to deliver on time), so most of them use new equipment because of that' (RO3)

However, PM1 commented that the energy generating equipment and technology in the company runs at full capacity even when less energy is needed, and this is factored into the project cost. According to PM1:

'But the problem some time is the change-over from the big generating set to the smaller ones. In some of the site we don't have automated system to make such changes and we don't have inverter that can keep the power supply to those vital equipment while changing-over from one source to the other as such we leave the generator running continuously' (PM1)

Also, PM9 acknowledged the need to use modern equipment and technology. PM9 said:

'It is also important to use modern technology and equipment, as compared to the general use of outdated equipment by most construction company' (PM9)

Security and Risk: The uncertainty with the political landscape, the religious crisis and security situation in some part of the country significantly influence the companies' investment strategy. The interviewees reported the companies are particularly concerned about the rate of return due peculiarity of the construction environment, and this influences the investment decisions and delivery strategy. PE7 stated that:

'We are more interested in short term investment, projects that are between two to three years due to the risk and political uncertainty' (PE7)

PM3 added that:

'In our company, we are more interested in short term contracts, the once we are able to execute within a short timeframe and get paid for it. Concerns over political stability are other reason we do not go for long term contracts. Once there is change of government you might run into problem with the new government. We focus on jobs that can be implemented within one to three years. However the short term contract turns out to be long term because of delays in payments and sometime increase in work scope' (PM3)

PM1 commented that:

'Once there is change of government you might run into problem with the new government. Anything we can do within one to three year we aim towards that' (PM1)

PD1 said:

'There are some levels of ricks surrounding long term contracts. Political instability and lack of a culture of continuity resulting from changes in government administrations had meant that our investment may not be secured under such conditions. So we like doing short term contracts' (PD1)

4.3.7 Sustainability Strategy

The data suggests that the plans and actions of the companies are motivated by the project objectives, client requirements and the local procurement criteria. The interviewees reported that construction companies are not inspired to develop corporate sustainability strategies or have sustainability reporting systems to monitor and report performance due to the fact that it is not a requirement for the award, procurement and delivery of projects. Thus, participating companies do not see the need to have a corporate sustainability strategy in planning and project execution.

According to PE7:

'We do not have specific sustainability strategy in place neither are we aiming at specific sustainability target. However, what I can tell you is that, the corporate social responsibility department handle sustainability issues, particularly those that had to do with people we interact with within our construction daily activities' (PE7)

PM9 commented that:

We don't have a laydown strategy for addressing all these aspects of sustainability like you explained' (PM9)

PM2 said:

'No we don't have any form of sustainability reporting. We don't have it, because the client does not require it or we are not made by the client (Government) to produce it. If the client requires it, it would be done' (PM2)

In justifying the view that project objectives, design, and specification drive a company's actions and delivery strategy, PM5 gave an example of the just-completed treatment plant in 2014 - called the 'WUPA project'. According to him;

'The WUPA project would make a very good example. The central aim of the project is to convert waste from the sewage to other productive areas. This is how it works; sewage is extracted from the system, converted into other uses such as agro-economic product, which at the end of the day would be valuable for agriculture. The waste serves as fertilizers for farms, while liquid from the waste is treated and channel back into rivers and this eventually serves as good water sources for domestic usage after purification. So I would say the client's specifications determine how the project is delivered which influences the sustainability strategy' (PM5)

PM4 stated;

'*There are no specific strategies. At the design stage we liaise with the client and work in line with government development policy. However, as far as I know, sustainability target or requirements are not explicitly stated in the procurement and development policies'* (PM4)

PM5 expressed that:

'My company does not have a plan for sustainability in particular. In our day to day construction activities, issues of sustainability is not often considered and there is no department cut out for this purpose as well' (PM5)

PM5 further enumerates;

It is only at the initial part of the project phase. There is what we call environment impact assessment which is often carried out before a project is approved, beyond this stage we just build according to the design. But we don't do sustainability progress report or have specific strategy for sustainability because there is no requirement for this' (PM5)

Some of the respondents raise concern about the uncertainty associated with sustainable practices and express that the construction sector does not encourage practitioners and project organisation to develop strategies that promote sustainable practices. Below excerpt illustrate this point:

'*However, relating to what I told you earlier, about certain structures not being in place and certain institutions not being enforced in Nigeria, sometimes it is difficult to convince client about the need for sustainable practices and in situation where there are no laws that expressly ensure that development should have sustainable outlook in Nigeria, there is no much that we can do as professional*' (PM8)

PM1 mention that;

'At the construction site local people are only told what to do base on the situation at hand, there is no specific sustainability strategy' (PM1)

Interviewee also reported that in most cases, their companies are not involved in the pre-conception phase, as they only execute projects that has been designed and approved by the appropriate agencies, limiting the opportunity for integrated approach. According to PM9;

'Most times we are not involved in the project inception, and design stage. The design is completed before the awards of contract, we only construct and deliver projects based on the approved design' (PM9)

PM1 says;

'*No we don't, we only do construction. However, we don't just accept you design. We cross check to ensure that your design fine and everything is ok. We review the design to ensure quality standard can be achieve and that all is okay, you know we are human and even the consultants make mistake. We also do feasibility study, we go to the site to check and ensure that the design is do able'* (PM1)

Also PE7 comment that;

'*We are not involved in the design, but we offer post-delivery maintenance and management*' (PM7)

4.4 Opportunity for Sustainable Practices

The findings from the primary data reveal that economic values and procurement criteria such as quality and timely delivery are among the main factors that drive organizational practices in Nigeria's construction industry. As indicated by the interviewees in section (4.3.7) above - procurement requirements, in addition to the economic interest of the company appears to be the main factors that inform the company's strategy for project planning, execution and delivery. Figure 6 below provides a structure of the findings on economic-led processes and procurement requirements that could present opportunity for

sustainable construction processes. By adjusting this processes to further embed socio-environmental values in construction delivery.

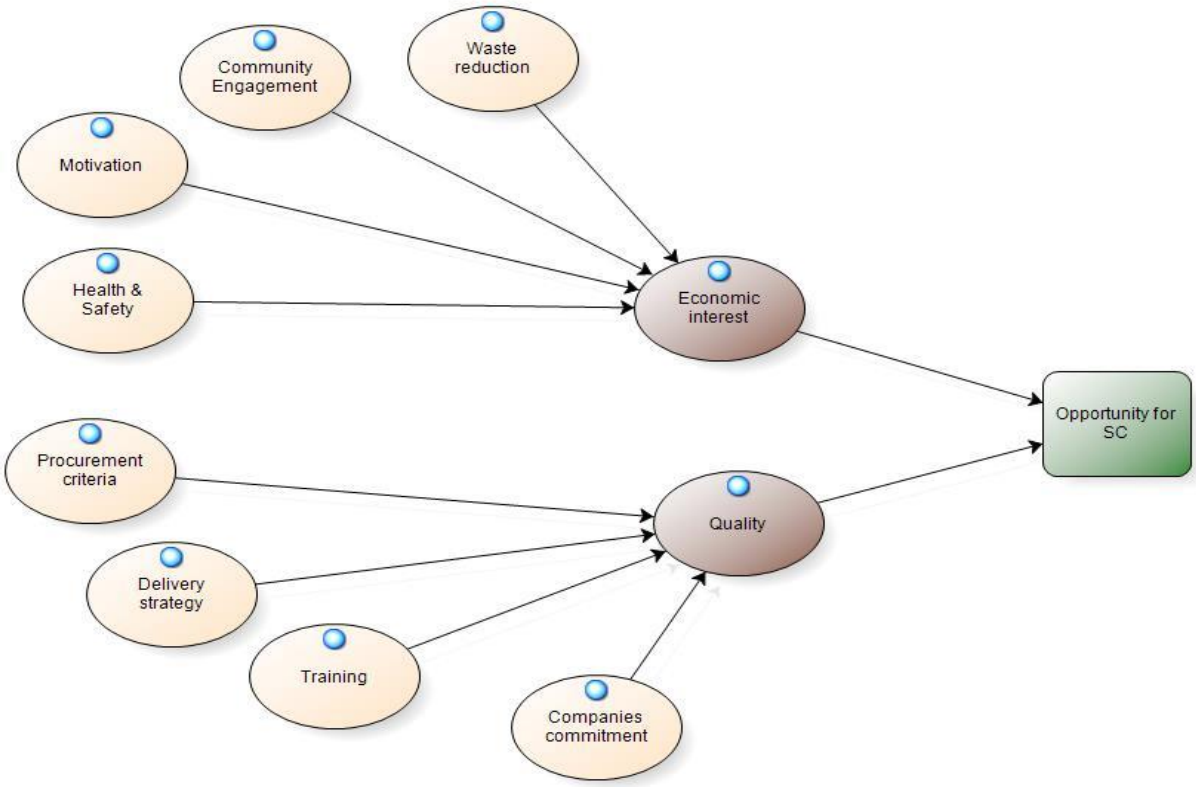


Figure 6: Opportunity for sustainable practices

4.4.1 Economic values

As reported by the interviewees, economic benefits were identified as one of the main driver for company's practices. The findings reveal that the companies were motivated to reduce waste, minimize natural resource usage, and implement health and safety rules for economic reasons. Majority of the interviewees stated that the underpinning factor for embedding sustainability processes is connected to economic values derived from implementing these practices.

Waste Reduction: The participants reported that waste reduction measures are primarily applied for economic reasons. According to PM1:

'*Presently we are not under check from anybody we have to check ourselves because it affects our income. So we ensure that waste is minimized by making sure that every segment of the construction works according to plan. On site we have instruments in place and do measurement to ensure waste is reduced to its barest minimum mainly for the company's benefits*.' (PM1)

OM1 also mentioned that:

'*We reduce waste and use of natural resources in ways that is beneficial to the company, especially to reduce cost'* (OM1)

According to PM9:

'In order to minimize waste we order material based on requirement and specification. We also try as much as possible to reuse any excess to save cost' (PM9)

PM5 pointed out that:

'Projects promote smart use of natural resource for the company's interest. It's an avenue for reducing cost' (PM5)

PM3 added:

'Minimizing waste is very integral to us as a company because we don't want to lose money. We kind of regulate ourselves and it also enhances our profits' (PM3)

'We consider issues of biodiversity. Removing everything comes with cost too, so we just leave some things the way they are' (PM3)

Also PM7 expressed that:

'We have a mechanism for minimizing waste as much as possible, for saving cost' (PE7)

In support of this view, PM4 commented that:

'We are now increasingly promoting the use of solar energy to minimise pollution. This is particularly due to the power situation in Nigeria where we don't have electric power supply for the most part of the day. We rely primarily on our own power generating sets and these are very expensive to run, so we now encourage solar system as a way of reducing waste and energy cost over time' (PM14)

<u>*Health & Safety*</u>: With regards to Health and safety concerns, effort towards safety is driven by the company's economic interest. According to PM3,

'Enforcing health and safety policy for us is a win-win issue, because in the event of an accident we often pay far too much for compensation' (PM3)

PM3 further emphasized that;

'Some companies now increasingly work toward improving safety standard to reduce claims, particularly insurance compensations'.

OM1 and PM1 also point out that:

'Although, there are effort recently to develop and enforce safety rules within the company due to high rate of accident, and it costing us mush to pay compensation' (OM1)

'Also the companies too are working toward it, particularly because of the insurance compensations. The kind of expenses they are incurring for compensation toward injuries is high so they are trying to improve and work in line with HSE policies of the federal ministry of labour' (PM1)

PM1 added further:

'Although this process is just starting we believe with time they will get to understand the importance and the need for safety equipment. We intend to enforce it by telling them if you don't wear it or come to work with it you might be dismissed, because by their not putting on safety equipment is also putting us in problems' (PM1).

Community Engagement: From the findings, the interviewees stated that engagement and involvement of the local community at the project conception, pre-construction and construction stage is not a usual practice. Participants acknowledged that minimum engagement with the local community at the project site is a usual practice, except it is of economic interest to the company. As OM1 pointed out;

'The company doesn't engage with the local community. It is expected that the client determines the need of the society and include this in project design and once approved the company implement in line with project specifications' (OM1)

According to PD1:

'Although majority of our jobs are from the federal government and we assume the government may have involve project communities in the process of designing such projects' (PD1)

RO4 said:

'Other factors influencing this are political consideration. For example, the types of projects implemented often by government agencies are white elephant projects that has little relevance in addressing ordinary people's needs' (RO4)

RO2 stated that:

Choices of where to construct projects are usually based on sentiments, with lots of selfish interest. Decision of type of construction and where to site projects is either based on religious or tribal interest' (RO2)

PM8 commented that:

'*Most of the projects that we do are owned by the federal government and its agencies; we just go there and deliver'* (PM8)

The interviewees acknowledged that their company engages with the local community only when they are compelled to, but is not a regular occurrence. In most cases, if engaging with the community does not benefit the company, they hardly involve the local community in the project. PM2 commented that:

'We do but not on a large scale, most of the time if the company will not benefit from it they won't do it. Normally, community engagement is not our standard practice.' (PM2)

PM5 pointed out that:

'We sometimes do it when we are compelled to do it. The company doesn't engage with the local community. The client is expected to determine the need of the society and once project design is approved the company delivers in line with set out specifications' (PM5)

PM1 provided an illustration to demonstrate the level at which his company engaged with the project community and why. According to PM1:

'For example you have a dam project located in a community. The community might be resettle and provided with means of livelihood, because you have taken over there farm land which is their source income. Also we try to engage them for the period of the project, anyone within the community that

is qualified will be employed and place according to their qualification. We access every employable person within the community and place them where they belong. That also provide some guarantee that the community will not come and disturb work on site. This approach is taken to avoid problems with the community. The company provide social responsibility towards the company not because the law require them to do, but to avoid disturbance from the community' (PM1)

According to PE1:

The company over the years has grown to become very sensitive to issues of sustainability. We now have a department that handle, and respond to issues of social responsibility. We have a Public Relations (PR) officer, who is in the top management of the company […]. A management staff with other staff working under him. When you look at it in the construction industry, the PR/CSR department does not bring money into the company, rather it take money out. For the company to have gotten to that point, it means that over the years they have realize the need to take the issue of sustainability seriously and it is better to manage the situation for it not to get worse. This department handles issue that has to do with people we interact with within our construction day to day activities such that any problem that may arise later can be tackled before it even comes up' (PE1)

4.4.2 Quality

The interviewees acknowledged that sustainable construction processes were not explicitly identified amongst the requirement for project procurement and delivery, however, quality of work, cost, and capacity to deliver on time were the main criteria for the awards of projects, selection of sub-contractors, and suppliers. The interviewees reported that emphasis is on quality as opposed to sustainability performance in the procurement and award of contracts. Accordingly, the companies' priorities were on quality performance in project execution and delivery.

Procurement criteria: The prevalent view amongst interviewees was that quality is the most important factor project delivery, followed by cost and this informs the action of the companies. They reported that quality of work, cost, experience and capacity to deliver are the main criteria for the selection and awards of projects to sub-contractors and suppliers.

PE7 pointed out that:

'We are much more concerned about getting the required quality than the environmental impact' (PE7)

Also PM4 stated:

'*The most important factors for now are quality of their work and availability and finance'* (PM4)

PM9 said:

'Sustainability is not a main criterion for selection. We select suppliers and subcontractors based their capability to deliver, cost and the quality of their product' (PM9)

According to PM4:

'*One of the major criteria that we use in our selection process is reliability, experience and capacity in terms knowledge expertise'* (PM4)

PM5 added:

'We also consider cost, if we can get supplier and sub-contractors who can deliver quality project at a relatively low price we don't hesitate to use them' (PM5)

Other comments included:

'*We prefer working with exiting contractors who we trust and are reliable'* (PD1)

'Another major criteria is cost, this is a main determinant for supplier and sub-contractors selection' (PM2)

'*Trust and experience is a major criterion, we ensure that the suppliers and sub-contractors can deliver and not disappear with money. We also look at the capability of the supplier (in terms of their materials and resources) to deliver because of the leading time to get pay back'* (OM1)

*'The primary criteria that we use are reliability and expertise of the supplier or level of expertise that the supplier brings to bear on the projects' (*PM8)

'For now we don't have any criteria for selection, because there are limited good contractors and supplier. What we do is that we make use of old hands, the once we already know in terms of honesty and our previous experience with them. You can get some contractors and they become funny once contract have been awarded to them you start having problems with them. We prefer the use of old hand we already know and have worked with before' (PM1)

Delivery Strategy: Participants reported that the companies' delivery strategies are primarily focused on achieving the required quality standards, and this principle is embedded in their material selection and operations. With regards to a company's criteria for material selection, interviewees reported that sustainability principles are not considered in choosing the supply chain, or in selecting materials. However, quality was a key factor; the participants acknowledged that materials are selected specifically to meet the quality requirement. PE7, expressed that:

'We have policies for material selection and this is based on quality. For example, in our building projects it is always very difficult to find good furnishing materials and we have been forced to set up a furnishing factory as a result of this. This furnishing factory has been set up to ensure that the quality of furnishing meet our required standard. We get the best quality materials; process them to a very high standard before sending them to site' (PE7)

According to OM1:

'Project purpose is the primary determinant for material selection. Emphasis is more on quality of materials for achieving design purpose than issues of sustainability' (OM1)

PM9 commented that:

'The main policy is getting good quality material' (PM9).

PM2 stated that:

'*Materials are selected based on the cost and purpose. Focus is more about quality to meet and achieve design requirements not really about sustainability consideration'* (PM2)

PM1 stated:

'We select materials that certify our need based on design requirement. Our need/standard is based on quality' (PM1)

PM8 said:

'Usually what we do is to minimize energy consumption through the design. We have been able to do that at the design stage' (PM8).

'The projects have policies for material selection. This is driven by the project objectives; however, we place more emphasis on quality especially for non-raw materials we source locally' (PM5)

'Part of the challenge is the difficulties in identifying original from fake building materials. Quality of the materials is a major priority for selection, because if it fail we will be held responsible. And there are very few reliable local suppliers out there' (OM1)

Commitment to Quality: The Interviewees referred to sustainability as quality, and reported that companies are committed to total quality management in project planning and delivery. This, however, presents an opportunity to improve sustainable processes in view of the notion that sustainability is an extension of total quality management. As OM1 put it:

'We set high standard in delivering our projects, and we don't compromise on quality. The standard and quality of our jobs stand out and that's why we are different. Sustainability to us is about delivering quality project' (OM1)

According to PM5:

'We take seriously issues of sustainability, sustainability to us mean quality. We emphasis on quality, because we believe if we do a good job you will get good recommendations' (PM5)

PM9 expressed that:

'We are more interested about getting the required quality than the environmental impact of processing and delivering these materials' (PM9)

PE1 stated that:

'The company over the years has grown to become very sensitive to issues of sustainability. We now have a department that handle, and respond to issues of social responsibility. We have a Public Relations (PR) officer, who is in the top management of the company [....] a management staff who has other staff working under him. When you look at it in the construction industry, the PR/CSR department does not bring money into the company, rather it take money out' (PE1).

Training: Interviewee reported that training is occasionally provided, but it's not a standard practice. The participants acknowledge that sometime training is provided, but it is geared towards specific need to enhance project delivery, and sustainability issues are not explicitly included in the training provided. Adequate training on sustainability issues, presents opportunity to improve on the uptake of sustainable construction processes in project delivery. According to PM4:

'We have series of training and education programmes in place to build the capacity of workers and staffs at various levels' (PM4).

However, RO2 comment on the relevance of the training to sustainable construction practices; he remark that:

'*Few occasions that we have come together to talk to ourselves, I have always emphasised the need for adequate training. As far as am concern, relevant training is Zero in* (Agency 1)*, the only time they organise training for us is when they have a friend looking for contracts, some of the trainings are not even relevant. Some of the software that is needed to make us function well is not even provided. Most of our ogars (*Senior Bosses) *do not see any need for special training here; if they do not need training, we do'* (RO2)

PM1 also stated that:

If we (the construction sector) can create something like the local content law, like the way it's being applied in the oil and gas that require oil companies to train and demand specific service period from employee, it will go a long way to improve on the quality of construction personnel' (PM1).

PM5 express that:

'Although it is not compulsory, trainings are often provided for staff and key stakeholders sometimes. When there need, they sometime train staff to acquire knowledge and skills'

The absence of adequate and relevant training on sustainability issues appears to have negative impact the behaviour of practitioners toward sustainability processes. The participants acknowledge consistent sustainability related training will help change practitioner perception of construction delivery. According to PM7:

'*Personally I think the lack of continuous training is a major problem'* (PE7)

PM7 further enumerate that:

'There is need for specific training to educate the project managers on these issues to understand the thinking of the company such that it will support the activities of the CSR department' (PM7).

PM5, PM3 and PM2 in support the above stated that:

'It is not a standard practice, but it does happen. For example when there is a new programme, say software that could be useful for the project, they will get some to train you for that purpose. But say company has a standard to train its workers no they don't' (PM2).

'There is no formally established standard for training its workers' (PM5)

'Not exactly, but occasionally some category of staffs are trained when there is request for such trainings by other organizations' (PM3).

4.5 Summary of Research Findings

The survey provides a broad insight on how construction companies in Nigeria embed sustainability in their practices. Findings from the survey provided information on the extent to which environmental, social and economic sustainability is considered and applied in construction processes. Information from the survey provided the sustainability

performance of the participating company, and this serves as a scoping review for construction practices in Nigeria. The survey indicates that the level sustainability is embedded in practice is relatively low, with social and economic sustainability having the lowest and highest performance respectively. Economic values were identified as the main driver of the companies' construction practices. The survey result also show that the desire of participating companies to improve socio-environmental sustainability performance is low as there is no significant difference between the percentage score of the actual and desired situation.

The interview provided detailed information on the rationale for the current sustainability performance by exploring the factors that influence the actions of companies and it implication on the current situation. The result suggests that the behaviour of the construction practitioners is connected to their interpretation and perception of construction, and this guides the delivery strategy. The participant's perception of construction is informed by the structure and system of operation in the construction industry, and this is linked to the requirements and specifications of the clients and key stakeholders. Though, there are environmental policies and safety regulations such as Environmental Impact Assessment (EIA) laws and Health and Safety Act, however, it appears the enforcement of these policies in construction practices is weak. The weak enforcement could be attributed a number of factors such as coordination problems, inadequate regulations, lack of commitment and political will from the government and main actors to drive sustainable construction agenda. The interview data indicate that factors such as quality, delivery time and economic values significantly influence the current practices of construction organization in Nigeria. This may present opportunity for change if socio-environmental values are embedded in the present processes without disproportionately affecting the economic values.

Chapter 5

5 Operations of Construction and Sustainability in Companies

5.1 Introduction

As described in the previous section, the primary research provides data on the extent to which construction companies in Nigeria consider sustainability in their practices, and the rationale for the current situation in the construction industry. The extent to which sustainability is considered and applied in the construction practices of the participating companies have been identified through a survey. Also, the factors influencing the current practices of the participating companies and key stakeholders in the industry have been identified through interview of the management team of both the construction companies and regulatory institutions. Based on the findings obtained from the two stages of the primary research in chapter 4, and as mentioned previously in chapter 3, section (3.1 and 3.6) in the research methodology. Based on the insight collected the researcher will attempt to construct a system in which construction activities take place in Nigeria; the system will be referred to as 'the construction governance environment'. Certain aspects of this system such as the construction sector, government actions or inactions and companies practice will be examined to identify the underpinning values and factors that drive current construction practices, and also explore opportunity for change.

This chapter examines how the different aspects of this system connect together and its impact on companies' behaviour. It explores in detail the participant's perception of sustainable construction and its impact on their level of commitment to sustainable processes. Also, chapter (5) examines and identified the opportunities and barriers to sustainable construction practices, and discusses the complexity of sustainable construction in Nigeria through the lenses of the companies. As has been described in the above paragraph, in order to understand this complexity; aspects of the construction system such as the company's practices, the construction sector and government actions will be looked at. It builds a picture of the current construction situation based on the primary research data. In doing this, the factors that shape the activities of actors in the construction industry were looked at under the following broad classification; clients requirements and contract administration practices; government policies and regulatory framework; capacity of the company to address sustainability concerns, and capability of institutions to deal with sustainability issues. Factors relating to the conditions of contracts, level of compliance with the conditions, organization work force and coordination issues were explored within the context of construction sector. Factors relating to the structure and system of supporting institutions, policies, enforcement and implementation, and education and research were reviewed under the government actions, while factors relating to the motivations, values and strategy for construction delivery and investment risk were reviewed under companies' practices.

Overall this chapter presents a narrative of the primary research data to gain understanding into the degree of complexities associated with embedding sustainability in construction processes in Nigeria and its impact on companies' practices. Based on the understanding derived, this research can then move on to identify the barriers and opportunities for sustainable processes, and propose a strategy for change. The first section (5.1) is an

introduction to this chapter, the second section (5.2) is focused on the environment in which construction company operate in Nigeria. It discusses the construction governance environment from a systems perspective based on the primary research data. The third section (5.3) discusses the opportunity to embrace sustainable construction processes in company's practices, and this comprises of two sub-sections; economic drivers with low sustainability commitment, and quality driver for construction delivery. The fourth section (5.4) then provides a summary of the research interpretation and analysis.

5.2 The Construction Governance Environment

The environment of any industry constitutes the atmosphere in which all the industry's transaction is carried out. It is made up of tangible and intangible systems and structure which affects and regulate the relations, actions and interactions of all the participants in the industry. In Nigeria, the construction industry consists of structures and systems of activities which interact under the catalyst of construction operators to attain specific construction goals. The operations of the construction industry involves different participant who belong to different organisation with different policies, objectives and practices. The policies and practices that drive the operations of the various actors are grounded on their values, knowledge and understanding of sustainability in construction (Pitt, et al 2009). Though, the concept is subjective, however, the understanding from which the construction system is created reflects the values of the actors, and this affects the actions and interactions of operators in the industry. An exploration of activities, and the factors that influence the action and interaction of actors in the system present useful insight into the underpinning values that drive construction processes.

The primary data from this research indicates that the awareness and understanding of the concept of sustainable construction is low amongst practitioners and actors in the industry and this level of understanding appear to guides the thinking from which the present construction system arise. Following the outcome of the survey, involving an investigation of nine different projects across the four main geo-political zones in Nigeria, the result reveals that an extent to which sustainability is considered and applied in construction practices of the participating companies is relatively low as compared to practices in the developed countries. This is consistent with the work of scholars such as (Du Plessis, et al, 2011; Diana, et al, 2013 and others). The low sustainability performance could partly be attributed to the participants knowledge and understanding of sustainable construction. As revealed in the interviews conducted for this research, many of the respondents appeared unfamiliar with the concept of sustainable construction. Amongst the few that are familiar with the concept, the common assumption suggests sustainable construction is about quality and durability. Below excerpts from the research data, illustrates interviewees interpretation of sustainable construction:

'Generally Nigerians don't know much about sustainable construction. Ours is to deliver project or building following the traditional approach which has been tested and trusted' (PM2).

'First I think there is need for more enlightenment to create better awareness amongst staff' (PM9).

'*We take seriously issues of sustainability, sustainability to us mean quality. We emphasis on quality because we believe that if we do a good job we will get good recommendations'* (PM5)

'*Emm [….] I think it's about good quality work. Though there is no definite approach to achieve this, however we adopt best practice to deliver projects'* (PM9)

'*We set high standard in delivering our projects, and we don't compromise on quality. The standard and quality of our jobs stand out and that's why we are different. Sustainability to us is about delivering quality project'* (OM1)

'*Sustainability is really not a part of our culture, no one really talk about it here as people carry on with their jobs without considering this issue'* (RO4).

Though, the interpretation of sustainable construction as 'quality' by some of the participants is not incorrect; quality is an aspect of sustainability. However, studies have shown that sustainable construction is much more than quality, it involves responsible creation and management of a healthy built environment which includes accountability, efficient use of resources, consideration of project long and-short term perspective, ethics and values components (Silvius, *et al*, 2012; Du Plessis, 2007; CIB, 2004). The significance of this is that the practitioners' level of awareness and understanding of sustainable construction is vital in shaping how sustainability principles are embedded in the systems and structures of activities in the industry, which affects all practitioners and companies' processes.

5.2.1 The Construction Sector and Organizational Practices

A number of factors within the construction sector impact on company's activities, the primary data suggest there is a huge gap in the coordination of construction activities in the industry. The absence of proper frameworks for coordinating the activities of the various actors in the construction industry remains a major challenge in embedding sustainability into the construction processes. The lack of proper coordination appears to hinder the development of professional cadres of trade and management personnel, which make it difficult to subject the sector to regulatory policies and improvement programme. Participants reported the prevalence of non-professionals delivering services met for qualified professional as a common feature. The absence of National agency to coordinate construction activities was implicitly identified as a challenge to sustainable practices, in addition to the issues of duplication and discrepancies in the policies and activities of the various agencies. This view echoes in the responses of the interviewees, for example, the remark from PM4, RO2 and PM2 in the extracts below illustrate this point:

There is no specific agency that organises and coordinates construction activities in the industry, the level of accountability is low and there are no supporting laws to guide and address issues of failures in certain areas. (PM4).

'You discover that a lot of sharp practices are being done, [……..] I have even seen mechanical engineer designing electrical work or even a draft man who will design buildings[....]this thing are for somebody who is certified and has experience, when you see this thing you know that there is a problem in the industry, but for somebody who is not detailed you think everything is alright' (RO2)

'As far as am concern, issues of environmental concerns are still at the back burner as every organization appeared to be doing what they like. There is no framework for coordinating various construction organizations in taking necessary action to ensure that construction activities or environmental issues are properly addressed' (PM3)

As a consequence therefore, the sector is fragmented and under-developed, limiting it potential to evolve into a functional industry. Although construction activities involve different operators with different policies, objectives and practices, however, fragmentation in construction operations is more pronounced in the developing country. In Nigeria for example, agencies responsible for implementing existing environmental policies appear not to be working together. For example, the interviewees reported that Environmental Impact Assessment (EIA) laws are not properly enforced due to its ambiguity and interpretation challenges. Ogunba et al (2004) point out that in the developed counties like the UK and the US, specific law governs the EIA system for national projects. In Nigeria three distinct EIA systems governs nationally founded projects, disparity also exist in the manner of operations of the EIA systems (Fatona et al, 2015; Ogunba et al, 2004). The existing EIA laws have come under heavy criticism by different scholars for its apparent vagary and ambiguity in it content description, subjecting it to different interpretation by different actors in the industry. Amidst mounting criticism of the existing EIA laws due to its duplications, and interpretations challenges, the institutions responsible for implementing these regulations appear not to be working in a coordinated manner. In view of the general lack of coordination and policy overlap, compliance level is low and most companies show apathy toward embedding sustainable processes in project delivery, and they are not required to account for their actions. Majority of the interviewee alluded to the absence of proper coordination mechanism for implementing environmental policies and programmes in the system. In the extract below, one of the interviewee PM1, express that:

'*The whole environmental issues or concerns are not just working, everybody does what they like. All these organizations are not working together to ensure that construction activities or environmental issues are properly addressed'* (PM1)

The primary data suggest that the system is marred with different construction standard across the various tiers of government - federal, state and local authorities. This presents another layer of obstacle towards the promotion of sustainable outlook in the construction industry. There are discrepancies in the regulatory policies across the various agencies and tiers of government; this has resulted to differences in construction requirements and standards across the industry. This situation also significantly affects the behaviour and actions of construction companies. The absence of unified construction standard was expressed by the participants, and the implication of this is that, in view of the difference in building and construction regulation across the tiers of government, it will be difficult to effectively implement sustainability initiatives across the construction industry due to variation in requirements at the federal, state and local government areas. Extracts from PM4, PM1 and RO4 allude to this point:

'Like I said before, state and local government are not very effective in ensuring compliance and their standards varies slightly' (RO4).

'*Even where some sustainability related laws exist they are not often enforced across the various tiers of government. For instance, the environmental impacts assessment policy is not strictly followed by construction industries in the country. This is very common within the local and state levels of government in Nigeria, but at the federal level a couple of government institutions that I know are very strict on enforcing compliance'* (PM4)

'Ministry of labour is working towards creating unified standards where all construction companies would have to fall in' (PM1).

Similarly to the challenge of coordination, the conventional system of procurement that separate design team and project execution team is still a common practice. The contracting and contract administration practices, such as the pre-qualification procedure, tendering and bid procedure appear to follow traditional procurement path which involves the separation of the design team and contractor. The participants comment that if the company design and build, it will provide opportunity to better consider and integrate sustainability principle at both the pre-construction and the construction phase. However, this is not always the case. The interviewees reported that in most cases they are not involved in the project pre-conception and design phase, and most of the design is fixed, they only deliver based on approved design. The implication of the traditional procurement practices which is prevalent in the system is that, the practical knowledge, experience and insight of the various actors is not incorporated at the project inception and design phase, as well as through the execution and delivery phase. The traditional approach is focused on delivery, the separate team is interested in delivering there bit, as against the integrated approach which examines the impact of the design on the project activities and delivery processes, and how practical experience from project execution could help enhance the design processes. The adoption of integrated procurement approach in the system could present opportunity to embed sustainability principles in project inception, design and construction phase. See below an extract for comment ascribed to PE1 and PM9 below to support this view:

'We as a company have gotten to a stage where sometimes we design and build. If for instance we are designing for a project, we do visibility study and identify where natural resource such as flora, streams, and natural features etc. we try in integrate these resource into the design as much as possible. However this normally occur if we are the once designing and not in cases where the design has already being done and given to us' (PE1).

'Most times we are not involved in the project inception, and design stage. The design is completed before the awards of contract, we only construct and deliver projects based on the approved design' (PM9).

Apart from separation of the design team from contractors, sustainability is not explicitly required in the procedure for the evaluation and awards of contracts. The interview data suggest that construction client do not demand sustainable practices. It appears the clients are uninterested to pursue sustainability goals. PD1, point out that *'But the country as a whole do not take issues of sustainability too seriously. It's really not part of the system unlike in the advance country'.* The systems and structure of activities in the construction industry appears to places little value on sustainable construction, it is however unclear whether this

behaviour is connected to their knowledge of sustainable construction or based on the development pressure. Whatever the case, the absence of sustainability requirements in specification of clients and contract condition has resulted in the companies and practitioner showing apathy towards the uptake of sustainable practice. This apparent lack of interest in sustainable processes appears to be a common feature in the construction system, sustainability is not often required in construction, according to PD1; *'It's not part of value system and customary for people to imbibe this practice in their daily task'.* This suggests that the value of sustainable construction in the system is low, when compared to the list of other construction requirements. Consequently, construction activities within the present system appear to contain factors that does not enhance or support sustainable process. The connection and interaction of these different factors is responsible for shaping the current construction situation in Nigeria.

With regards to issues of skills and expertise to deal with sustainability concerns, the primary data suggests that training, education, research and staff development programmes are a not a common practice in the construction sector. Consequently, there is shortage of skilled personnel to develop and implement programmes that support sustainable construction practices in the system. RO2, acknowledged that '*The problem is training; the majority of those monitoring and implementing it are not well trained*'. The absence of relevant training and education to gain up to date skills and required expertise could be connected to the fact that sustainability in construction is not a standard practices, and actors in the system are not mandated to adopt sustainable practices. The implication of this is that, companies and practitioners pay less attention to training and development programmes to enhance their capacity for the uptake of sustainable practices. In support of this view, PM3 point out that *'Skill shortage is a major constraint to implementing sustainability strategy'* (PM3).

Apart from training and skill shortage, access to funding is another challenge within the construction sector. Difficulties in securing credit on reasonable terms from commercial bank for construction financing are prevalent features in the construction environment and there are no incentives to support and encourage the uptake of sustainable construction practices. PM8 and PM9 express that access to funding locally is a major problem, the financial institution don't support long term investment and interest rate is ridiculously high.

5.2.2 Impact of Government Actions on Construction Organization Operations

The system and structure of the construction environment includes the systems of government policies, and the procedures and administrative structure. In Nigerian, although the government is the major client in the construction industry, it also plays a significant role in formulating and implementing policy direction, as well as coordinating the activities of the construction industry. Against this backdrop, the uptake of sustainable practices and the extent to which companies delivering construction projects can attain the goals of sustainability greatly depends on the actions of the government. However, evidence from the primary research conducted for this study suggest that, the political will by the government to drive sustainability agenda in the construction industry is lacking. The participant acknowledged the lack of commitment by government and those in position of authority to address sustainable construction concerns. This behaviour could be connected

to the understanding and value attached to sustainable construction. Research has shown that unless the government (who is the main client) and key stakeholders are aware of the need and importance of sustainability they are not able to brief sustainable construction practices (Pitt et al, 2009; Shackly et al, 2002). As PE7, put it '*the general lack of interest by the authorities to pursue sustainable practices is a major problem'* (PE7).

The actions or inaction of the government and main actor to support sustainable practices in the construction industry, affect the behaviour of the companies and construction practitioners. The system and governance of construction activities does not encourage or motivate the companies, and practitioners in embedding sustainability in their practices. This point echoes in the views of the interviewees. According to PM9, *'Government should be willing to encourage and enforce sustainable practices. Presently, the desire to make this happen is weak or not high up in the agenda'* (PM9). One of the interviewee, PM7 provided an example to illustrate this point; he made reference to the bilateral agreement between his company and the government on issues of technological transfer for sustainable construction, and acknowledged that the government are un-interested to see this happen. In his remark, PM7 comment that; '*Unfortunately the political will to make it happen is not there. The government and those in authority are uninterested in addressing the issues of sustainable construction. For example, we as a multi- national company, we have bilateral agreement with the government on issues that boarders around 'technological transfer' to improve construction practice in Nigeria. But the people to enforce it are uninterested. There are no active institution to support this process and there is little we can do as a company to make this happen'* (PM7). The government inaction or commitment towards sustainable practices could be linked to the understanding from which the system arises. According to PM1, *'Those in authority do not see the need to take enforcement seriously, they believe the country has more than enough natural resources, for this reasons, it gives the company room to practice and do whatever they like'* (PM1). This assumption appears to guide the conduct and behaviour of the actor in position of authority in enforcing regulations that support sustainable practices, and by implication the compliance rate is low.

In view of the level of commitment to sustainability in the system, the institutions responsible for creating and enforcing sustainability laws are not adequately empowered. The interviewees identified inadequate training, skills and absence of appropriate technology amongst factors hindering implementation and enforcement of existing sustainability related policies. According to RO2, *'We are not adequately empowered, there is no adequate training and up to date technology to address this issues'* (RO2). Consequently, the desire of actors in the government organizations to enforce and pursue sustainability goals is weakened due to inadequate support and empowerment. OM2 comment that *'there are professionals in the enforcement agencies who should know what to do in terms of the professional standards. However, I am unsure if they are willing to do what they need to do. In my experience, in terms of professional expertise they are there, but I am not sure of their desire to really enforce these things. I think there could be a number of reasons, one of this could be lack of adequate empowerment to enforce this laws'* (OM2). Furthermore, OM2 enumerate that: *'Addressing these concerns (sustainability issues) is very important, particularly at the inception phase. As an Architect (Design Manager), it vital to imbibe sustainability principles into design because it set the scene for other processes. However there are many factors that we need to consider to adopt*

sustainable practices, even when practitioners know what to do, some of this factors make it difficult to imbibe sustainable construction principles into practice. For instance, so many of our institutions in Nigeria are not developed and do not encourage sustainability as compared to other countries in Europe and America, thus, becomes difficult to adopt sustainable practices in this environment' (OM2). Lack of government commitment to sustainable construction is linked to weak empowerment of supporting institution to develop and implement regulations and legislation that promote sustainable construction.

Inadequate empowerment negatively affects the ability of the supporting institution to initiate, develop and implement effective sustainability policies. Evidence from the primary research undertaken for this study suggest that the absence of strong and active institution to develop policies that fit with the peculiarity of the construction industry, accounts for the adoption of policies that are largely incongruent to the peculiarities of the economy and the Nigerian construction environment. RO3 comment that '*we try to adopt the America and the UK Green building council frame work'*. Weak and inadequate policies for driving sustainable construction practices appear to be a major constraint in construction industry. PM4 comment that '*The fact that there is no strong government policy or active institution to monitor and enforce compliance on this issues has not helped*' (PM4) Also, PM9 acknowledge the need for enabling laws that specifically encourage and address sustainability challenges peculiar to the Nigerian construction industry. According to PM9 - 'there *is need to reform and encourage the necessary institution to effectively address sustainability issues. Although there some effort lately, but more need to be done particularly at the state and local government level*' (PM9). In support of this, PM8 express that '*In situation where there are no laws that expressly ensure that development should have sustainable outlook in Nigeria, there is no much that we can do as professionals*' (PM8). The capability of the institution (both technical and financial) to support and enable sustainable construction is crucial to the development and application of sustainability intervention. Thus, the inability of the supporting institutions to enforce sustainability laws is connected to the level of compliance and the behaviours and actions of companies in the industry.

Apart from the low commitment, weak policies and inability of supporting institution to adequately enforce and implement regulatory policies, corruption was also identified among the factors that impede sustainable construction practices. The primary research data suggests bribery and corruption as prevalent feature in the system. PM1, point that *'first we have to fight corruption; until we kill corruption every other thing will not work'* (PM1). Corruption significantly affects the operations in the construction industry, the forms of corruption centred largely on appointments, contract awards and tendering irregularities, to contract administration and project delivery irregularities. Some factors instrumental to the apparent corruption in the system include the perceived absence of deterrent and punishment of corrupt personnel, procedural impediments, skills shortage in the industry, and poor ethical standards. OM1 comment that '*doing business in Nigeria could be challenging when it comes to corruption. It's almost impossible to operate successfully without compromising by giving bribe at one point or another'.* Based on the level of corrupt practices in the system, accountability is low, companies do not accounting for their actions or inactions, and due the noticeable low level of accountability, companies and other actors in the industry

appeared less concerned about the impact of their activities. It appears there is apparent absence of genuine concerns for the negative impact of construction activity on the society and environment in view of the poor ethical standard within the system. As RO2 point out, *'People don't care here, since it is government property nobody really cares. It unfortunate, no accountability, and you know most of this foreign construction companies, they are aware of that so they take advantage and they are collaborators with our people'* (RO2). One way of address corruption is by improving the administrative and procurement process, especially in the public sector since government are the main client in the construction industry. This should be followed by a shift towards higher standard of ethical behaviour by actor in the industry. Apparently, the present construction situation is a product of the systems that governs the operations and activities in the construction industry. Majority of the interviewees express that corruption cut across all sector in the construction environment, and practitioner are sometime compelled to compromise in one way or the other. Extract below, from the comment of OM2 illustrates this point;

'It is like a worm in our society. Corruption is got different layers in this country, with regards to construction; there are some that deliberately corrupt the system from the top leadership for personal interest and benefit. For example withholding and circumventing fund that is budgeted for the effective running of government institutions. Others create unnecessary difficulties in getting certain permit to deliver project to encourage you give bribe for them to carry out their duties. We have been force to encourage government officials to do their duties, but what I can tell you is that we will never compromise our professional ethic in the name of bribery and corruption' (OM2).

5.2.3 Company Practices

Results from the empirical research data indicate that the actions of the companies are guided by the following three key factors in the construction system; (1) the perceived construction needs, (2) the nature of the environment in which construction takes place, and (3) the systems and structure of activities in the construction industry. As evidenced from the primary data, quality was identified as one of the main requirement for construction, and the structure and system of activities in the industry also place high emphasis on quality. Thus, the system to a notable large extent support conventional construction practices which focus on quality, cost, and time. All the participants acknowledged that the planning, execution and delivery processes are tailored to address the project needs and requirements. Since quality has been identified as one of the key requirements in the construction industry, it is therefore unsurprising that companies places high priority in achieving the required quality standard. As PM9 point out, '*Sustainability is not a main criterion for selection. We select suppliers and contractors based the quality of their work, their capability to deliver, and cost'*. This point was alluded to by PM8, PM4, PM7, PM5, PE7 and others suggesting quality of work, cost, and ability to deliver on time as the main criteria for the selection, award and execution of projects. The implication of this is that the perceived construction need appear not to stimulate sustainable processes in the operations and activities of actor in the industry.

The present quality movement in the industry could suggest why interviewees' interpreted sustainable construction as quality. The demand for quality, together with the practitioner's perception of sustainable construction as quality delivery suggest why companies' planning

and delivery processes is design to meet the construction quality need. This view echoes in the responses of all the participants, for instance, PM5 remark that; '*sustainability to us mean quality, we emphasis on quality because we believe if we do a good job we will get good recommendations'* This implies that the companies' approach to construction delivery is most likely focused on product quality which is about the short-term perspective of sustainability; however, sustainability is about short and long term implication of construction activities. The systems and structure of activities in the construction industry appear to favour short term delivery, overlooking the significance of the processes leading to the finished product and the long term implication of the construction process and product. It could therefore be argued that the general perception of construction need and the system that govern the various activities in the industry informs how the construction companies plan and deliver projects.

The participants acknowledged that, companies' strategy and processes for project delivery is focused on achieving the contract requirements and conditions. With quality at the top in the hierarchy of requirement, companies' delivery strategy is focused on achieving project quality standard. Evidence from the primary research data suggests sustainability principles are not adequately embedded in the practices of the participating companies. Apart from company A which has Corporate Social Responsibility (CSR) department for dealing with minor social issues, the other companies do not have any specific sustainability strategy. The management team of these companies acknowledged that they do not have sustainability strategy and do not see the need to develop sustainability reporting system to monitor performance. This is based on the notion that the sustainable practices are not included in the condition of the contracts and companies are not required to account for project's sustainability performance. As acknowledged by the participants, companies processes and delivery strategy is driven and guided by the project need and contract conditions. In view of the general perception that sustainability processes is often not explicitly required in construction delivery, the need for companies to developed sustainability strategy for the execution and delivery of projects is undermined. Most of the interviewee alluded to the point that apart from protecting the companies' economic interest, delivery strategy is based on the client specifications and project need. Comments from PD2 below present a more exact representation of the views echoed by the interviewees;

'Well, I will not say there is a plan for sustainability in the company. Particularly with reference to the day to day construction activities, and there is no department that deals with or address the issues of sustainability […], no there is none in the company. But what I can tell you is that, depending on the project, and the details or requirement of the project is provided by the client; in these case consultants from the government, they specify standards and principal requirements. If the client require the project to address sustainability issues such as the economic, social or environmental concerns they will provide us with those details and we would deliver projects based on the client needs or requirement' (PD2)

Companies operations is focused on meeting project specifications and clients need, since sustainability is not explicitly identified among the criteria for the selection of contractors and suppliers, the companies do not see the need to embed sustainable processes in project

delivery. The prevalent views among interviewees suggest that sustainable practices are not included in the contract evaluation and award procedure, neither is it stated in the condition of contract. Rather, factors such as cost, quality of work, experience and capacity to deliver appears to be the main criteria for the selection and awards of projects to contractors and suppliers. The construction environment places priority on these requirements, as a consequence, construction companies' pay less attention towards developing strategies for sustainability their practices. The outcomes of the survey justify this point, as mentioned in section (4.2.1), the results indicate that the participating companies' have low desire to embed socio-environmental values into the current practices. This position was also validated by the interview data; the excerpts below illustrate this point:

'No we don't have any form of sustainability reporting. We don't have it, because the client does not require it or we are not made by the client (Government) to produce it. If the client requires it, it would be done' (PM2).

'Sustainability is not a main criterion for selection. We select suppliers and subcontractors based their capability to deliver, cost and the quality of their product' (PM9)

'My company does not have a plan for sustainability in particular. In our day to day construction activities, issues of sustainability is not often considered and there is no department cut out for this purpose as well' (PM5)

Apart from the absence of corporate sustainability strategy in the construction processes, it appears the contract conditions and system of activities in the industry do not requires companies to account for their actions and behaviour, especially in terms of labour practices and rights/privileges of the workforce. In order words, the structure and system of activities in the industry does not encourage accountability. The primary data suggest companies are not required to account for their action or inaction particularly on issues relating to social and environmental sustainability. The interview data indicates there is high level of inequality in the labour practices of the companies; majority of the interviews echoed the point that, there is a cap on career progression for local professional. The structure of the companies is such that a limit is placed on the extent indigenous profession can excel in the companies. The rationale for this unclear, however, it appears this is the standard practice by majority of the multinational construction companies in Nigeria. The implication of this is that professional in the companies are not likely to demonstrate genuine care and commitment to process improvement, viz-a-viz the companies showing genuine concern about the impact their activities in the environment and society in which they operate. Sustainability is about genuine care in our daily practices for the good of humanity, and the environment while achieve economic gains. With the absence of specific policy framework and or conditions that demands accountability; it is unsurprising that there is high rate of discrimination in the companies' practice. The entire indigenous professional that was interviewed alluded to this point. The remark from OM1 and PM1 below is an excerpts representation of this view:

'Unlike in the advanced country, we do not have gender equality and equal opportunity policies in place; a decision regarding these is largely depended upon personal reasons and benefit. In terms of

*Promotion, local professional cannot advance above certain level because the company is not an indigenous company. However, if you are from their country the situation would be deferent' (*OM1).

'In this country we have the minimum standards for labour practice that is what we keep and try not to go below the minimum. Anything above it is okay for us; we try not to go below the minimum' (PM1).

The extracts above are an illustration of some of the problems associated with inequality in the labour practice of many multinational companies operating in Nigeria. With regards to staff wages, training and development, the interviewees acknowledged that the company's rarely provide training or staff development programmes and there is huge variation in staff wages between the local and foreign staff. The situation is apparent because the system does not require or check certification of practitioner on site, rather emphasis is on ability to deliver required project standard. According, for economic reasons, companies show minimum interest to provide adequate professional training for staff. Several of the interviewees highlighted some of the reasons why many multinational companies are not keen to providing training and skill development programmes for their employees. They attributed this lack of interest to train employees to cost and issues expertise flight' (where recently up-skilled employees find better paid employment elsewhere). This is reflected in the following statement attributed to PM1:

'*The thing is just for economic reasons; sometimes they tell you if you train them now some other companies will take them off you. This is also because of poor wages, if you train some body and the person is now aware of his/her their potential and some other company is offering a better opportunity/pay they are bound to leave'* (PM1)

The participants also made reference to the point that the surrounding business environment in which the company operates significantly impacts the investments decisions and plans of action. While responding to questions on investment evaluation, the participants stated that the companies have preferences for short-term investment, owing to the level of risk and uncertainty associated with the construction environment. Sustainability is about long term investment and impact, however, with evidence from the primary research suggesting that the perceived level of instability in the political domain, and the lack of continuity with changing government, together with the challenge of insecurity and access to funding locally, impact on the companies' behaviour and delivery strategy. The level of support from the financial institution, and the lack of incentives for promoting sustainable practices in the construction system influence the plans and action of company toward the uptake of sustainable practices. These and other factors such as inadequate electricity and delay payments suggest why companies prefer short-term contracts. The implication of this is that, practitioners' perception of the nature of the environment in which they operate affects their decisions and methods of delivery. In describing why companies have preference for short-term investment, the data suggest nature of the circumstances affecting the project significantly influenced a company's decision. This echoes in the views of the research participants, extracts from the comments of PD1 and PM9 below illustrates this point.

'*We are more concerned about short term contracts. There is this need to get returns back as quickly as we can. There are some levels of risks surrounding long term contracts. Political instability and lack of a culture of continuity resulting from changes in government administrations had meant that our investment may not be secured under such conditions'* (PD1)

'We prefer short term investment in order recovery our money on time due the challenge of getting funding locally' (PM9)

Another major factor that has attributed to the behaviour of companies in the construction industry is the lack of adequate implementation and enforcement of regulatory laws. Based on the primary research data, it appears the construction system shows apathy towards creating and implementing sustainability policies. Several studies such as (Pittet al, 2009; Nwokoro and Onukwube, 2011) suggest that penalties and regulations help drive sustainable construction. However, the action of the companies toward the uptake of sustainable practices is connected to the absence of adequate sustainability regulations and improper enforcement procedures in the construction environment. The participants acknowledged that the present structure and system of activities in the construction industry does not promote sustainable construction. Weak policies, inadequate enforcement and implementation of existing regulations contribute to the behaviour of the construction companies. Sustainability is often not included in the contract conditions, neither is it explicitly required in the construction regulatory framework even though some sustainability policies exit. In view of this, companies pay less attention in addressing sustainability concerns expect for their economic interest. All the participants alluded to the view that sustainability related policies and regulations are not implemented and enforced, and they are not required to account for project's sustainability performance. The implication of this is that companies are not motivated to embed sustainability into their daily practices. Many interviewees suggest that more-responsive governance will be required to encourage the uptake of sustainable practices. The excerpt below, from the comments of OM2, PM8 and PM1 represents the views of the participants:

'Government policies and enabling laws to support sustainable construction are not enforced, which give room for professional developers to conduct their practice in ways that does not support the principles of sustainable development.' (OM2)

'In situation where there are no laws that expressly ensure that development should have sustainable outlook in Nigeria, there is no much that we can do as professionals' (PM8)

'For the company, we work according to the rules. On the issue of the environment, the federal ministry of environment is there to regulate issue concerning the environmental impact assessment, environmental rehabilitation plans and all that. But these organizations are passive themselves, very passive. Only recently they are trying to be active, but I still consider them to be passive because they are practically not enforcing anything. Those in authority don't see the need to take enforcement seriously, they believe the country has more than enough natural resources, for this reasons, it gives the company opportunity to practice and do whatever they like' (PM1)

Ineffective enforcement and implementation of existing regulations present opportunity for construction companies to increase economic benefits. The majority of the interviewees expressed the view that inadequate enforcement of environmental policy and the absence

of strong legal frameworks to back such policies in the industry appear to favour purely economic benefits of the construction organisations. The lack provides opportunity to save costs, and disproportionately affects the uptake of sustainable practices. As indicated in the survey findings, companies show minimum desire to change; the unwillingness to change is connected to the opportunities presented for cost savings due to the weak and ineffective enforcement of socio-environmental policies and regulations that promote sustainable construction and the uncertainty with the benefit connected to the uptake of sustainable practices. This view was echoed in the participants' responses, as PM3 put it:

'The construction companies benefit from these poor enforcements and implementation of existing environmental policies by not complying with existing procedures because they want to make more money'. (PM3)

Based on the nature of the environment in which construction activities take place, together with the structure and systems of activities in the construction industry, most of the companies show apathy towards sustainable practices and appear unwilling to improve. The primary research data show that companies did not have a clear desired to improve. The result of the survey indicates there is no significant difference between the actual and the desired situation for social and environmental sustainability, except for economic sustainability with a difference of 4% (See figure 4.1). This significance of this is that the companies are willing to improve processes for achieving economic values, rather than improving processes for achieving socio-environmental values. This is unsurprising because the companies exist to make profits; however, proper enforcement and implementation of regulations that supports sustainable practices will stimulate companies to develop ways to improve socio- environmental values in their practices. This sentiment is also expressed in the following extract:

'In my opinion, the regulatory authorities are ineffective. The standards are there, but in most case they are not implemented. The authority are not really interested to regulate this processes, they believe the country has these resources in excess. To the company it's okay because they are profit oriented, and the more the authority responsible for enforcing environmental issue are not enforcing it, the more money they can make by going around these issues. For instance, natural resources like the aggregates such as sand and stone-base we acquire to do the roads. There are also different body in charge for that, although they are more active, but yet not effective because there is no way of measuring what is taking out of the construction site for use or taking it to other place' (PD2)

Similarly, clients' requirements significantly influence the company's strategy and method of delivery. From the primary data, participants acknowledged that project design, specification and a specific client's requirements guides the actions of the company. In view of the structure and nature of the construction systems in Nigeria, sustainable practices are often not included in the project brief. The government, which doubles as the main construction client and the regulatory authority, does not explicitly demand sustainable practices. The behaviour could be connected to the perception that the Nigeria has abundant natural resources, in addition to the urgency to meet the development needs due to the added time dimension of taking sustainability into account. Accordingly, this perception might contribute to the lack of commitment to develop and effectively

implement existing regulations that support sustainable construction. This point is echoed in the responses of the majority of the participants, for instance, PM1 and OM1 remarked that;

'For the company, we work according to the rules. On the issue of the environment, the federal ministry of environment is there to regulate issue concerning the environmental impact assessment, environmental rehabilitation plans and all that. But these organizations are passive themselves, very passive. Only recently they are trying to be active, but I still consider them to be passive because they are practically not enforcing anything. Those in authority don't see the need to take enforcement seriously, they believe the country has more than enough natural resources, for this reasons, it gives the company room to practice and do whatever they like' (PM1)

'We try as much as possible to implement our project in line with the specifications of our clients and in most cases they determine what we do. Our main client is the government, and they specify standards and principal requirement. If the client require the project to address sustainability concerns we try as much as possible to execute the project according to their needs' (OM1).

Participants acknowledged that projects are designed to meet clients' needs and are approved by the planning/regulatory authority based on the standards of the construction system. As noted by the interviewees, sustainable construction is not a usual practice; this suggests that the systems and structures in the industry are configured in a way that sustainability is not expressly included in the code of practice. From the primary data, most of the variables identified that could adversely affect the uptake of sustainable construction were connected to factors relating to the business environment of the construction industry. This situation can be linked to the values the system attaches to sustainable construction, which directly or indirectly affects the action of practitioners and actors in the industry. Figure 7 below presents the nature of construction business environment and its impact on companies' practices.

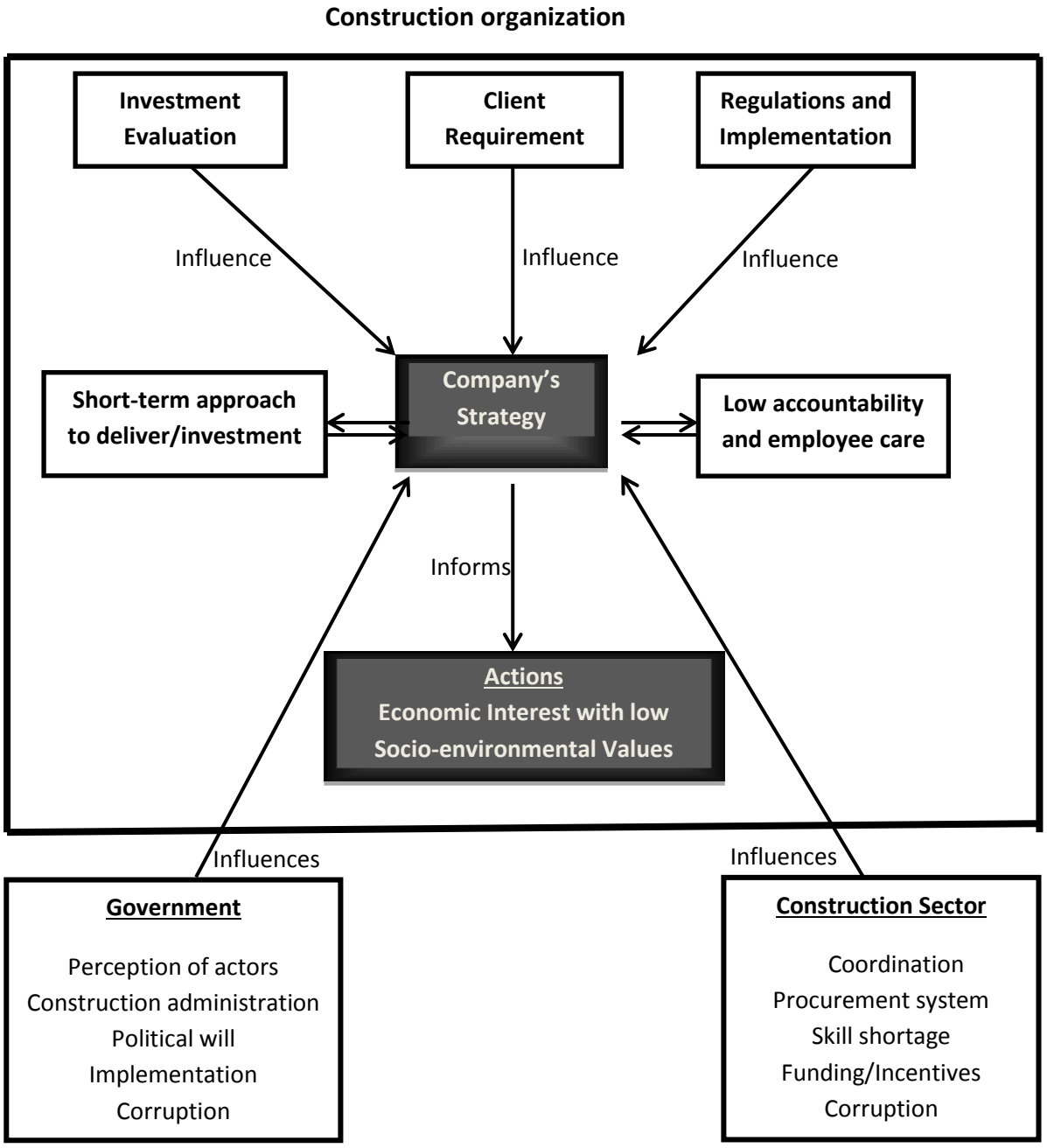


Figure 7: Impact of construction environment on companies' practices

As shown in the above diagram, the primary data indicates the company's practices and delivery strategy is stimulated by a number of factors within the business environment of the construction industry. These factors can be broadly classified under the following headings:

1. Project brief and client requirements
2. The company's investment evaluation
3. Regulation and enforcement of sustainability policies and legislations
4. Government action or inactions

5. Structure of the construction sector.

In evaluation of the company's investment decisions, the issues of insecurity, political instability and lack of continuity with changing government, together with the absence of funding and incentives to promote sustainable practices, are amongst the common features in the construction industry. These factors influence a company's strategy, thus, most of the companies show preference for short-term investment. Similarly, the project brief and client requirements were also identified as a key variable that guides a company's actions. Under this classification, factors relating to project design and specification, and issues associated with the condition of contracts and client requirement were reviewed in the present study. As stated in the previous paragraph, these factors were considered crucial in shaping the company's plan of action. However, within Nigeria's construction environment, sustainable practices are often not included in the client briefs and contractual conditions. With regards to regulations, the absence of proper enforcement and implementation of regulation and policies that support sustainable construction negatively impact on companies attitudes towards the uptake of sustainable practices. As stated in section 4.3.3 and 4.3.4, the findings suggest that lack of adequate regulation/implementation is connected to the absence of functional and effective institution in the industry; this situation is linked to lack of institutional empowerment, and the absence of continuous education, research and training in the system.

Together with the above, the perception of key actors in the industry, the system of construction administration, and the lack of political will by the government to support sustainable practices, creates additional layers of complexity. In addition to this, the challenges of proper coordination of activities within the sector and the level of corruption in the construction industry further complicate the situation. All these factors affect the strategy and action of the companies, and since companies exist to make profit, their methods and delivery strategy is focused on gaining economic values with low interest on sustainability. The peculiarity of the construction environment and the nature of the existing system significantly influence the company's practices. The following sections examine some sustainable construction opportunities inherent of the present practices.

5.3 Drivers of Construction Practices in Nigeria

Information from the primary research data suggests that, the environment in which construction activities take place in Nigeria consists of systems and structures which do not support sustainable construction practices. Previous research identified financial incentives, and building and construction regulations as the two key drivers of sustainable construction (Pitt et al, 2009). Through financial incentives, stakeholders can demand sustainable construction, and with effective regulation, sustainable practices could be implemented, however, these variables are not evidenced in the current system. As discussed in the previous sections, weak regulations, enforcement and lack of proper coordination in the construction industry, in addition to absence of active and functional institution to develop and implement sustainability initiative was echoed by the interviewees. Together with this, lack of political will and commitment on the part of the government and the challenges of

corruption amongst key stakeholders and actors were identified amongst the barriers to sustainable construction practices.

However, the apparent quality movement in the system appears to significantly impact on the activities of actors in the construction industry. Participants reported that in spite of the challenges of regulation enforcement, and corruption in the system, the companies do not compromise on quality. From the research evidence, it appears the company's commitment to quality delivery is for economic reasons; the system favours a high-quality end product which provides a competitive advantage for the company. As PM5 pointed out,

'*We emphasis on quality, because we believe if we do a good job we will get good recommendations'* (PM5).

With quality being a dominant force in the system, the companies and practitioners appear to place high value on quality and economic benefits. The primary research data suggest quality and economic value are the main factors that drive construction practices in the industry. All the participants acknowledged that economic interest and quality stand as priority factors to the companies; these factors appear to significantly impact project delivery processes. Since companies exist to make a profit, it is unsurprising that the focus is on economic benefits is connected to quality management systems that focus excessively on product quality and not the process. However, it also stimulates adoption of processes that support sustainable construction. The quality movement and economic value drivers present an opportunity for sustainable practices, by exploring the sustainability potentials inherent in the economic-led quality control and management processes. The following sections will examine the economic-led practices and quality management processes in the system that support sustainability, with the view to identify opportunity for sustainable construction practices.

5.3.1 Economic Drivers with Low Commitment to Sustainability

From the survey results (see figure 4) the performance of economic sustainability has the highest score when compared to the environmental and social sustainability. This result was further validated from the interview of the senior management team of the companies and regulatory agency. As the entire set of respondents acknowledged that though the quality of work is not compromised, the underpinning factor influencing the strategy and operations is the company's economic interests. In terms of how the company's economic interest supports sustainable construction, health and safety concerns in the construction system present a good example to illustrate this point. Findings from this research indicate that health and safety issues are not adequately considered, there are no unified standards across the industry, and health and safety issues are not enforced in the construction industry. OM1 stated that,

'One of the biggest challenges to implementing health and safety issues in Nigeria is that there is no existing government policy or active institutions that promote and enforces compliance to safety issues' (OM1).

PM5 also pointed out that;

'There is no standard for health and safety, and companies are no regulated so company spends less for health and safety issues' and '*there are little checks or control mechanisms by government institution hence companies do what they deemed fit'* (PM5).

The majority of the respondents echoed that lack of health and safety (H&S) regulations and enforcement in the construction industry has not encouraged companies to see the need to address safety concerns. As PD1 put it,

'Health and safety concerns in construction sector is only recently being advocated, it has been overlooked over the years in this country. Unlike in the developed world countries where this issue is taken more seriously, people are not really concern about it' (PD1).

Based on the inadequate policies and enforcement of H&S regulations, the standard practice amongst companies is to pay compensation in cases of accident. However, due to the rising cost of accident compensation as a result of frequent site accidents, the companies have had to improve their safety standards and implement safety regulations internally, rather than paying accident compensation. The excerpt from PM1 illustrated this,

'*There are effort recently to develop and enforce safety rules within the company due to high rate of accident and it costing us much to pay compensation'* (PM1)

In spite of the absence of proper and effective safety requirement in the system in which a company operates, in an attempt to protect the company's economic interest due to high cost of accident compensation, companies are compelled to improve and enforces health and safety practice internally based on the notion that it is more cost effective to implement safety regulations, and this action actively encourages sustainable construction.

With regards to waste management, the primary research data suggest that cost saving is the key driver for waste reduction and management practices. As OM1 put it

'*We reduce waste and use of natural resources in ways that is beneficial to the company, especially to reduce cost* (OM1)

Although waste reduction and recycling is an importance element of sustainable construction as this practices support resource conservation, it appears the contracting and contract administrative practices in the system do not explicitly include factors relating to management of industrial plants and materials to promote resource conservation and waste reduction. The response of the interviewees alluded to this view, for example, RO4 responded to question on material usage and waste reduction:

'*To begin with, they don't waste energy because somebody is paying for it. If they use energy that is not needed nobody pays for it'* (RO4)

This suggests the cost implication encourages waste reduction and recycling. Also, PM5 expressed that

'Projects promote smart use of natural resource for the company's interest. It's an avenue for reducing cost (PM5)

As echoed by majority of the respondent, economic interest significantly influences the companies' behaviour towards the uptake of practices that support sustainable construction. PM9 also pointed out that,

'We also try to as much as possible to reuse any excess to save cost' (PM9)

The companies were motivated to reduce waste, minimize resource usage, and implement recycling practices for economic reasons. According to PM1,

'*Presently we are not under check from anybody we have to check ourselves because it affects our income. So we ensure that waste is minimized by making sure that every segment of the construction works according to plan. On site we have instruments and do measurement to ensure waste is reduced to its barest minimum mainly for the company's benefits'* (PM1)

The significance of this is that, although economic interest appears to be propelling force for companies' action towards waste reduction and recycling, increasing the inherent socio-environmental values contained in the present economic benefit-led waste management and resource conservation processes present opportunities for sustainable construction.

Similarly, the same sentiment is shared in dealing with issues relating to community engagement. The participants acknowledge that corporate economic benefits are the underpinning factors that motivate the companies to engage with the local community. The current system in the construction industry does not expressly promote community engagement and companies seldom engage with the community in which the project is located. The views expressed by OM1, PM2 and PM5 suggest that community engagement is not a standard practice; the usual practice amongst the companies during project execution is ensuring minimum engagement with the local community. If engaging with the project community does not benefit the company they hardly involve local communities in projects. However, in cases in which engaging with the local community protects the company's economic interest, community engagement is embedded in the project delivery practice. PM2 pointed out that: *'Normally, community engagement is not our standard practice; if the company will not benefit from it they won't do it.'* (PM2)

For example, companies seek community engagement in projects where the natural resources, such as granite rock and fine-quality laterite, which are important raw materials for road construction, are protected by members of that community. Where the construction companies engage with the local community, they try as much as possible to integrate and address needs of the community within the scope of the project in exchange for the opportunity to extract the raw materials they need. In some situations, the contracting companies employ workers from the local community to avoid disruption. In addition to the benefits of material extraction, by engaging workers from the local community, the cost and level of pollution associated with transporting workers from outside the community is reduced. If companies include local community engagement as standard practice, it provides a platform for a win-win situation for the companies and the local community, and presents an opportunity for sustainable practices without disproportionately affecting the company's economic values.

On the other hand, if the company have unrestricted access to natural resources in the community in which they operate, they extract indiscriminately, degrade the environment and the simply move on to the next project without taking any corrective action. Taking advantage of the inadequate and ineffective environmental rehabilitation policies and implementation is apparent in the system. This raises the issue of the influence of the civil society and Non-Governmental Organizations to promote sustainability, however, based on the knowledge and level of awareness of the importance of sustainable construction, the local community and the civil society appear uninterested in sustainable construction concerns. The responses from the interviewees suggest that there is no strong opposition or active civil society group in Nigeria's construction environment that actively promotes sustainable practices. This point echoed in the views expressed by OM1:

'the company doesn't engage with the local community. It is expected that the client determines the need of the society and include this in project design and once approved the company implement in line with project specifications' (OM1)

The influence of the civil society group on activities of the government and construction companies is minimal in the construction industry. The role of the civil society as an agent of change towards sustainable construction practices has been identified in various articles in the literature (Adger, 2010; Fowler and Unies, 2000). However, the actions or inactions by the local community are based on the understanding and perception of construction needs. With good awareness of the importance of sustainable construction practices, particularly from the viewpoint of the benefits, local communities and civil society would take actions to influence the uptake of sustainable practices in the construction industry.

5.3.2 Quality Control and Management Standards

As acknowledged by the entire group of respondents, quality was identified as the key factor for the award, execution and delivery of projects. The concept of quality is also echoed in the participants' definition and interpretation of sustainable construction. All interviewees acknowledged that quality is the main criteria in project execution and delivery. For example, PM4 pointed out that,

'*The most important factors for now are quality of their work and availability and finance'* (PM4).

The thinking is shaped by the pattern of operation in the construction industry. The construction paradigm places emphasis on quality. 'Paradigm' in this context refers to the shared values, concepts and practices of a society or community as shaped by their particular view of the world that they hold (Wilber 2000a, p.282). As indicated in the primary research data, the paradigm from which the present system arises appears to support quality and these impacts on different elements in the construction system. With regards to material selection, PM2 expressed that

'*Materials are selected based on the cost and purpose'.* However, *'focus is more about quality to meet and achieve design requirements not really about sustainability consideration'* (PM2).

Similarly, demand for quality delivery by the client (typically the Government) also impacts the operations and actions of the construction companies. This is reflected in the statement by PE7,

'We are much more concerned about getting the required quality than the environmental impact' (PE7).

In relation to the selection of sub-contractor and the company's supply chain, PM9 stated that

'*Sustainability is not a main criterion for selection. We select suppliers and subcontractors based their capability to deliver, cost and the quality of their product'* (PM9).

Thus, quality echoes in every aspect of the construction process.

The primary research data suggest that the construction *procurement system* also places high value on quality. Previous research revealed that the persistent collapse of buildings and infrastructural projects and the high rate of abandoned projects resulting from poor quality practices has been a major concern in the construction sector (Aibinu and Odeyinka *,* 2006; Nwokoro and Onukwube*,* 2011)). In addition to this, the impact on the people, the environment and the cost implication for reconstruction have necessitated the current quality movement in the construction industry. Accordingly, quality appears to top the requirement in contract condition and has become a key criteria for contact award; this view is echoed in the comments of all participants. For example PE7 expressed that,

'We are much more concerned about getting the required quality than the environmental impact' (PE7)

In view of the need for high quality standard in projects execution and delivery, companies proactively adapt and improve their practices to meet the desired quality requirements. This view is exemplified in the statement accredited to PM7:

'In our building projects it is always very difficult to find good furnishing materials and we have been forced to set up a furnishing factory as a result of this. This furnishing factory has been set up to ensure that the quality of furnishing meet our required standard. We get the best quality materials; process them to a very high standard before sending them to site' (PM7)

Although immerse value is put on quality in the system, the research findings indicate that companies' quality management processes and control measures appear to focus on product quality *due to the competitive advantage* associated with the construction output. The economic benefit connected to quality output appears to motivate a company's action, thus, less attention is on the quality elements inherent in the *processes* leading to product quality. However, the quality movement in the industry presents opportunity to extend the apparent product quality-management practices to embrace total quality management through the inclusion of socio-environmental values inherent in the product quality-management practices. Figure 8 below shows the companies' economic-led quality management system with specific focus on management responsibility towards construction product quality.

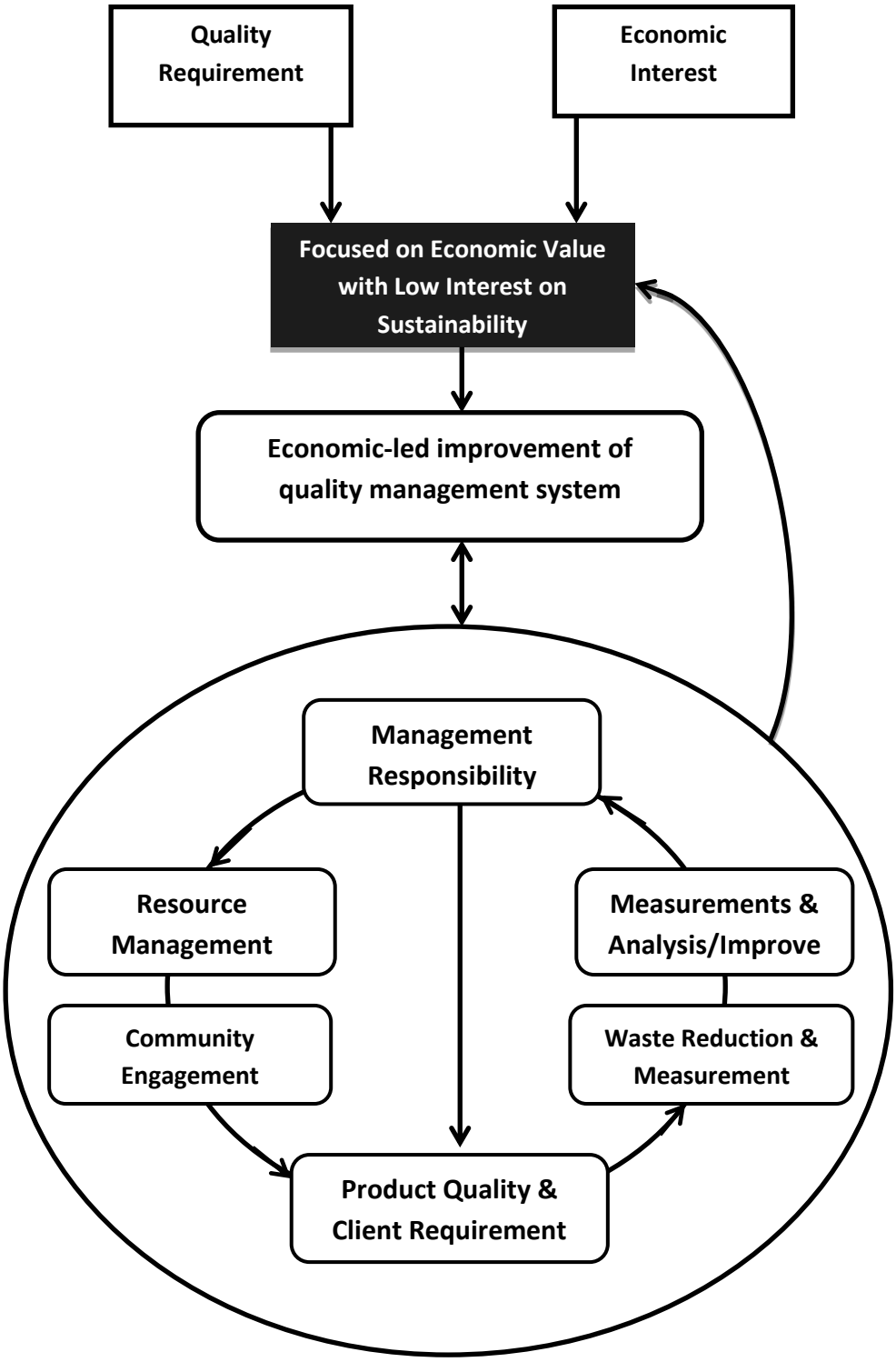


Figure 8: Product quality management system

The pursuit of quality in the management and delivery of projects appears to be an important aspect of companies' practices, not only because it is a major criterion for the award and delivery of projects, but also because of the notion that government (which is the main client) ensures companies have the capacity to deliver the required quality standards through the contract and administrative mechanisms. Quality assurance and

management requirement appear to be taken seriously in the award of contracts and delivery of projects; this was evidenced in the comment by PM1

'We take all we do with all seriousness, because if it falls we have to be responsible for the cost of reinstating it. Sustainability to us is about quality, so we have to work towards our goals to make sure that everything works according to plan'. (PM1)

Quality control activities adopted by companies involve good leadership, continuous monitoring and follow-up by the senior management team to ensure the required quality standard is achieved. Members of the senior management teams appear to understand the rationale for these processes without adequately training and clearly communicating their philosophy to the junior and casual workers. In order words, the companies' leadership appears to have been responsive to managing the operations of the construction processes to attain the quality standard from the standpoint of the economic value connected to the product quality. However, there is little attention toward increasing the socio-environmental value associated with these processes. This will be reviewed in greater details in chapter 6.

5.4 Summary

Through a systemic view, a narrative of the current situation has been presented above. Based on the primary research data, this chapter explored the governance environment in which construction activities take place. In doing this, it utilized a system approach to examine the interactions and interconnectedness of the different parts of the construction system and its impact on a company's behaviour. It identified the factors that influence actions of actors within the system. First, participants' knowledge and understanding of sustainable construction were identified, which provided insight into how the current construction system was created. Their understanding is connected to the level of awareness and interpretation of sustainable construction and this informs the policies and practices that drive the operations of the various actors in the system. In examining the factors that shape activities of the different aspect of the system, factors relating to the values and perception of construction needs significantly have an impact on the operations and structure of activities in the construction sector, government, and a company's practices. Based on the understanding and perception of construction needs, it appears the system and structure of activities in the construction sector, and the actions of the government does not promote sustainable practices.

As acknowledged by the research participants, inadequate empowerment of supporting institutions responsible for creating, promoting and ensuring compliance with existing regulations was connected to lack of government commitment. These and other factors such as inadequate training, skills and funding to support sustainable construction were identified among the barriers to sustainable construction, which affects the ability of these institutions to implement and enforce sustainability laws and regulations. Furthermore, improper coordination and fragmentation of activities in the construction sector presents additional challenge to implementing existing sustainability initiatives and a sustainable development programme. Together with the above, the level of corruption, insecurity in the system, in addition to the dominant procurement practices that involve separation of the

design team from the contractor makes it difficult to integrate sustainability principles at the design stage and shows the level of complexity to embed sustainable processes in the system. Participants went on to determine that the uptake of sustainable practices is connected to the requirement of the client and implementation of regulatory policies and contract conditions. The primary research data revealed that government (which is the major construction client) does not expressly require sustainable practices in the award of contract for, or execution and delivery of, construction projects. Therefore, a company's strategy and delivery practices are focused on economic values with little interest in addressing sustainable construction concerns. Companies and contractors are not required to report or account for their sustainability performance.

Despite the prevalence of the factors mentioned above which appears not to support sustainable practices in the construction system, quality and economic values were identified as the key drivers in the construction practices. They significantly affect and direct the priorities and operations of construction companies. This presents opportunity for sustainability, if socio-environmental values embedded in the processes leading to product quality are scrutinized. Redefining the quality requirements to embrace socio-environmental performance in quality control and management processes will create a value shift from product quality to total quality management, and sustainability is directly linked to total quality management. The primary research data indicate that companies are likely to embed sustainability processes only if it provides economic benefits. From the findings, waste reduction and community engagement practices were embedded in the delivery strategy only when it provided economic value to the company. The motive for adopting these practices is largely economic rather than for socio-environmental reasons. However, exploring the sustainability potential inherent in the present quality requirements, without disproportionately affecting the company's economic interest, presents an opportunity to embrace sustainable construction. Clients' demand for quality influences the strategy and action of companies. It opens up opportunity to change the thinking from which the present system operates by examining quality from the both the process and product perspective. Quality management involves a genuine concern for the impact and consequences of the construction activities.

Chapter 6

6 Barriers and Opportunity for Sustainable Practices

6.1 Introduction

As described in the previous chapter, the primary research provided data on the current practices of companies investigated, and factors influencing their actions and behaviour. The operations of these companies are a reflection of the complex and dynamic nature of the Nigerian construction system. Further inquiries into companies' construction processes provided more insights into the complexities of embedding sustainability into the practices of the companies in Nigeria. As evidenced from the primary research data, sustainable practice is at the bottom of the hierarchy in the list of requirements for construction; this appears to have significantly shaped the thinking of actors in the construction industry, and, by extension, their actions. An examination of the construction systems and the interconnectedness of the activities of the key stakeholders in the construction industry, such as the companies, the government (who is the main client) and regulatory institutions, suggest actors in the construction industry place low value on sustainable construction. Accordingly, construction organizations show apathy towards developing capacity to create and implement policies and regulations that support sustainable construction. The response from the management teams of construction companies, clients and the regulatory institutions as to the reason for the current situation was useful in identifying the barriers, and opportunity to introduce change towards sustainable practices.

Information relating to the barriers and opportunity for sustainable practices has been developed into themes that are crucial to review in order to understand how companies can initiate change towards sustainable construction practices within the Nigerian context. The themes developed for the barriers and opportunity for sustainable construction together provide broad insight into the present construction practices in Nigeria, which goes beyond what is contained within literature. The themes are based on the relationships between the different parts of the construction system, which were summarised using the research data, both the survey and interviews, and they present the key issues to sustainable construction for companies operating in Nigeria. A close examination of these themes shows the priority, interest and conflict that arise in embedding sustainable construction practice in the stakeholders groups (companies, client/government, and regulatory institutions) that were investigated.

Overall, this chapter discusses the findings and analysis obtained from the two stages of the primary research. It describes how the primary research complements information obtained from literature, and examines the factors that hinder sustainable practices and the inherent opportunities in the current practices to embed sustainability principles into construction processes of companies in Nigeria. Section 6.1 provides the introduction for this chapter, while section 6.2 discusses the barriers to embedding sustainable practices. Section 6.3 explores the opportunity for change. Section 6.4 provides a summary of this chapter.

6.2 Barriers to Sustainable Construction Practices

The survey report provides detailed information on company's sustainability performance and the extent to which the three main tenets of sustainability are considered (economic, social and environmental). The findings indicate there is low consideration of environmental and social sustainability, compared to the economic perspective. Also, the interview data

provided information on how construction activities are conducted, particularly as to how it relates to the construction system and the governance environment in which construction take places, and how it affects the behaviour of companies in the construction industry. Based on the research data, themes for sustainable construction barriers were derived, these includes companies' perception of construction delivery, stakeholders' commitment to sustainability, capacity and expertise to deal with sustainable construction issues, and the challenges of regulations and implementation. This is consistent with the literature reviewed in chapter 2, section 2.5. which provided information on the barriers and challenges of sustainable construction in Nigeria and most developing countries (Ebohon et al, 2002; Dania et al, 2013) indicating these problems still exist. Du Plessis, (2007) points out that developmental priority and the cultural context in which building and construction takes place in most sub Saharan-African countries informs the perception of construction and project delivery. The main development challenges of poverty, rapid urbanization, capacity building, weak institutions and regulations, appears to hinder the uptake of sustainable construction practices (see also, Ofori 2007; Nwokoro & Onukwube, 2011). The following sections discuss the barriers to sustainable construction in Nigeria.

6.2.1 Perception of Construction Delivery

As evidenced from the primary research data, the awareness of sustainable construction in the companies is low. Many of the participants seem unfamiliar with the term 'sustainable construction'. It is however unclear as to whether they are unfamiliar with term 'sustainable construction' or if the concept of sustainability in construction is new to most of the participants. The data indicate that the understanding of sustainable construction appears vague to majority of the respondents, this closely mirrors sustainable construction obstacle Du Plessis (2005) and Dahiru et al (2014) identified within Nigeria and the developing countries context (see chapter 2, section 2.5). Extracts from the participant interviewees highlight remarks of some of the project managers when asked about their understanding of sustainable construction:

'In this part of the world we are yet to really understand what sustainable construction is all about […] we still adopt the traditional method and that is how we deliver our projects' (PM1)

'Sustainable construction, emm […] emm […] how do you mean sustainable construction, can you please explain what you mean by sustainable construction' (PE1)

In defining 'sustainable construction', participants familiar with the concept directly relate sustainable construction to quality. Their interpretation appears not to reflect the goals of sustainable construction. As stated in chapter 2, section 2.3 in the literature review, the concept of sustainable construction is complex and broad, with differing interpretations and methods of application (Carew and Mitchell, 2007). The principles of sustainability according to the International Council for Research and Innovation in Building and Construction (CIB, 2004, 2010) provide a guide to interpret the concept of sustainable construction. Participant's interpretation of sustainable construction as stated in the excerpts below, especially in the views from members of the senior management teams of the construction companies, regulatory institutions and clients, suggesting sustainability means quality, falls short of the vision of sustainable construction. For example PM5 stated:

*'Sustainability to us means quality. We do the job in such way that it's a point of reference for us to get another job. In that regards I could say my company is high on providing quality jobs which are point of reference for more jobs. In as much they would want to make profit, we try not to allow profit making overshadow or supersedes the aim of the project, particularly to protect the company's reputation' (*PM5)

The above interpretation suggests that, sustainability is about quality and delivery. Though quality is an aspect of sustainability, the interpretation is however incomplete; the concept of sustainable construction transcends quality. It involves responsible creation and management of a healthy built environment which includes accountability, efficient use of resources, project life cycle analysis, ethics and values. (Silvius et al, 2012; Du Plessis, 2007). From the empirical data, it appears this understanding and interpretation of sustainability in construction informs the present system that guides the operation of companies and practitioners in the industry. Pitt et al (2009) point out that unless construction professionals are aware and understand what the concept of sustainability and what its associated issues entails, they are not able to adopt sustainable construction practices. Parkin, (2000) in support of this view, stated that construction stakeholders and practitioners need to understand sustainable construction sufficiently so that their corporate and individual actions and decisions that might affect the actions of others, contribute positively to the sustainable development agenda. This is crucial if sustainable practices are to be adopted over and above the requirement of building regulations and contract/ project conditions.

Key stakeholders in the construction sector, especially the companies, client and regulatory organizations may need to renew their thinking and perception of construction delivery to further embrace sustainable processes, which includes consideration of the long -term implication of construction activities. Authors such as Akadiri et al (2012), Garies et al (2013) and Baredi (2013) stated that sustainable construction practices concern the long and short-term goals of development, which involves implementing construction activities in ways that promote less harm to the environment, and promote economic value and human and social equity. The empirical data gathered for this research indicates that the construction system focuses on product quality and delivery, and this approach does not sufficiently embrace long-term perspectives to sustainable development. The systems and structure of activities in the construction industry appear to support product quality and timely delivery, this approach seems to overlook the long-term significance and impact of the processes involved. However, one of the ways to embrace the long-term perspective of construction is to focus on the quality requirement inherent in the processes leading to the product quality. This could be achieved if the requirements of the construction systems and conditions of contract include factors that require both the construction processes and product activities to embrace both the short-and-long term perspectives. It will positively influence the company's behaviour towards the path of sustainability and the overall goals of sustainable development. In order words, adjusting the construction requirement to include conditions relating to the short-and-long term implications of construction activities will help renew the perception of construction delivery. Companies will likely begin to evaluate the impact of the construction process and products, and their significance to sustainable development

for both the short- and long-term perspectives. In view of the stakeholders' perceptions, the need for sustainability in construction practice is undermined.

Many of the themes identified link to the stakeholders' perception of construction delivery as one of the main factor influencing the behaviour and actions of the construction organization. The majority of the project manager reported that embedding sustainability principles in the companies project management processes is not a priority, based on the notion that sustainable practices is not a requirement for project delivery. Project clients and regulatory institutions do not explicitly ask for sustainable construction processes, this could be connected to the development need and their knowledge and understanding of sustainable construction. The absence of sustainability requirements in the client brief, procurement system, and in construction contract conditions and administration, accounts for the low uptake of sustainable practices by the companies and the overall low sustainability performance in the industry. Adidin and Pasquire (2005) identify the construction clients as the key stakeholders to sustainable development. The importance of the construction clients for the uptake of sustainable construction has been put forward in several literatures. Authors such as Pitt et al (2009) and Michelle et al (2014) point out that construction client play a major role towards sustainable construction uptake, as contractors tend to focus on meeting the client's requirements. Client perception of construction delivery is particularly important as clients are the principal stakeholders that determine the actions of companies or contractors they engage. This was clearly evidenced from the primary research data, as some of the participants, such as OM1, PM2 and PD1 remarked that client requirements influenced how companies plan and deliver projects:

'We try as much as possible to implement our project in line with the specifications of our clients and in most cases they determine what we do. Our main client is the government, and they specify standards and principal requirement. If the client require the project to address sustainability concerns we try as much as possible to execute the project according to their needs' (OM1)

'We do what the client requires us to do, and our job is based on the standards set by the government or the client and in most case we exceed that standard' (PD1)

'No we don't have any form of sustainability reporting. We don't have it, because the client does not require it or we are not made by the client (Government) to produce it. If the client requires it, it would be done' (PM2)

The government is the main client in Nigeria's construction industry, according to Dania et al (2013) over 80% of construction project contracts are awarded to companies by the government, and the resultant products owned by them. The huge government construction and infrastructural development programme provides an opportunity to demand and drive sustainable practices, however this appear not to be the case, partly due to the level of awareness and understanding of the importance of sustainable construction, and the consequences of non-sustainable practices. Changing the thinking from which the present system arises becomes vital. Adequate information and understanding of the importance and benefits of sustainable construction would help to renew the perception of the clients, who are key actors in the industry. Information of the importance of sustainable practice through the lenses of its benefit will stimulate client's demand for sustainable

construction processes in the contract conditions. By renewing the clients' views of construction delivery, sustainability could become a major criterion for procurement and award of contracts. Abidin (2010) mentioned that the catalysts for a shift towards sustainability practices are awareness and knowledge, followed by interest and demand. By educating stakeholders on the importance and benefit of sustainable construction, it will encourage demand for sustainable practices. This tie in with the assertion by Pitt et al (2009) that education of the clients will raise awareness and increase demand for sustainable construction practices. Provision of adequate information to construction clients is important to help shape their thinking and possibly create the desire to demand sustainable processes in construction project delivery.

Abidin (2010) argued that the pace of actions towards sustainable application depends on the level of knowledge and understanding of stakeholders. More effort to educate and create the need for sustainable practices amongst stakeholders would help to improve the momentum for sustainability in the industry. Actions should be directed towards improving this knowledge at all levels. Education institutions have a significant role to play, indeed studies have revealed that a sustainable development agenda and construction education are inextricably linked (Barth et al, 2007; Hayles and Holsdworth, 2008; Ekundayo et al, 2011; Brennan and Cotgrave, 2014). Several studies have expressed the need for international organizations, sustainability experts and educational institutions (higher education research and development) to work in collaboration to drive the sustainability agenda. Sustainability education and the provision of adequate information to all stakeholders, in particular, the Government (which is the main client in this case) and the construction companies is important to further propel the construction system toward the path of sustainability. Gough and Scott (2007) suggest that research and teaching institutions need to generate and transfer relevant knowledge to change the thinking of practitioners to address regional a nd local situations, as well as educate future decision-makers to enable them contribute to a more sustainable future.

6.2.2 Stakeholders Values and Commitment to Sustainability

The participants identified low commitment and lack of political will to drive the sustainability agenda as a major barrier to sustainable practices. The data indicate that this situation is linked to the nature of the systems and structure of activities in the industry, which do not appear to embrace sustainable construction. The actions or inaction of the key actors towards the application of sustainability principles do not seem to encourage or motivate companies and construction practitioners to embed sustainability in their practices. Tan et al (2011), point out that commitment of efforts and resources from companies and contractors to meet sustainable construction needs is motivated by the influence exerted from stakeholder demands, construction systems and regulations. The data suggests less attention is on sustainable practices due to nature of the construction systems, the business environment and the absence of political will by government to support sustainable construction processes. The significance of this is that, companies are less likely to embed sustainability in their practices without any form of motivation. Aniekwu, (1995, 2006) and Pitt et al (2009) point out that the environment in which industry transactions are carried out consist of both tangible and intangible systems which

affect the relations, actions and interactions of all the participants in the industry. The actions of the companies are tied to their experience of the structure of the surrounding systems and the nature of the environment within which they operate. As mentioned in sub-section (6.2.1) above, the government, which is the main client in the construction industry and the key stakeholder to sustainable development, does not demand sustainable practice. Subsequently, sustainability is not expressly included or required in the regulations and procurement systems, and in the award and execution of projects. As a consequence, companies are not required to account for sustainability performance in project operations and delivery. Excerpts below from the primary data echoed these views;

'The general lack of interest by the authorities to pursue sustainable practices is a major problem' (PE7)

'Government should be willing to encourage and enforce sustainable practices. Presently, the desire to make this happen is weak or not high up in the agenda' (PM9)

'Issues of sustainability are not taken too seriously here when you compare it to the appropriated standards. Events on site suggest which strategy we adopt and communicate this with worker as necessary' (PM3)

'We do not have specific sustainability strategy in place neither are we aiming at specific sustainability target. However, what I can tell you is that, the corporate social responsibility department handle sustainability issues, particularly those that had to do with people we interact with within our construction daily activities' (PE7)

In view of the above, construction organizations do not see the need to develop and incorporate sustainable practices into their corporate strategy. As noted in several articles in the literature, organizational strategy and plans of action significantly influence how projects are managed and delivered. Azapagic, (2003); Keeys (2012) and Lange (2013) argued that construction company contributions to sustainability are directly influenced by an organization's corporate strategy. The absence of a specific sustainability strategy is an indication of the company's level of commitment to sustainable practices, and this could be connected to the general perception of the construction needs and requirements in the industry. Overall, it could be argued that absence of a specific sustainability strategy, and corporate support for sustainability, is connected to the lack of accountability for projects socio-environmental performance, a situation tied to the perception and level of commitment of the stakeholders. Labuschagne et al (2005) and Garies et al (2011) express that corporate support for sustainability significantly influences how sustainability principles are addressed.

The absence of corporate strategy and commitment to sustainability practices could be connected to the values of actors in the system and the peculiarity of the surrounding environment within which construction organizations operate. Ebohon and Rwelamila (2000), and Adebayo (2002) point out that the enormity of the construction and infrastructural need in sub-Saharan Africa, and the challenges of meeting development needs, may contribute to the level of commitment to sustainability demonstrated by the key stakeholders in Nigeria and most developing countries. Du Plessis (2005), in support of this, suggested that in Africa, there is often confusion between developmental interventions and interventions that need to follow the principles of sustainable development due to the huge

level of underdevelopment and the various construction challenges. Consequently, the construction requirements and system of activities in the industry focused on delivery to meet specific building and infrastructural needs in order to reduce development pressure. This approach gives less preference to sustainable processes, and the long-term implications of construction. This point was echoed in in the views of the participants.

'Well, I will not say there is a plan for sustainability in the company, particularly with reference to the day to day construction activities, and there is no department that deals with or address the issues of sustainability [...], no there is none in the company. But what I can tell you is that, depending on the project, and the way things are in the country, the details or requirement of the project is provided by the client, and in this case consultants from the Government. They specify standards and principal requirements. If the client require the project to address sustainability issues such as the economic, social or environmental concerns they will provide us with those details and we would deliver projects based on the client needs or requirement' (PM1)

The enormity of construction and infrastructural needs in Nigeria and most West African countries, appears to overshadow the need to follow a sustainable development path. The need to account for sustainability performance in construction development projects seems to be at the lowest in the list of priorities. As indicated in the empirical data from this study, construction companies show more interest in economic performance and in addressing development needs through timely delivery, and are rather less concerned with embedding sustainable processes in construction operations and delivery. This is an indication of the value system that drives the activities of the companies and the construction industry. Du Plessis (2007) points out that construction professionals and other stakeholders in sub-Sahara Africa perceive some level of unfairness with regards to meeting their needs with the emergence of sustainable construction initiatives, based on the notion that the developed countries were responsible for introducing unsustainable practices to meet their construction and development needs during the post-independence and pre-sustainability era (see also Adebayo et al, 2002).

Stakeholders' behaviour and commitment towards sustainable practices is also linked to their understanding of the importance and benefit of sustainable construction. Companies appear to show less commitment towards sustainable processes because they are unsure of the benefits associated with following the path of sustainability, together with the fact that they are not made to account for projects' sustainability performance. Shackly and Deanwood (2002) stated that stakeholders' interest in sustainability and their ability to respond through adaptive policies and practices depends on their frame of reference with respect to their understanding, decision-making system and the operations of the supporting institutions. As evidenced from the primary research data, the majority of the participants noted that they are unsure of the direct benefits for following the path of sustainable practices. This appears to be the general perception of companies and other actors in the construction industry and it is an indication of the shared ideas in the mind of the stakeholders. However, it is difficult to know the mind-set unless explicitly expressed. Here, 'mind-set' refers to the shared ideas and thinking that informs the present paradigm. Excerpts below from the primary data echoed this view:

'Issues of sustainability are not taken too seriously here when you compare it to the appropriated standards. We are more focused on meeting immediate construction needs, and sustainability issues

as you explained, is at the bottom of the hierarchy. We don't consider this issue explicitly in our processes because it does not benefit us in any way, neither is it a priority in the project design. We deliver projects based on the design requirement, and events on site suggest which strategy we adopt and communicate this with worker as necessary' (PM5)

'The company over the years has grown to become very sensitive to issues of sustainability. We now have a department that handle, and respond to issues of Corporate Social Responsibility (CSR). When you look at it, in the construction industry, the Public relations office or (CSR) department does not bring money into the company, rather it takes money out. This department handles issue that has to do with people we interact with within our construction day to day activities, such that any problem that may arise later is tackled with before it even comes up, such as engaging with the project community, providing alternate roads, renovating or providing better access to schools that are around our projects site etc. The job of the CSR unit is to ensure that those things are happening even though they are not bringing direct money into the company, rather they take from it. But because of the co-operate policy to ensure that all these thing are taken care of the department was established' (PM3)

This thinking or belief system could be linked to the value actors in the industry attach to sustainable practices. However, the concept of 'values' is complex and subjective, various literature suggests that values express a belief of desired end goals, which guides individual action (Dietz et al, 2005; De Vries et al, 2009). However, within the context of this study, 'values' refers to a prescriptive conviction about desirable behaviour and goals. De Vries et al (2009) express the idea that people hold different values about the way the society interprets and sustains the quality of life for its members. The present research data suggests that level of commitment is linked to the value participating companies and other stakeholders in the construction industry attach to sustainable practices, and this is connected to how they understand and perceive the idea of sustainable construction. Awareness of the negative impact of non-sustainable practices and benefit of sustainable construction could create a value shift from the present practices towards the path of sustainability. However, the perceived notion that sustainable construction is more expensive and time consuming, with little or no clear tangible benefit, appears to impact on the actions or inactions of the stakeholders in the industry. A commonly accepted observation by construction stakeholder is the inherent difficulty in quantifying the financial benefits of sustainability (Zhou and Lowe, 2003; RIC, 2009). Thus, the level of apathy demonstrated by the government (the main client) and other stakeholders in the industry towards sustainable construction practices is a reflection of their values and commitment.

The uncertainty associated with applying sustainable processes also impacts on the participating company's behaviour. The risk in embedding sustainable processes, the cost implication and associated uncertainties, significantly informed the actions of the companies, and other stakeholders in the industry. There are several debates on sustainability cost and benefit analysis (Häkkinen and Belloni 2011; Brennan and Cotgrave, 2014; Zuo and Zhao, 2014), and there is not yet enough evidence to show the direct benefit for companies that adopt sustainable practices. Construction companies in developed countries (for example in the UK) are cautious because of the uncertainty associated with adopting sustainable construction practices (Brennan and Cotgrave, 2014), even though it is perceived as a source of competitive advantage to companies that adopt them. In Nigeria, and other countries in West Africa, it appears much worse, in that sustainable practices are

hardly considered as source of competitive advantage, and it is not a requirement for delivering projects. Therefore there is minimum commitment towards the uptake of sustainable processes. Accordingly, construction companies show great apathy towards sustainable construction and are less interested to pursue or contribute to sustainability agenda except for economic reasons. The excerpt below illustrates this;

'It's not part of value system for people to imbibe this practice in their daily task' (PD1)

'*In order to keep a good face as a company with the environment, the company when delivering projects still goes further to try and use this idea of sustainability technicalities to deliver the project even though we are unsure how it will benefit us'*(PM5).

The participants perceive that adoption of sustainable construction processes will impact on the project delivery cost and time, and it does not present any opportunity to gain competitive advantage. As such construction organizations and actors in the industry appeared uninterested in developing knowledge and skills to support and enhance sustainable construction practices. On the other hand, the assumption that the country has abundant natural resources reduces fear of resource depletion, and this presupposition appears to negatively influence the thinking of construction stakeholders, particularly in relation to their commitment towards sustainable construction campaigns. This assumption has been further substantiated by overemphasis on environmental concerns such as resource conservation, energy reduction and pollution in the sustainability movement (Hill and Bowen, 1997; Zhang et al, 2014) presented by developed countries who appear to be driving sustainability initiatives. Adebayo (2002), Du Plessis (2005) and other authors expressed that global sustainability debate and priority focus on issues of climate change, and, with regards to construction, particular emphasis is placed on energy reduction, CO_2 emissions and indoor climate, such as heating and cooling and energy efficiency of buildings and these issues are lower in the priority of most developing countries.

Within the Nigerian context, the values that participating companies and actors in the industry attach to sustainable practices have significantly affected their level of commitment to them. This behaviour is connected to their incomplete perception or misapprehension of the need and importance of sustainable construction. However, values tend to change either at individual or societal level. One method to achieve this change is by providing adequate information and practical alternatives to persuade the companies and other stakeholders within the construction industry to change or modify their ideas, behaviour or practices. This alternative must be beneficial to those that needed to change in exchange for their current beliefs, practice and behaviour. De Vries and Petersen (2009) stated that, a sense of value of an activity can be developed and expressed freely upon reflection, and this is the case in most society. The tension between the desired (ideal situation) and the actual situation makes up the forces for change. Creating awareness and benefits of the alternative (desired situation) in exchange for the present situation provide an opportunity for value shift which will facilitate change in behaviour. Value shift will likely create the necessary motivation to act in a sustainable way by embedding sustainability in active working and regulatory processes. The commitment and behaviours of people is influenced by their common values; if stakeholders can see and understand that sustainable practices present options with greater benefits compared to the traditional practices, it might create the necessary motivation to shift from the present paradigm towards a more sustainable path.

6.2.3 Capacity to Deal with Sustainable Construction Issues

The majority of the participants made reference to the inability of supporting institutions to effectively enforce and implement policies and regulations that encourage sustainable construction. Data from the present study suggests that empowerment of supporting institutions to develop, monitor and implement sustainability policies appear not to be taken seriously. Du Plessis (2002) pointed out that the challenges of enforcement and implementation call for the need to radically improve the capacity of the government institutions to be more active in developing and enforcing policies and regulations that support sustainable practices. The inability of institutions that have the responsibility to drive a sustainable construction agenda to effectively monitor and enforce sustainability regulations is part of the reason construction companies show minimum interest in developing the capacity to deal with social and environmental challenges associated with the planning, execution and delivery of projects. Rather, they focus on conventional construction business practices which optimize the company's economic performance. In the literature, there is little indication to suggest that conventional business models actively consider the impact of companies' operations on the wider environment and society in which they operate. Schaltegger et al (2012) argue that business-model innovations may be required to support a systematic, on-going creation of business case scenarios for sustainability. However, the conventional construction business model that companies in Nigeria adopt appears to be less ideal for optimising positive environmental and social impacts of a company's processes and products. In order for these companies to innovate their business models to support social and environmental sustainability, the institutional gap and policy vacuum will need to be addressed and filled. It is vital to develop the capacity of supporting institution to initiate and implement effective sustainability policies. Authors such as Ebohon and Rwelamila (2000) and Du Plessis (2007) stated that the structure, conduct and performance of the construction industry are crucial to its ability to respond to sustainability policy and development strategies. They argued that the functional existence of a construction industry is a necessary prerequisite to sustainable construction processes. This view is echoed in the responses from the senior management team of the participating companies:

'We are not adequately empowered, there is no adequate training and up to date technology to address this issues' (RO2)

'*There is need to reform and encourage the necessary institution to effectively address sustainability issues. Although there some effort lately, but more need to be done particularly at the state and local government level'* (PM9)

'For the company, we work according to the rules. On the issue of the environment, the federal ministry of environment is there to regulate issue concerning the environmental impact assessment, environmental rehabilitation plans and all that. But these organizations are passive themselves, very passive. Only recently they are trying to be active, but I still consider them to be passive because they are practically not enforcing anything. Those in authority don't see the need to take enforcement seriously, they believe the country has more than enough natural resource, for this reasons, it gives the company room to practice and do whatever they like. To the company it's okay because they are profit oriented, and the more the authority responsible for enforcing environmental issue are not enforcing it the more money they can make by going around these issues. For instance, natural resources like the aggregates such as sand and stone-base we acquire to do the roads, there are also

different body in charge for that, although they are more active, but yet not effective because there is no way of measuring what is taking out of the construction site for use or taking it to other place'(PM1).

The institutional element is vital for the attainment of sustainable construction. In chapter 2, section 2.3.1, it was shown that authors such as Valentin and Spangenberg (2000) identified institutional elements as a crucial factor for sustainable practices. They argued that the institutional aspect should be differentiated from the environmental, social and economic element. It is therefore important to develop human and technical capacity to deal with sustainability issues. This is in consonant with the findings from the present study. Participants made reference to the absence of relevant training and staff development programmes to gain up to date skills and techniques. RO2 commented that

'As far as I am concern, we are not being trained as it is supposed to be for us to acquire that competitive skill that will make you to be able to deliver what you are expected to do at any time' (RO2)

This point was representative of the views of the participants. Acquisition of adequate skills and techniques through training and education is necessary to develop the capacity to enhance sustainable practices.

The financial capability and fiscal policies of countries in sub-Saharan Africa including Nigeria are vital in shaping the methods or approach to address sustainable construction challenges. It is however, unclear whether these factors account for the actions and behaviours of stakeholders in the construction industry. But this point was also implied in the primary research, as cost seems to be the main factor for selecting suppliers, sub-contractors, and materials. The perception that it is more costly to follow the path of sustainability and the lack of financial capability to support this process through provision of incentives and other financial initiatives seems to stimulate the general lack of interest to support a sustainable development agenda in the construction industry. Solutions to these problems are widely discussed in the literature with divergent views (Du Plessis and Cole, 2011; Brennan and Cotgrave, 2014). It is, however, important to begin by educating and creating awareness of the negative impact of non-sustainable practices to reorient and change the perceptions of construction stakeholders in Nigeria; this could create a shift in the value system of the construction industry and stimulate the need to develop capacity (both human, technical and financial capability) to deal with sustainable construction challenges.

6.2.4 Regulations and Implementation

The need for adequate regulations, and proper enforcement and implementation was severally re-echoed by the interviewees. Weak policies, inadequate enforcement and implementation of existing regulations significantly influenced the behaviour and actions of the construction companies. Author such as Babatunde and Low (2015) point out that, actors in the Nigerian construction industry face challenges of inadequate regulations and poor policy implementation, and this significantly affects the uptake of sustainable practices. Though there are several policies and regulations to safeguard the environment and promote sustainable practices in Nigeria, these regulations are poorly implemented. Ogunba (2004) argued that there are marked shortcomings in the regulations and Environmental Impact Assessment practices. Fatona et al (2015) points out that various

environmental and sustainability related regulations have not yet evolved satisfactorily in Nigeria, despite the comprehensive guidelines and sound legal bases for these regulations. The significance of this is that effective implementation of sustainability regulations and policies initiatives is more likely, if the particulars of the construction environment and institutional mechanisms to effect policies are considered in the formulation of such policy initiative. Nwokoro and Onukwube (2011) remarked that effective monitoring and compliance to regulations is essential for the attainment of sustainable construction. The apparent weak sustainability regulations and ineffective enforcement and implementation mechanism was identified by the participants to have negatively affects companies' actions towards embedding sustainability into their daily practices. The quotes below from OM2 and PM8 illustrate this:

'Government policies and enabling laws to support sustainable construction are not enforced, which give room for professional developers to conduct their practice in ways that does not support the principles of sustainable development.' (OM2)

'In situation where there are no laws that expressly ensure that development should have sustainable outlook in Nigeria, there is no much that we can do as professionals' (PM8)

Ineffective implementation of existing regulations, and the uncertainty of the direct benefit for adopting sustainable practices, is one of the reasons companies show apathy towards embedding sustainability in their daily construction practices. Tan et al (2011) stated that sustainability regulations required companies to take action to protect the environment and assume their social responsibility while delivering their business activities. The need to clearly understand and comply with these regulations to contribute to sustainable development has been expressed in many articles in the literature. Baumgartner and Ebner (2010) point out that in complying with sustainability policies, companies need to have a clear sustainability strategy, designed to improve sustainability performance. However, ineffective implementation of sustainability regulations in the industry presents opportunity for companies to save cost implications for compliance, promoting their economic interest. Participants in this study remarked that construction companies appear to take advantage of this situation to promote economic benefits. Excerpts from PE3 and PM1 illustrate this view;

'The construction companies benefit from these poor enforcements and implementation of existing environmental policies by not complying with existing procedures because they want to make more money' (PE3)

'To the company it's okay because they are profit oriented, and the more the body or authority responsible for enforcing environmental issue are not enforcing it the more money they can make by going around these issues' (PM1)

Concerns were raised by the participants on cost–benefit perspectives of sustainable practices; this issue has also been raised in the literature. There are several accounts for and against compliance with sustainability regulations and its cost implication on company's economic interest. Authors such as Tan et al (2011) argue that compliance with sustainability regulation would sacrifice a company's profit. However, better regulation provides the right balance between the regulation, environmental protection, and social responsibility without disproportionately increasing cost or deterring compliance (HM

Government and Strategic Forum for Construction, 2008). Weak and poorly defined regulatory policy and absence of strong legal backing to address non-compliance has disproportionately affected the promotion of sustainable practices in the construction industry. Participants in the present study identified corruption amongst the barriers to the adoption and implementation of sustainable practices. PD1 commented that

'*majority of those in power* [position of authority] *often abuse their official positions to influence policy directions to serve vested interest.'* (PD1)

Corruption in construction practices impedes compliance and implementation of sustainability initiatives. Authors such as Annuziata et al (2013) and Du Plessis (2005) point out that any regulatory and policy instrument can fail if its design, implementation and enforcement are compromised. The apparent corruption in the system, together with the weak regulatory policies significantly affects enforcement and implementation of sustainability regulations.

The interview participants reported that most of the existing sustainability regulatory policies were adopted from the west. The adoption of foreign policies (see section 4.3.3 and 2.5.2), suggest that most of the existing regulations did not consider the particular circumstances of the Nigerian construction industry. This, amongst other factors, accounts for the weak enforcement and implementation of these regulations. Placet et al (2005) pointed out that it is difficult to have a general sustainability strategy or intervention that is practicable and applicable in all situations. The extent to which policies or regulations fit with the peculiarities of the construction environment would either enable or hinder effective implementation. Placet et al (2005) further argued that sustainability strategy most be customised to suit different scenarios because each industry, location and culture is subject to its own environmental and social pressures which change over time. However, Todorov et al (2010) argued for the possibility of a generalised sustainability strategy based on recent technological advancement and information technology. However, differences in environmental, behavioural, cultural and institution structure across the globe hamper the possibility of effective implementation of a global strategy for the application of sustainability principles. It is therefore important for local institutions to adapt or develop sustainability policies and regulations that fit with the particulars of the local construction environment while contributing to the global sustainability agenda (Placet et al, 2005).

Hakkinen and Belloni (2011) stated that actions to promote sustainable practices are the development of the stakeholders' awareness about the benefits of sustainable construction, and the development and adoption of methods for sustainable construction requirements and management. Section 6.2.1 above established the need to create sustainability awareness within the construction industry. Development and implementation of adequate sustainability policies would encourage a shift from the present traditional approach to that which supports sustainable construction processes. The interviewees strongly emphasized this view, although development and implementation of regulations to encourage sustainable practices is not without its drawbacks, Du Plessis and Cole (2011) stated that interventions such as regulations implementation and assessment systems may not effectively motivate change; these are reductionist approaches. They argue for paradigm shift through renewing the mind-set from which the present practice arises. The participants

in this research deviated slightly from Du Plessis and Cole's position; the data suggests effective enforcement of regulations will create change in companies' attitude towards sustainable construction. The participants' position is unsurprising due to the apparent lack of implementation and enforcement of regulations that support sustainable practices in the industry. However, in developed countries like the UK and the US, even with the great effort towards enforcement and implementation of regulations and policies initiatives that support sustainable construction, change toward sustainable practices is still relatively slow. Brennan et al (2014) point out that anticipated change toward sustainable construction is yet to be achieved in the UK; practitioners still have their preferred method of working, despite the numerous policies drive by the government in the UK construction industry. They argue that a deep cultural and behavioural shift needs to be achieved within the industry. Given the peculiarity of Nigeria's construction situation, regulation enforcement and implementation without changing the thinking of stakeholders might not produce effective change; a combination of both is likely to enhance the desired transition to sustainable practices.

6.3 Opportunity for Sustainable Practices

The companies were motivated to reduce waste, minimize natural resource usage, and implement health and safety rules for economic reasons. Despite the apparent low commitment towards SC and ineffective monitoring and enforcement of sustainability laws, companies appear to develop and adopt sustainable processes not out of genuine concerns for the environment or society, but for economic interest. PM5 remarked that,

'*Projects promote smart use of natural resource for the company's interest. It's an avenue for reducing cost'* (PM5).

Also, PM3 stated that,

'Enforcing health and safety policy for us is a win-win issue, because in the event of an accident we often pay far too much for composition' (PM3).

Oyindo et al (2016), comments that businesses develop environmental business values mainly for economic reasons. This aligns with the assertion by Anderson and Mills (2002) which suggest that sustainability options are only used if they are financially viable. Companies tend to favour aspects of sustainable practices which have clear economic benefits. For example, the pursuit of quality in the management and delivery of projects appears crucial in companies' practices, due to the fact that quality was identified as main criterion for selection and awards of projects. As PM4 put it (see section 4.4.2 and 5.3.2),

'*The most important factors for now are quality of their work and availability and finance'* (PM4).

Companies were committed to adhering to the principles of quality management through development and maintenance of quality control standards which involve consistency and continuous monitoring by middle and senior management to meet clients' requirements and to ensure the required standard is achieved. Willis et al (2001) make reference to quality considerations as a major criterion for construction procurement. For the companies, embedding quality control processes in project operations and delivery, presents competitive advantage to secure more contracts. The quotes below illustrate this point.

'We are much more concerned about getting the required quality than the environmental impact' (PE7)

'Sustainability is not a main criterion for selection. We select suppliers and subcontractors based their capability to deliver, cost and the quality of their product' (PM9)

We have policies for material selection and this is based on quality. For example, in our building projects it is always very difficult to find good furnishing materials and we have been forced to set up a furnishing factory as a result of this. This furnishing factory has been set up to ensure that the quality of furnishing meet our required standard. We get the best quality materials; process them to a very high standard before sending them to site' (PE7)

As mentioned in section 5.3.2, the underpinning rationale for a company's quality management practices is tied to economic benefit; it provides recommendations and creates opportunity to secure more contracts. The management staffs focus on efficient resource usage and ensure that measurement and project execution are carried out to a high standard. This is achieved through constant monitoring and follow-up. The current high-quality requirements present an opportunity to embrace sustainability principles better, but due to companies focus on product quality this opportunity is overlooked. For example, the lack of staff training, especially the middle and junior staff as acknowledged by the interviewees, implies that companies' management will need to put in great effort and resources to continuously monitor and supervise workers to deliver the require quality standard. Compared to the provision of adequate information and training to improve staff effectiveness and understanding of the purpose for quality objectives, this will reduce the pressure of continues supervision and presents opportunity for staff improvement and innovation. Quality is about true care and ensuring that every aspect of the processes is carefully and appropriately carried out. It involves a balanced mix of all requirements for the project delivery, which closely align with the tenets of sustainability. Sustainability is about a balance consideration or harmony of the various concerns such as the environmental, social and economic concerns. Thus, further exploration of the present quality control and management processes presents opportunity for sustainable construction practices.

The construction stakeholders show keen interest in quality improvement due to declining level of client satisfaction over the last decades for poor quality performance (Idrus and Sodangi, 2010). The movement for quality in the construction sector necessitated a radical change in the system, requiring companies to improve the quality of the products of construction. However, sustainability as a performance issue necessitates the need to take a broader look at the time (life cycle assessment) space (impact of the activities on the wider system setting and cost (beyond just monetary value to greener cost metric). This will require more than what is being done in the present traditional construction practices. Although, the primary research data identified quality and economic values as the key drivers in the construction practices, this presents an effective leverage point to change, if the socio-environmental values embedded in the processes leading to the product quality are included and scrutinized as part of the quality requirement. Interestingly, quality and sustainable practices are closely linked, if it works out how to embrace sustainability. Sustainability is aligned to quality, and the fact that quality management does not yet fully embrace sustainability does not rule out a powerful convergence in the future (Srdić and Šelih, 2011). Adjusting quality requirements to embrace a project's socio-environmental

performance from inception through execution and delivery would provide opportunity for a shift from product quality to total quality management, and sustainability is directly linked to total quality management. On the other hand, Zinck (2007) warns that total quality management and sustainability is not just about changing the name (replacing TQM with sustainability) rather it requires a change in culture and actions of stakeholders. In order words, this will require an overarching framework that pulls all of the various quality standards together (businesses quality standard, ISO 9000, environmental quality standard ISO 14001 and ISO 26000, released in 2010 were designed to bring social responsibility into the equation) to embrace sustainability in construction. The quality requirement and quality movement in the industry present opportunities for value shift, if the present product-quality requirement is extended to include socio-environmental values performance in the processes leading to product quality. Redefining the construction need in this way will reduce resistance from companies and actors in the industry, because it does not require a major change in method of delivery, but rather an adjustment of the current processes. And this adjustment does not disproportionately affect a company's economic considerations.

6.4 Summary

The stakeholders' understanding of sustainability in construction and the nature of the surrounding system influences their views and practices for project delivery. The present system supports quality, economic values and timely delivery, and this approach focuses on the short-term perspectives overlooking the long term implication of construction activities. The stakeholders that influence the decision-making and the structure of activities in the construction system are client (government), the construction companies and regulatory institutions. Perception of these key actors in construction appears to favour economic values and quality, thus the system does not explicitly require companies to account for project socio-environmental performance. For the system to move toward sustainability path, it is necessary to renew the thinking that creates the present system. One way of doing this is by redefining the key stakeholder in the construction industry and incorporating the values, needs and requirement of these stakeholders in the decision-making of the design, construction and operations in the system. This approach may facilitate value shift in the systems and structure of activities in the construction industry, and this will likely impact on the strategies and activities of the companies and other stakeholders in the design, execution and delivery of projects.

Renewing the perception of construction requirement provides opportunity to enhance the development of capacity and commitment to address the institutional gap and policy vacuum in the systems. This might stimulate adjustment in construction administration, such as the contracts conditions and procurement criteria to include sustainability requirements. This might help change the company's perception of construction delivery, ultimately resulting in a shift from the conventional construction business practices focus on economic profit and actor's reputation to that which considers the impact of companies' operations on the wider environment and society in which they operate. Pitt et al (2009) pointed out that renewing client perception is crucial to facilitate a move away from the predominant financial decision-making paradigm which is currently in place, to a more-sustainable project-procurement and delivery approach. The implication of this is that renewing the thinking will help to redefine the current notion of stakeholders' engagement

in the construction industry and this will affect the control mechanisms such as regulations and assessment systems.

Chapter 7

7 Initiating Change towards Sustainable Construction in Nigeria

7.1 Introduction

The aim of this research was to get insight on the current practices, and develop a strategy for change to improve sustainability in the practices of companies in the construction industry. Consistent with previous findings in the literature, the research data identified a number of barriers to sustainable construction practices in Nigeria, evidencing that these challenges still exist. The findings reveal the stakeholders' perception and the nature of Nigeria's construction system as major factors influencing the practices of companies and practitioners in the industry. Building on this line of inquiry, this study provided insight into how to initiate change. It examines theories of change from the literature, and explores how the current construction processes can be adapted to enhance sustainability transition.

Although there are several models of change (such as social practice theory; structuration theory; social technical transition theory, among others), each represents a different ideology with its own assumption about the nature of the environment, human and social organization. Amongst these theories, the social technical theory for sustainability transition closely reflects the multi-level change required in Nigeria's construction industry. However, the complexities of Nigeria's construction industry and the systems and structure of activities appear not to be well presented in the transition theory. This research provides a model to improve sustainability in construction practices in Nigeria. The model for change presented in this study is an addition to the aspect that was overlooked in the sustainability transition theory. In developing this model, it was necessary to first overcome the strain of resistance or group conformity that is apparent in the system, especially among construction companies in Nigeria. In doing so, changing the perception and requirements of construction delivery in a way that does not require entire change in their processes, but rather slight adjustment in the current practices, was important. Research has shown that sustainable construction is not hindered due to lack of information, technology or assessment methods, but the main resistance to change is the difficulties associated with adopting new method/process. Hakkinen and Belloni (2011) and Brennan et al, (2014) point out that new technology, information and assessment are resisted because they requires process changes, in addition to the risk, uncertainty and unforeseen costs associated with changing the established processes. Changing the perception of construction needs in ways that do not significantly alter the existing method and the company's economic interest would help create value shift from the long-established practices.

In view of the complexities of sustainable construction in Nigeria, this study argued that for effective change there is need for a move in the entire construction system. In doing so, this study identifies the various leverage points from where to start moving the system. Through a dynamic multi-level system modelling for sustainability transition, it shows how construction practices in Nigeria can migrate from the traditional practices towards the path of sustainable construction. This study argues that the first point of leverage is to renew the thinking from which the present system arises. More thoughts and attention is needed to improve awareness and education of sustainable construction from the viewpoint of the benefits of sustainable practices. This would serve as catalyst for change that would affect the entire system. Another point of leverage is the quality movement in Nigeria's

construction industry – micro level change. The present quality management practices have potential for improving socio-environmental practices, but it is limited due to the traditional practices focused on economic values. By adjusting the present economic-led quality management processes to embrace the latent socio-environmental values contained within it, this will work positively for the attainment of sustainable construction practices.

This chapter examines different transition theories to determine how to introduce change in Nigeria's construction system. It explores the multi-level sustainability transition theory, the practice-based approach and the individual behavioural change theory to suggest how the system can make the transition from the present traditional approach towards sustainability. It presents a practical approach on how construction organizations can embed sustainability into the present construction practices to improve their social environmental performance without disproportionately affecting the organization's economic performance. Section 7.1 provides an introduction to this chapter. Section 7.2 identifies the leverage point for change that will flow through the entire system. Section 7.3 discusses the importance of socio-ecological systems as key stakeholder in the construction industry and the influence of socio-environmental stakeholders in decision making. Section 7.4 explores the individual and practice-based transition theory to determine if the approach is suitable to introduce change in Nigeria's construction system, while section 7.5 discusses the multi-level sustainability transition theory and the challenges of utilizing this theory to introduce change in the construction industry. From these transition theories, a dynamic multi-level modelling for sustainability transition in Nigeria construction system was developed and is presented in section 7.6. Section 7.7; provide strategy to improve sustainable practices at company level.

7.2 Change Catalyst for Sustainable Construction

Renewing the thinking that creates the present construction system is crucial to help move the system from the traditional practices towards sustainability. Through conferences, research, training, seminars and workshops targeting key stakeholders in the construction industry, the perception of sustainable construction may change. This might promote the need to adjust the contract conditions and procurement criteria to include sustainability requirements, which will, in turn, enhance change in the company's perception of construction delivery. Ultimately this may result in a shift from the conventional construction practices that focus on time, cost and quality performance, to embrace sustainability performance. Renewing the thinking from which the present system was created is the most effective point of intervention to promote change that will affect the entire system. Du Plessis and Cole (2011) argued that sustainability intervention such as regulations and an assessment system are a reductionist approach that does not deal with the root source of non-sustainable practices; they emphasize the need for a paradigm shift through engaging and motivating stakeholders to renew the mind-set from which the present practices arise. Thus, renewing the thinking provides opportunity to redefine the current notion of stakeholders' engagement in the construction industry and this will affect the control mechanisms such as regulations and assessment systems.

The present researcher acknowledged that renewing the thinking and/or changing the perception of construction stakeholders through education and information is only a part of the change process, as this will require simultaneous change in other broader socio-cultural,

economic and regulatory forces that influence construction practices. While simultaneous multiple sources of intervention are required for the attainment of sustainable construction, significant and lasting change will not be achieved without an overarching shift in the way things are currently framed in the system, and in the practices of the construction companies. Having discussed the barriers and opportunity for sustainable processes in the construction system in the previous chapter, this study argues that effective change will only occur through paradigm shift and this will require changing the thinking from which the present practices arises. Du Plessis and Cole (2011) warn that changing the rules and regulations, and provision of incentives to encourage change operates at the lower range of effectiveness for a transition to improved sustainability practice. Change in the values and perception of the construction stakeholders is the first and most effective point of intervention. Change in perception is needed as a base-level intervention to initiate the move that will trigger other changes, and ultimately create a paradigm shift in the practices of the companies and actors in the construction industry. Despite the perceived lower effectiveness of interventions such as rating and assessment systems and changing rules and provision of incentives, in Nigeria, like most developing countries, it might be difficult to implement this approach, due to the challenges they face, and peculiarity of the systems and the structure of activities in the construction industry. The empirical data suggest the ability (technical and financial capability) to implement sustainability regulations, develop assessment systems, and provide incentives to encourage sustainable construction is weak (Dania, et al, 2013; Ebohon and Rwelamila, 2000).

Authors such as Capra (2002), Raskin et al (2002), Adams (2006) and Du Plessis and Cole (2011) argued that for any society to make the transition towards sustainability there is need to change the paradigm within which it operates, and this will require shifting from the thinking that frames the current system of operation. 'Paradigm', here, refers to the shared values and practices of a community or society which is shaped by the particular view of the world or perception held by that community. A shift in values will most-likely result in redefining of the construction needs from the current standpoint of quality, cost and timely delivery to that which includes socio-environmental values in the project requirement and operations. This helps to gradually create a shift in behaviour and actions of actors operating in the system. As mentioned in chapter 5 and 6 in sections 5.3.2 and 6.3 respectively, based on the peculiarity of the construction system, quality and economic values are at the forefront of construction needs, and actors in the industry interpreted 'sustainable construction' to mean quality. With the quality movement in the industry, policies enforcement and regulations appear to focus on high-quality requirements. Leiserowitz et al (2004) suggest that if the transition to another paradigm is to be achieved, existing values will need to change. A shift in the stakeholders' values from product quality performance to total quality performance which embraces socio-environmental sustainability in the project management processes and product is crucial to make a sustainability transition. Renewing stakeholder thinking of construction need is the most-effective point of leverage to create a shift towards sustainable practices in the construction system. A shift in stakeholders' perception of construction needs would facilitate change in the goals and rules of the system, such as the policy instruments, and this could eventually results to change in the standards and parameters. Miller and Page (2007) argued that the element of a complex and adaptive systems are interdependent to such an extent that the

removal of one element destroys or fundamentally alters behaviour. Renewing the perception of construction need to focus not solely on quality and timely delivery, but also to embrace the long-and–short term perspective and its implication to sustainable development provides opportunity for a shift that could gradually change the systems and structure of activities in the construction industry towards sustainability.

7.3 Stakeholder Engagement

Several articles in the literature identified the importance of stakeholder engagement in achieving a transition towards sustainability (Mitchell et al, 1997; Steurer et al, 2005 Winch, 2007; Mathur et al, 2008; Bebbington et al, 2014). Stakeholder engagement is vital because it is essential to get all the necessary information that will affect or is affected by the project. This is useful to guide decision-making processes in project design and delivery. Adequate knowledge and understanding of the needs and requirements of key stakeholders is useful in framing the thinking that creates a construction systems and structure of activities. The empirical research data indicate that the knowledge and understanding of sustainable construction is low in Nigeria, and within the construction system; the companies', clients, and government entities are the primary and active stakeholders in the industry. These stakeholders place emphasis on economic value, timely delivery and quality in decision-making process, and these decisions significantly influence project designs and deliver practices. As mentioned in chapter 4 and 5 in sections 4.4.1 and 5.3.1 respectively, engagement with communities affected by a construction project and inclusion of other stakeholders in decision-making processes is not a common practice. It is necessary to recognise and include all key stakeholders in the decision- making processes and rethink how best to engage with all stakeholders in a way that brings about change in the practices and value systems in the industry. To do this, it is important to understand that socio-ecological systems and the future generations are also key stakeholders in the construction industry and should be considered in the projects decision-making processes.

In traditional stakeholder theory, Mitchell et al (1997) remarked that what is at stake is the wellbeing (reputation, profit) of the company or other actor such as a government entity. This point was echoed in participant responses, which suggested that companies focus on economic values and high quality standard to meet the system requirements and protect their reputation. Economic interest and product quality for reputation protection appears to be the main factors at in the decisions-making processes and actions of stakeholders in the current construction system. This behaviour could be linked to the level of awareness and understanding of the needs of socio-ecological entities that are also key stakeholder in the construction, and what is at stake if these needs are not addressed or incorporated in framing the thinking and decision making processes of the construction system. Du Plessis and Cole (2011) point out that what is at stake in a sustainability paradigm that recognizes the fundamental interdependence of the socio-techno-ecological system is far more than the profitability or reputation of the actors involved in a construction project. It is also the well-being of the social–ecological systems within which the project is situated, as well as the well-being of future generations. This is the goal of sustainable development.

Starik (1995) defines stakeholder as any naturally occurring entity that affects or is affected by organizational performance. This suggests that entities like the social–ecological system and future generations also have a stake in the project, and should be considered in the

stakeholders' engagement and decision-making process. Authors such as Chiniyo and Olomolaiye (2010) provide an extensive discussion of stakeholders in construction, including environmental stakeholders such as non-governmental organizations and community-based organizations. These stakeholders represent various socio-environmental entities in the construction industry, signifying the importance of socio-ecological entities as key construction stakeholders. An understanding and inclusion of the requirements or needs of these entities in project design and decision-making will help in re-shaping the thinking that frame the systems and structure of activities in the industry. This raises the question of how to deal with diverging priorities in the field of sustainability, considering that not all partners have equal stakes or equal abilities to engage. It however, calls for the need to re-invent not only the practices of decision-making, but also perhaps the very assumptions and values on which decisions are based in the design, construction and operation of the construction industry.

7.4 Individual and Practice Based Behavioural Models for Sustainability Transition

As mentioned in chapter 3 and 7 see sections 3.3 and 7.1, this study examines a number of sustainability transition models to determine how best to introduce change into the construction practices. It explores the individual change model, social practice model and multi-level transition theories with the view to identify a more effective approach for change in the construction industry. Several theories of change exist in the literature with each representing different ideology and assumptions about the nature of the environment, human and social organization. Authors such as Darnton (2008) and Jackson (2005) argued that if pro- and anti-environmental beliefs could be identified and modified, behaviour might be changed. Hargreaves (2011), in support of this, stated that behaviour is the outcome of a rational process of decision making by individuals or a groups of individuals. Though numerous attempts have been made to construct a model of human behaviour, such models have looked at individuals' beliefs, attitude and values as a predictor of behaviour. Jackson (2005) made reference to the importance of identifying the factors that determine such behaviour in order to determine an effective leverage point to introduce change. As evidenced in this research, stakeholders' perception of sustainable construction is one of the main factors that influence the current delivery method; however, the method of construction delivery does not fully embrace sustainability tenets. The key and active stakeholders in the Nigeria's construction industry include the clients (government), construction companies and regulatory institutions, and the current construction systems and structure of activities is predicated on the values and interest of this stakeholders group. In order words, the construction activities in the industry are guided by the values and interest of these stakeholders.

The individualistic change model suggests that by modifying the perception of the key stakeholders, behavioural change could be made. This is in agreement with the views of Bamberg (2003), that through identification and modification of the necessary cognitive components in operations within a system, behavioural change will occur. Within the Nigerian construction industry, environmental stakeholders are not actively involved in decision processes to advocate the need for socio-environmental practices in construction. Authors such as Du Plessis (2011); Sankaran (2010); Chiniyo and Olomolaiye (2010) argued

that socio-ecological systems are key factors in the construction industry and should be adequately represented by environmental stakeholders such as non-governmental organizations and community-based organizations in the decision-making process. Within the Nigerian context, the absence of active environment stakeholders such as the NGOs and community-based organization in the construction industry stakeholders group limits the opportunity to advocate pro environmental beliefs for a rational process of decision making by individuals or groups of individuals that could result to change in behaviour. As stated by Hargreaves (2011), behaviour is the outcome of rational decision making by individuals or groups of individuals. However, inadequate representation and identification of the needs of the socio-ecological system prevents the opportunity for rational process of decision making due to non-involvement or exclusion of socio-environmental actors in the construction stakeholders group.

Another challenge with the application of the individual change model in the construction system is that the systems and structure of activities in the industry do not support sustainable construction, so individual actors with the strong belief in, and placing high value in, socio-environmental needs are limited. For instance, one of the interviewees PM8 remarked that:

'*In situation where there are no laws that expressly ensure that development should have sustainable outlook in Nigeria, there is no much that we can do as professionals'* (PM8).

Authors such as Fatona et al (2015) and Ogbona (2004) point out that there is a marked shortfall in the environmental impact assessment regulations and various environmental and sustainability regulations have not yet evolved satisfactorily in Nigeria. Also, Babatunde and Low (2015) stated that actors in the Nigerian construction industry face challenges of inadequate regulations and poor policy implementation. The point was also echoed in the views of the research participants; they acknowledged that government and non-governmental environmental institutions are inactive, preventing compliance and implementation of sustainability initiatives. Although the individual change model and its assumptions are a useful for describing change, in view of the nature of Nigeria's construction system, it is less likely the individualism behavioural change model is an effective approach to bring about substantive change in construction practice. A more-effective change will require a move in the system, and this will involve a multi-level change including the individuals, structure of activities, and infrastructure.

In contrast to individualism of the behavioural change model, Shove (2010) and Warde (2005) argue that behaviour is shaped by practice and is not based on individual reasoned decision that is influence by the beliefs, value and attitude. They emphasized the source of change in behaviour lies in the development of practices themselves, which is a middle stance between agency and structure (see also Giddens, 1984). This approach identified practices themselves, rather than the individual that performs them, or the social structure that surrounds them, as the source of change in behaviour. Practice theory appears applicable in a society or system with active and functional institutions, and behavioral change is connected to certain structures and systems. As mentioned in the above paragraph and in chapter 2 and 6 in sections 2.5.2 and 6.2.4 respectively, sustainability

legislation and regulations fail at the implementation level, due to the absence of active functional institutions to support these practices in Nigeria's construction industry. The apparent low commitment by actors in the industry towards sustainability and the weak institutions and infrastructures to support sustainable practices hinders the possibility of adopting practice theory for behavioral change in the system. Hargreaves (2011) points out that practice-based behavioral change is strongly linked with the surrounding material infrastructure, and legal and power relations. The practice-based approach to change is more suited to a society with well-developed and active institutions, where changes in the regulations and practices are properly monitored and implemented, and engaged in modified practices over time that will in turn result to change in practitioners' behaviour. However, as acknowledged by the interviewees and authors such as Mbamali and Okotie (2012); Dania et al (2013) and Babatunde and Low (2015), in Nigeria and other developing countries, in the apparent weak and inactive institutions and structures there is low ability to enforce and implement regulations, a fact which is further complicated by the challenges of security and lack of continuity in the industry. Modified rules and practices are less likely to produce significant change. A necessary prerequisite for development of practices that could result in behavioural change towards sustainable construction in Nigeria, and most developing countries, is the availability of a functional system (society's major institutions) which defines how stakeholders interact within the construction system, and the belief that this structure exists and is effectively monitored (Du Plessis, 2007).

Hargreaves, (2011) argued that a conventional approach to behavioural change that focuses on individual cognitive states and contextual barriers appears too narrow to capture all that is involved in driving behavioural change. Thus, a combination of approaches involving the individual behavioural change model and the social practice model is more likely to produce an effective transition towards sustainable practices. Authors such as Meyerson et al (1987) point out that if researchers focus on the bottom-up individualistic- level processes, they will miss the top-down leadership and social-practice source of change. Therefore, the first and most important point of intervention is to renew the perception of the companies, practitioners and key stakeholders. This would lead to the development of functional institutions that enhance sustainability application by creating a structure that guides behaviour. Ajzen (1975) stated that behavioural intentions preceded actual behaviour shift and this intention is based on interaction between individuals' attitudes towards that behaviour, their beliefs about what others think, and the perceived level of control over their behaviour. Individuals do not exist in a social vacuum; they are part of a system in which actions and interactions are connected. In some cases, the surrounding context or the system may override all of the cognitive component or factors of the individual model (Stern, 2000). The gradual incorporation of other variables such as social norms, social network- and or surrounding infrastructures alongside the individual decision-making processes (Barr, 2003; Martin et al, 2006) would be a more effective approach to behavioural change towards achieving sustainable construction practices in Nigeria.

7.5 Multi-level Perspective for Sustainability Transition

A review of different transition models demonstrated the variety of approaches to introduce change. However, the complexity of Nigerian construction system will require simultaneous multi-level change to move the entire system. The multi-level transition

theory has emerged as the middle-range framework for analysing socio-technical transitions to sustainability. The concept is firmly rooted in the tradition of system thinking. Authors such as Geels (2011), Grin et al (2010) and Smith (2005) refer to socio-technical transition as the co-evolution of a web of interconnected elements such as technology, user-practice regulations, institutional infrastructures, market- and supply-chain networks and the dynamics by which changes in these can occur. The functionality of the system is predicated on the effective interaction of the different elements of the system (Geels, 2005). Much of the literature on multi-level transition make use of Rip and Kemp's (1998) multi-level model of change which distinguishes between the macro level – the socio-technical landscape, the mesa level – regime, and micro level – niches (Shove and Walker, 2007). The key idea of the multi-level model is that change takes place through the processes of co-evolution and mutual adaptation within and between these layers. Smith (2005) points out that these processes occur in a multi-dimensional space comprising institutional and social cultural rules, and economic requirements. As mentioned in the literature reviewed in chapter 2, section 2.7.1, it is about a deep structural change, which involves an alteration in the overall configuration of established systems such as technology, market, policy, infrastructure, consumer practice and scientific knowledge (Grin et al, 2010; Elen et al, 2004).

The multi-level transition theory appears to be suitable for describing how the construction system in Nigeria can move from the present traditional practices to a more socio-environmental approach. However, the realities of operations within Nigeria's construction system are not well represented in the multi-level sustainability transition theory. In an attempt to apply this theory to change the system in Nigeria towards sustainable construction, a change at the entrepreneurial/company level upwards is required; this process involves companies, and/or group of individual actors in the system creating innovative methods and practices within their particular niches. New methods gradually become working configurations that shape and reshape the rules, policies and institution practices (the regimes), which will generally result in change in the value systems and political ideology in the construction industry (the landscape). The model emphasises policy development and technical innovation in changing the landscape; in theory this approach appears excellent to bring about the kind of change required to move towards sustainable construction in Nigeria. However, the assumptions presented in the multi-level transition model about how individuals and entrepreneurs/companies might or should act to affect the process appears distanced from the situation in the country. The circumstances in which construction activities take place in Nigeria are generally unfavourable to the kind of entrepreneurial initiatives needed to develop and initiate the kind change described in the transition model. The apparent lack of co-ordination, research and education about sustainability in the construction industry has hindered the development of professional cadres of trade and management personnel to bring about innovation and evolution at the niche level. Although there are efforts towards proper coordination and sustainability education, a lot still need to be done. Authors such as Anny et al, (2015) and Ebohon and Rwelamila (2000) point out that the construction sector faces technical and managerial difficulties arising from skill shortage. They attribute this to the fact that most construction firms are owned and managed by sole trader-type entrepreneurs with little knowledge of the working of the construction industry (see also Ofori, 1991). Inactive research institutions and lack of education on sustainable construction have hindered the ability of niches in the

development of new ideas and innovative methods that could propel the necessary alignment to create a force for change. For instance, the minister of education remarked that funding for Research and Development (R&D) is not included in the 2016 government budget (Channel News, 2016). There are strong indications to suggest that construction practices at the niches level mainly replicate those used by their former colonizers (Mbamali and Okotie, 2012; Babatunde et al, 2010).

The finance challenges and uncertainty with the economic benefits of sustainability, together with the issues of delayed payments, continuity and seasonality of work, is prevalent in the industry. This has disproportionately affected the entrepreneurial capacity and interest to develop new and innovative methods for sustainability. Although seasonality of work is a common feature globally in the construction industry, it is however more pronounced in Nigeria and most developing countries due to the over reliance on the government for projects. This point was echoed in the participants' response and in literature such as Ebohoh et al, 2002; Du Plesis, 2005). Seasonality of work, delayed payments, political instability and insecurities in some parts of the country, together with the apparent lack of continuity with new governments refusing to honour contracts established by their predecessors discourages long-term strategic planning, leaving smaller firms, which form the niche nucleus, extremely vulnerable without the capacity to develop novel and/or innovative approaches that could create a force for bottom-up changes in the system. Many of the local firms suffer from financial ruin, leaving local indigenous firms at the lower-value end of construction activities, while the larger multi-national companies are dominant at the higher-value end (Ebohoh and Rwelamila, 2000; Adebayo, 2002; Dania et al 2014). In Nigeria, construction activities are dominated by non-indigenous multi-national companies that have the knowledge and capacity to deliver the required quality standards. Thus, multi-national companies in this case represent the micro level actors in the system; however, the primary data indicates that these companies are unwilling to initiate change that supports sustainability due to the economic benefit associated with the present *status quo*.

The multi-level transition is firmly rooted in the tradition of system thinking which highlights the co-development of the social and the technical aspects and which seeks to understand and analyse the emergence and transformation of the interaction between society's complex infrastructures and human behaviour. As mentioned in chapter 2, section 2.7.1, the multi-level transition model appears to focus on bottom-up approach to change, downplaying the role of top-bottom approach in transitions. The system places undue emphasis on regime change and policy development beginning from the niches, overlooking changes that operate downward (Berkhout, 2004). This assumption, however, does not effectively present how to deal with situations in Nigeria's construction industry where the niches prefer the *status quo* and are unwilling to act as force for change due to the economic gains inherent in the current system. Even if the niches were able to successfully propel change, the ability of existing institutions and infrastructures to support the predefined change appears weak. This presents another layer of difficulties to utilize the socio-technical sustainability transition models in the Nigerian context. Aniekwu et al (2015) stated that a regulatory environment should aim at building credible institutions and infrastructures that could support change in order for change to occur. The fundamental

challenge of transitioning towards sustainability entails harmonising the pace and direction of change at a multi-level perspective (the socio-technical perspective). Addressing this requires a thorough understanding of the complex interactions between social and technological systems. However, the construction system in Nigeria presents a situation in which the niches show minimum interest for a transition to more-sustainable practices, with minimum pressure on the regime for change. On the other hand, there is no evidence to suggest that the regime has the capacity to support and institutionalize changes that support sustainable practices, nor the political ideology and value system in the construction environment (landscape) that supports sustainable construction. This raises the question of how can the construction system make the transition towards sustainability. A common challenge to the adoption of sustainable practices is that construction is part of a complex system that includes institutions, culture, physical infrastructure and economic underpinning. The simplistic uptake of a multi-level approach, and models that are originally rooted in the complexities of system thinking, suggests that caution is required. Shove and Walker (2007) argue that, in terms of transition, the main task is to decide how the present dominant regime might be dislodged and replaced, and how the new configuration might become the mainstream. Drawing on insights from the different transition theories, the following section will explore how to move the Nigerian construction system toward the path of sustainability.

7.6 System Modeling for Sustainability Transition in the Nigerian Construction Industry

In view of the nature of the situation with construction and sustainability in the Nigeria, it appears the complexity of the Nigeria construction system is not well placed to embrace the socio-technical transition model. In order to determine how construction practices in Nigeria can move from the present traditional practices towards a more socio-environmental approach, this study utilized a combination of the different approaches suggested in the transition models discussed in section 7.4 and 7.5 to develop a dynamic multi-level system model for sustainability transition in Nigeria's construction industry. The practice-based behavioural change and the multi-level transition models comprise of different set of assumptions, however, a combination of these approaches would help avoid the difficulties associated with following any single model. This study argues that renewing the thinking that creates the present paradigm is the most effective point to start change in the system. First, it is important to change the stakeholders' perception of sustainable construction. The present systems and structure of activities in the industry focus on quality and timely delivery, and this informs the conditions of operations and administrative mechanisms. The systems operation is based on stakeholders' perception of construction needs and requirements. Changing the perception of construction delivery will require engaging with all stakeholders, most especially the socio-environmental stakeholders. Author such as Du Plessis et al (2011) and Chiniyo and Olomolaiye (2010) point out that the socio-ecological system contributes immensely to construction activities and is a key to stakeholders in the system with the least ability to engage in the decision making processes. Therefore, engaging with all key stakeholders and identifying their needs and prioritizing them in the decision making process, opens up opportunity for value shift from the economic value and quality (profit and reputation) focus to that which embraces socio-environmental sustainability. Although there are environmental agencies in Nigeria, there

are no data to suggest they are actively involved in construction project design and decision-making processes.

As mentioned in section 4.3.3, the interviews conducted in this study made reference to the passive nature of the environmental agencies. Active participation of environmental stakeholders would promote genuine concern for socio-environmental issues in the construction industry, and by reasoned judgement, actors may identify and prioritise requirements and action that could guide behaviour and practices. In order words a shift in stakeholders' perception of construction processes may occur if socio-environmental stakeholders are actively involved in framing the decisions and requirements in the system. This will help companies and actor in the industry to embrace more socio-environmental values along with traditional economic values. Another way of doing this is through education and information to create awareness for the importance of sustainable construction. The primary data indicated that the knowledge and awareness of sustainable construction is low amongst actors in the industry. Information and education could play significant role in changing the stakeholders' perception of construction. By educating stakeholders through the lenses of the benefits of sustainable practice, it will help reduce resistance, and encourage companies and other actors in the industry to give up present practices in exchange for more sustainable ones. Value shift in the system and structure of activities in the construction industry could happen if the stakeholders' perception is renewed. This will impact on companies' design and delivery strategy which could result to other changes in their operations and practices.

Education and information on the benefits of sustainable practices, compared to the effects and dangers associated with the present practices could be a starting point for unfreezing the existing situation (i.e. traditional construction practices) to renew stakeholders thinking and gradually promote value shift. Barr (2008) pointed out that intervention that seeks to identity and remove real and perceived contextual barriers, and then advocate the benefits of sustainability, will create new social norms to motivate individuals to adopt the desired behaviours, (see also DEFRA, 2008). With a shift in stakeholder's values, it provides opportunity for other changes to follow. Value shift is the hub that propels other changes in the system; value shift could facilitate changes in construction requirements to support sustainability and this helps to improve the commitment of stakeholders to sustainable development. Stakeholder's commitment would result in development of capacity to address the institutional gap and policy vacuum in the system. This will in turn pressure the companies and actors in the system to operate in a more sustainable way. The lack of commitment by companies and actors in the industry is connected to their values and their perception of sustainable construction. Value shift presents the opportunity to create a genuine commitment from the stakeholders towards sustainable construction and this could result to change in rules and regulations. Also changes in the commitment to provide necessary resources to empower supporting institutions to develop, monitor and implement sustainability policies will most likely flow through the entire system. Changing the rules and regulations that govern construction by incorporating sustainability-related practices presents an effective channel to enable change, but renewing the thinking from which the present paradigm arises appears to be a more-effective approach for a sustainability transition in Nigeria's construction industry.

Figure 9 below presents a model for sustainability transition in the Nigerian construction system; it utilizes a combination of practices-based and multi-level perspective theory to determine how the Nigerian construction system can transit from the present traditional practices towards sustainable construction practices. This model is a development intended to address those aspects of the situation not covered by multi-level transition theory.

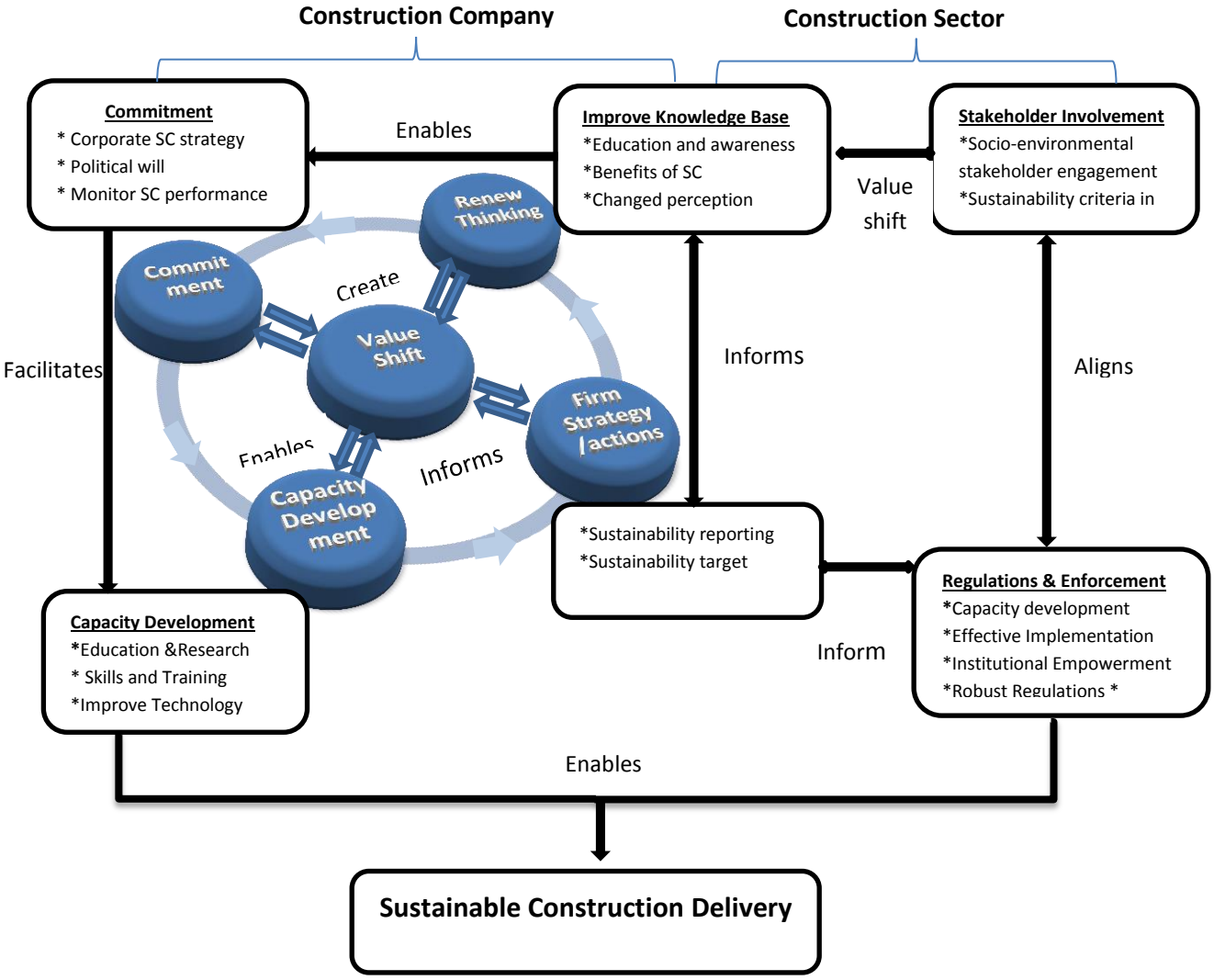


Figure 9: A model for change towards sustainable construction

The above model in Figure 9, suggests a combination of top-down and bottom-up approach for sustainability tradition to occur in Nigerian construction industry. Improvement of the sustainable construction knowledge base through education and information from the stand point of sustainability benefit and through active involvement of socio-environmental stakeholders will help enable value shift amongst players in the industry. This will propel actors in the construction sector to put pressure on the company through the various regulatory mechanism and proper enforcement and implementation of policies that support sustainability. On the other hand the companies would be more susceptible to embed sustainability principles in their practices through commitment and development of strategies to deal with sustainability concerns. Thus, the model proposed that value shift will proper change in the systems and structure of operations in the industry (construction

sector) as well as in the practice of companies delivering construction projects (construction companies) and this will facilitate change from both the top-bottom and bottom-up pathway.

The finding from this study and the sustainability transition model presented above will positively impact on the activities and actions of actors in the industry. First, by improving the knowledge base for sustainable construction in Nigeria through education and active involvement of key stakeholders, particularly the socio-environmental stakeholders, it will help to advance the field of sustainable development. This will enhance planning and public debate on issues relating to knowledge, understanding, and implementation of sustainable construction practices in Nigeria. Second, adequate knowledge and renewed thinking will inform future policy development and practice based intervention that addresses the particular circumstance of sustainability in Nigeria's construction industry. This will boost empowerment of institutions and development of capacity to deal with sustainability issues in the construction industry.

7.6.1 System Modelling Showing Effects and Flow of Change in the Nigerian Construction Industry

The operation and governance of the construction processes in Nigeria occur within a closed system that is inter-relational. By addressing the core factor that influences the system, it will likely flow through the entire system. Figure 9 shows that the most-effective leverage point for change is the thinking from which the present system arises. Figure 10 below shows the ripple effect of changing the thinking from which the present construction system arises. If the mind-set that constitutes the present construction practice can be renewed, it will be a catalyst for change that would flow throughout the whole system. Through sustainability education and information about the benefits of sustainable practices, a change in the worldview of how stakeholders see and perceive sustainable construction can occur, which could influence and facilitates value shift. The value change might result to greater commitment by the government, civil society and actors in the industry to promote sustainable construction and empowering existing institutions. This will enable institutions within the construction sector to develop and implement sustainability policies, and coordinate construction activities more effectively. Brennan et al (2014) assert that clients are the key driver to sustainable construction practices. Shift in value towards sustainability will create the need for the government (which is the major construction client in Nigeria: Adebayo, 2001; Ebohon et al, 2002; Adeyemi and Kashiwagi, 2014) to demand sustainable practices, by setting out sustainability criteria for the award of contracts. When there is a change in mind-set, the required attitude, the political will, and commitment towards sustainable practices will likely follow. Thus, value change will trigger changes in the construction goals, rules and actions which would probably result in change in tools and technology for construction activities, and ultimately result to improved sustainable practices in Nigerian.

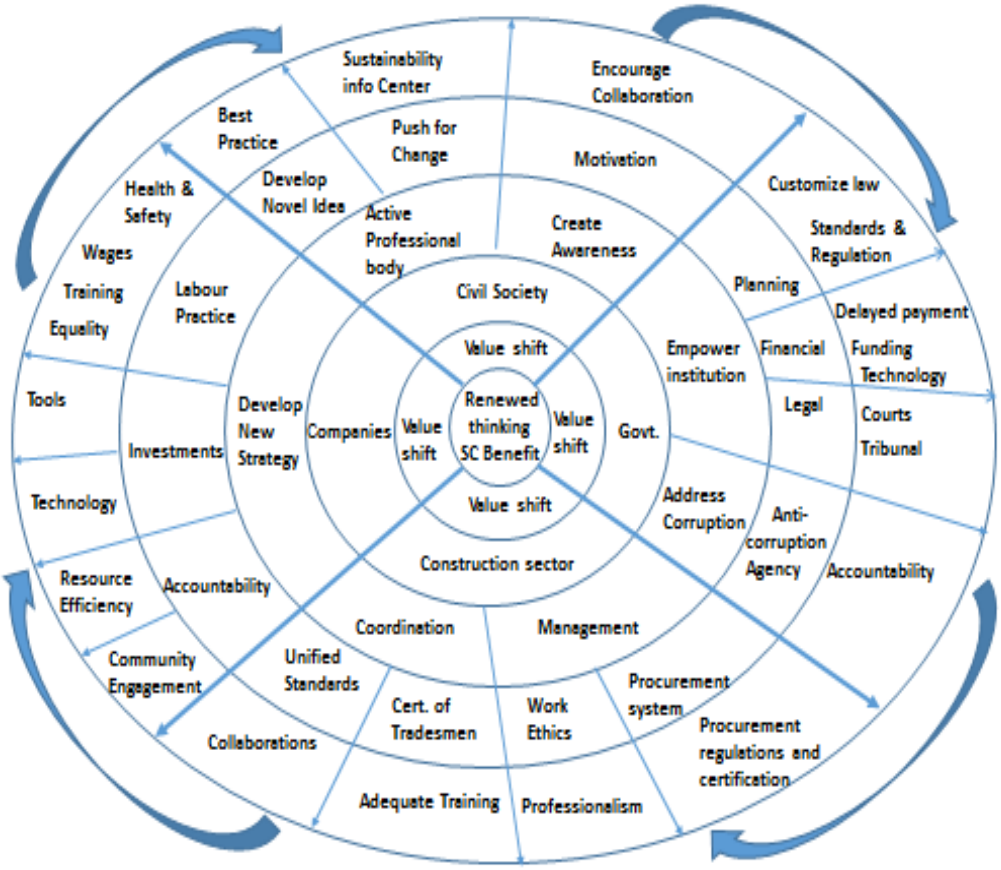


Figure 10: Ripple effect of change

7.7 Strategy to Improve Sustainable Practices at Company Level

The foregoing sections describe how to move the present system in the construction industry towards the path of sustainability. With regards to the companies that deliver construction projects, changes towards sustainable practices can be achieved through embedding socio-environmental values into the current quality and economic value-driven processes. The companies that participated in this research interpreted sustainable construction as quality of construction. However, it appears the companies are not able to transform sustainability tenets inherent in quality management into actual practice, due to operational barriers and high attention on economic value. As mentioned in chapter 5 and 6 in sections 5.3.2 and 6.3 respectively, they adhere mainly to the traditional, economic-led perspectives of quality control, with particular focus on product quality management. The company management teams perceived quality management to be mainly an economic-led process, thus companies focus more on economic gain attached to quality management processes. However, development of quality management elements would also yield significant but understated socio-environmental benefits. In this way the research findings suggests that the transition from the current traditional system of construction practices does not necessarily require the invention of completely new processes. Rather, it can be achieved through a shift or adjustment in how existing quality management activities are conventionally perceived. By adjusting existing, traditional economic-value driven activities to focus more on the latent social and environmental values, more emphasis can be placed on the role that these activities have to play in minimising the negative environmental and social impacts of the companies' construction practices.

Adopting this approach would encourage companies to view construction quality management activities less as a wholly economic process and more as a sustainability-related one. Also, it encourages companies to view socio-environmental responsibility not as an extra burden that falls outside their core operations, but rather as an inherent part of them. By redefining existing quality management activities as opposed to creating new ones, it has the added advantage of lowering companies' resistance to change, as the activities involved include ones that they already utilise. This view is supported in the literature; for instance, Hilary (2004) identifies resistance to change as a significant barrier to companies adopting environmental management systems. Hakkinen and Belloni (2011) also point out that new technology; information and assessment system for sustainable construction are resisted because they require process change away from the established traditional practices. In a similar vein, Nidumolu et al (2009) state that company executives treat environmental protection and social responsibility as different from business objectives due to concerns that a more-sustainable approach may require new processes and facilities. To enhance effective transition towards sustainable practices in the companies, this present research looks at how the economic-driven quality management process can be expanded to further accommodate environmental and social dimensions contained in the established quality management system. The work of Elkington (2011) and Zink et al (2009) echoed the view that sustainability is related to quality management; all it requires is an overarching framework that pulls all of the various quality standards together. In order to do so, the present study adopted a systems model that takes into account the high priority attached to economic considerations by the companies - because these companies exist to make profit - but also carried the principles of environmental protection and social responsibility alongside the need to achieve economic success.

The representation of the development and transition towards sustainable construction practices in this manner is crucial for two main reasons. First, it emphasizes the role that the current quality movement in the Nigerian construction industry can play in addressing social and environmental concerns. If the construction quality management activities are expanded to focus more attention to the socio-environmental potential, they would be less understated within companies' views of quality control and management system than they are at present. Second, the model illustrates how environmental and social practices can be of economic benefit to companies, thus providing an incentive for companies to implement these practices. However, it is commonly accepted that there is limited evidence of cost savings, as well as an absence of transparent mechanisms that identify the economic benefit and financial viability for adopting sustainable construction practices (Brennan et al, 2014; Warren-Myers and Reed, 2010). Most business organisations see adopting sustainable construction practices as too risky and as a 'one-dimensional nuisance' that is rigidly connected to regulations, added cost, and liability which might potentially put them out of business (Brennan et al, 2014; Hart et al, 2003). Since the business case for sustainable practices is far from being realised (Brennan et al, 2014), and many organisation remain unconvinced by the arguments for sustainability, especially in Nigeria where sustainability does not provide competitive advantage as indicated by the findings. It is therefore important to link sustainability practices and advice to a clear business case (Sinclair, 2012). Raising awareness about the potential commercial benefits of enhanced socio-environmental performance embedded in quality management and project delivery could

result in managers being persuaded to adopt a more-positive mind-set (Worthington and Patton, 2005). The challenges of environmental protection and social responsibility, when viewed from the appropriate business perspective, can help to identify strategies and practices that positively contribute to social and environmental values whilst simultaneously embracing economic value (Elkington, 2011; Hart et al, 2003). The following sub-sections explore the quality management elements adopted by the companies which present opportunity for sustainable construction, as well as, enhancing their economic interest.

7.7.1 Quality Management Element that could Enhance Shift towards Sustainable Practices

As mentioned in the chapter 6, section 6.2.5, economic drivers and the quality movement in the construction industry significantly influence the behaviour of the companies. Despite the perceived low commitment and the ineffective enforcement of sustainability regulations, participants acknowledged that companies do not compromise on quality, for economic reasons – assured high quality construction work builds reputation which encourages more contracts. Figure 11 below shows elements and activities of quality management applied by the companies.

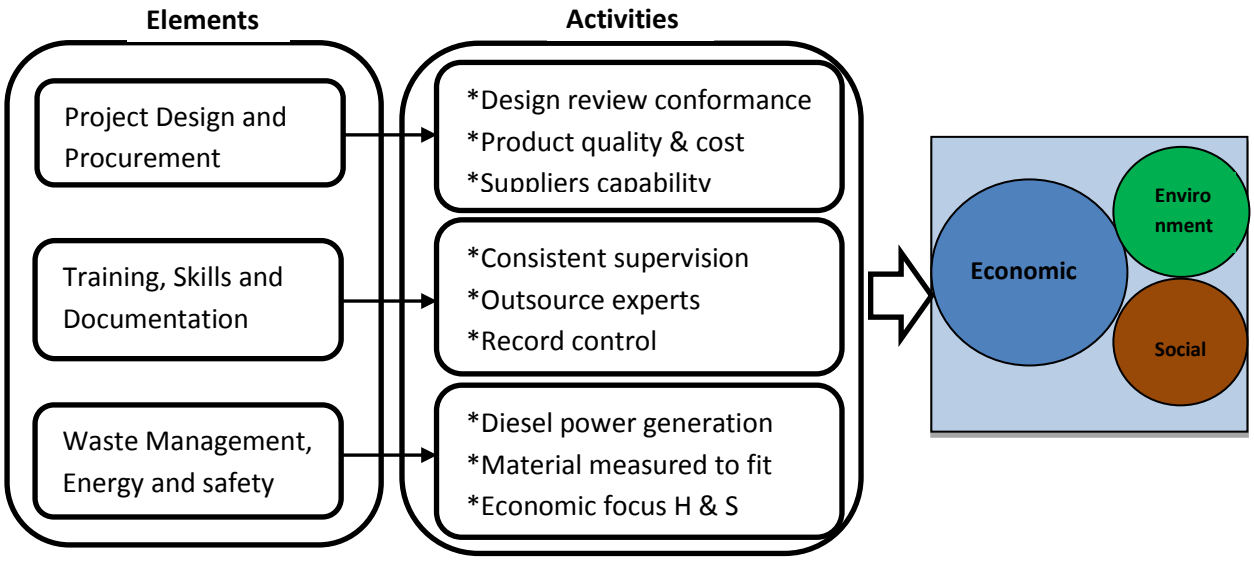


Figure 11: Elements of quality management system and companies activities

These activities focus more on economic values, but if adjusted to embrace social and environmental values would enhance a shift towards sustainable practices.

7.7.2 Design and Procurement

As mentioned in chapter 4 and 5, sections 4.3.2 and 5.3.2, the interviewees acknowledged that companies implemented projects from a design specification, and client requirements (OM1, PD1, PM5, PM9, PM3 and others), and a main requirement in design and the contract condition is quality. In keeping with the quality standard, the project managers and teams review the design to ensure safe and effective construction procedure to achieve the specific design standard, as well as to meet the client requirements. One of the project managers PM1, for instance stated that;

'We don't just accept your design, we cross check to ensure that your design is fine and everything is ok. We review the design to ensure that all is okay [...]. We also do feasibility study, we go to the site to check and ensure that the design is do-able' (PM1).

The activity of the project team at this preliminary stage is focused on procedures and processes to meet requirements of the design and client specification. Plans ensure compliance with required standards of materials and workmanship, in order to ensure performance of the project according to design is put in place. To shift from this traditional approach, the preliminary stage of the design reviews and planning presents the opportunity to embrace the socio-environmental concerns of the project design. Realigning the design review processes to capture more of the understated socio-environmental values will enhance shift towards sustainability.

With attention to conformance as the measure to quality during the construction process, the quality requirement and documentation becomes very important. Embracing the project socio-environmental issues alongside the economic concerns are crucial at this stage; this should be clear and verifiable so all parties will understand the requirement for conformance. As acknowledged by the interviewees, sustainability is not explicitly included in the project pre-construction phase. For instance, one of the project engineer PE7 commented that '*We do not have specific sustainability strategy in place neither are we aiming at specific sustainability target'* (PE7). This is because a project's sustainability performance is not expressly identified in the company's quality control and management strategy. If companies could include sustainability reporting in quality assurance documentation and developing the demand for quality by the client, it provides opportunity to embed socio-environmental concerns in the review of the project design and client requirements. Documenting and reporting sustainability issues in the quality assurance and management processes presents an opportunity to examine projects' socio-environmental performance together with the economic performance. This view is supported in the literature; for instance, Adams et al (2007) stated that integrating sustainability reporting in organisational practice encourages the incorporation of sustainability issues into decision-making processes. The most-important decisions regarding quality and project performance are made during the design and planning phase, rather than during construction. It is during the preliminary phase that component configuration, material specification and functional performance are decided. By evaluating projects socio-environmental impact in the design review, and incorporating it into the quality control planning and processes, it would enhance transition to sustainability without reducing the project's economic significance.

As mentioned in chapter 4, section 4.4.2 and chapter 6, section 6.3, evidence from this study suggests that quality is the main criterion for the selection of materials, sub-contractors, and the supply chain. The activities of the companies involve identifying and acquiring high-quality material specific to design and client need at the best possible price. Particular focus is on strength, durability and cost, with the view to ensure minimum defects in project delivery. Similarly, the main criteria for the selection of sub-contractors are cost, quality of work, experience and capacity to deliver. For instance, one of the respondents PM5 pointed out that, *'We also consider cost, if we can get supplier and sub-contractors who can deliver quality project at a relatively low price we don't hesitate to use them'*. (PM5). Quality management activities consist largely of selection and acquisition of materials ensuring

conformance to the original design and planning decision. The socio-environmental impact of the sub-contractors'/suppliers' activities and the impact of the materials production process on the environment are not considered in the selection of suppliers and materials. As PM1 put it, '*No we don't check all that, all we are checking is to ensure the work is within our contract price and the quality of their work is good, we are not interested in any other thing.* (PM11)

Embracing the understated socio-environmental issues in the quality audits that are overlooked by the companies becomes important for change towards sustainable practices. Quality audit and procedure mainly covers three realms: design conformance, process conformance and supplier deliverables (Basu, 2013). With regards to process conformance, companies focus on the results or products from subcontractors and suppliers. In the current quality management systems, the activities and process of production and delivery by suppliers and subcontractors are not included in the strategy for selection and award of contracts. By expanding the quality audit and management processes to incorporate socio-environmental factors such as impact of material production processes, and sub-contractors activities on the socio-ecological systems, this adjustment will enhance the understated socio-environmental values in the design and procurement practices. For instance, localization of supply chain in the audit processes to reduce travel distance of the workforce and pollution will also save transportation cost, as against the traditional cost-quality driven procurement processes. This approach would also help to embrace environmental business values with the social benefit of fostering local job creation without disproportionately affecting the economic benefits. Improving the design and procurement practices to promote not only economic values but also a project's socio-environmental values is a pathway to sustainable practices without a complete change in methods of the established quality management process.

7.7.3 Training and Skills

As mentioned in Chapter 4 (section 4.3.5), training and staff development programmes are not a common practice, especially for junior staff. This was acknowledged by most of the interviewees, PE7 for instance stated, '*Personally I think the lack of continuous training is a major problem'*. The implication of inadequate staff training is that project managers, the quality control managers, line managers and other senior management staff will have to continuously supervise and monitor the activities of workers to insure required quality standard is achieved. One of the interviewees PD1, comment that '*the major challenge here is lack of qualified manpower'*. The companies that participated in the study acknowledged that in pursuit of total quality control, in some cases, they outsource experts to supervise and ensure conformance to desired standard. Similarly PM1 alluded to this point in his remark:

'*We use tested standards and procedures, already established standards and procedures of work and ensure that we don't deviate from it rather we continue to improve on those practices, and we employ professionals in areas where we don't have the manpower to look into such aspect of the work'.* (PM1)

Rather than investing more effort to supervise or outsource management staff to constantly monitor and supervise workers to deliver desired quality standard, overlooking the understated opportunity to embrace related social sustainability, staff training. If the companies could channel effort towards extensive training and development programme

for the workers (both junior and senior staff), it will create the necessary confidence and genuine desire for workers to improve quality and standard of work.

Though, author such as Hendrickson et al (2008) argue that training and educating staff is difficult to apply particularly in construction due to the unique nature of each project, the variability of the workforce, the multitude of sub-contractors and the cost of investing in training and education of the various workforce. Nevertheless, trying to achieve greater quality through the traditional practices of outsourcing experts, may substantially increase costs of inspection and reduce workers' productivity. A commitment to improve quality through training and skill acquisition for the workforce can pay real dividend to the companies. This could help save the cost of continuous monitoring and supervision, as well as reduce the possibility of defect which would be more costly to fix. More importantly, it has a tendency to improve social values in the companies practices such as job satisfaction, skills and work experience, and opportunity for career progression and also reduces the barrier of inequality which was acknowledge by the interviewees as one of major challenge in the companies labour practices. Training and skill acquisition will increase worker competence and innovative capacity which could overtime promote companies economic interest.

7.7.4 Safety, Energy and Waste Reduction

Quality control and safety represent an important part of construction projects. Evidence from the primary research suggests that by re-aligning and re-organising the health and safety standards within the companies, it reduces site accident and presents cost saving opportunity. As stated in chapter 5 (section 5.3.1), the participants acknowledged existing health and safety regulations are not enforced in the industry, However, to promote total quality assurance in construction operation, and reduce cost of accident compensation, health and safety standards within the companies were improved, which was also a source competitive advantage. As PM1 put it, '*the companies too are working toward it* (health and safety standards), *particularly because of the insurance compensations'.* It buttresses the economic significance of improving socio-environmental practices. Participants reported that in re-engineering and implementing safety practices, companies activities involves assigning safety officer to monitor complaisance to safety standards and in some cases safety measure were resisted by the workers. The workers perception of the health and safety re-engineering initiative is mainly for company's economic interest, rather than genuine care for their safety and welfare, consequently, the level of compliance has been low. This view echoes in the comment attributed to PM5, *The challenges are even the workers themselves[…] due to ignorance and their level of awareness, because it is actually meet for their own safety'.* Re-aligning the company's safety standards will require an inclusive approach, to reduce any form of resistance. Adjusting the current practices will require a collective effort involving all personnel in the companies. This will create necessary understanding and motivate all personnel to genuinely accept the processes. Rather than focusing only on the economic value attached to health and safety practices, a shift to genuinely embrace worker safety to make them understand that safety programme is mainly for their interest will require a combine effort including the top management, and all personnel to collectively develop quality and safety programme. It requires collaboration; a more inclusive approach in developing companies' internal safety policies and programme

will create genuine sense of ownership and commitment by all personnel to embrace these practices which also produces some economic benefits. As Datta, et al, (2003) point out, an effective quality, health and safety management program not only assures a quality product but also reduces costs, and enhances productivity.

With regards to energy and waste reduction, the interview data suggest, the construction companies internally generate electricity due to the power and electricity challenges in Nigeria (see section 4.3.6). Companies focus less on energy efficiency because they are not directly responsible for the cost. The research findings suggest that limited priority is attached to energy efficiency and resultant impact on the socio-ecological systems, due to company's perceptions of sustainability as a secondary concern. One interviewee, PM1 stated *'we run every site on generating sets, because the country has epileptic power supply. Our policy is practically to run every site on generating set. There is no way we can minimize whatever usage because the generator has to be working 24/7, you can't rely on national grid'.* On the other hand, the government and regulatory agency (clients) are uninterested to monitor power consumption based on the notion that fixed cost of power generation has been set out in the contract terms, companies will be responsible for the cost of wastage or excess usage. One of the respondent from client and regulatory team RO3, comment that '*they don't waste energy because somebody is paying for it. If they use energy that is not needed we won't pay for it*'. With regards to energy generation, pollution and waste reduction, the activities of the companies is directed at generating enough energy to deliver project with less interest on pollution and ways to minimize energy consumption.

This strategy does not help companies to reduce the energy and carbon emissions impacts of their activities; neither does it encourage the client (government) to demand energy efficiency. However, if companies put more effort to reduce energy usage this situation can be altered. This can also translates to a drop in companies' energy generation which lowers recurrent expenditure. Thus, energy efficiency doubles as both an economic and an environmental measure. As an alternative, companies can focus on renewable energy source as against the use of diesel power generators. Also construction waste reduction through recycling and reuse, lower companies' negative environmental impacts and reduces materials consumption that a company requires, thus benefitting the company financially. By adjusting the company's current practices to include clear and measurable energy efficiency and waste reduction plan, it have the potential to fulfill both an environmental and an economic role in companies practices if included as part of the quality control and management strategy. The next section presents a framework to improve quality management activities to embrace more socio-environmental values.

7.7.5 Framework for Company to Embrace Sustainable Construction Practices

By identifying the understated elements in the company's quality management systems that embrace socio-environmental sustainability, and embedding these elements into their operations and activities. It would encourage companies to develop quality control and management standards within the sustainability context as against only economic context, without diminishing the economic significance. Figure 12 below presents how these activities could be re-adjusted to improve the inherent socio-environmental potentials contained in the current quality management practice.

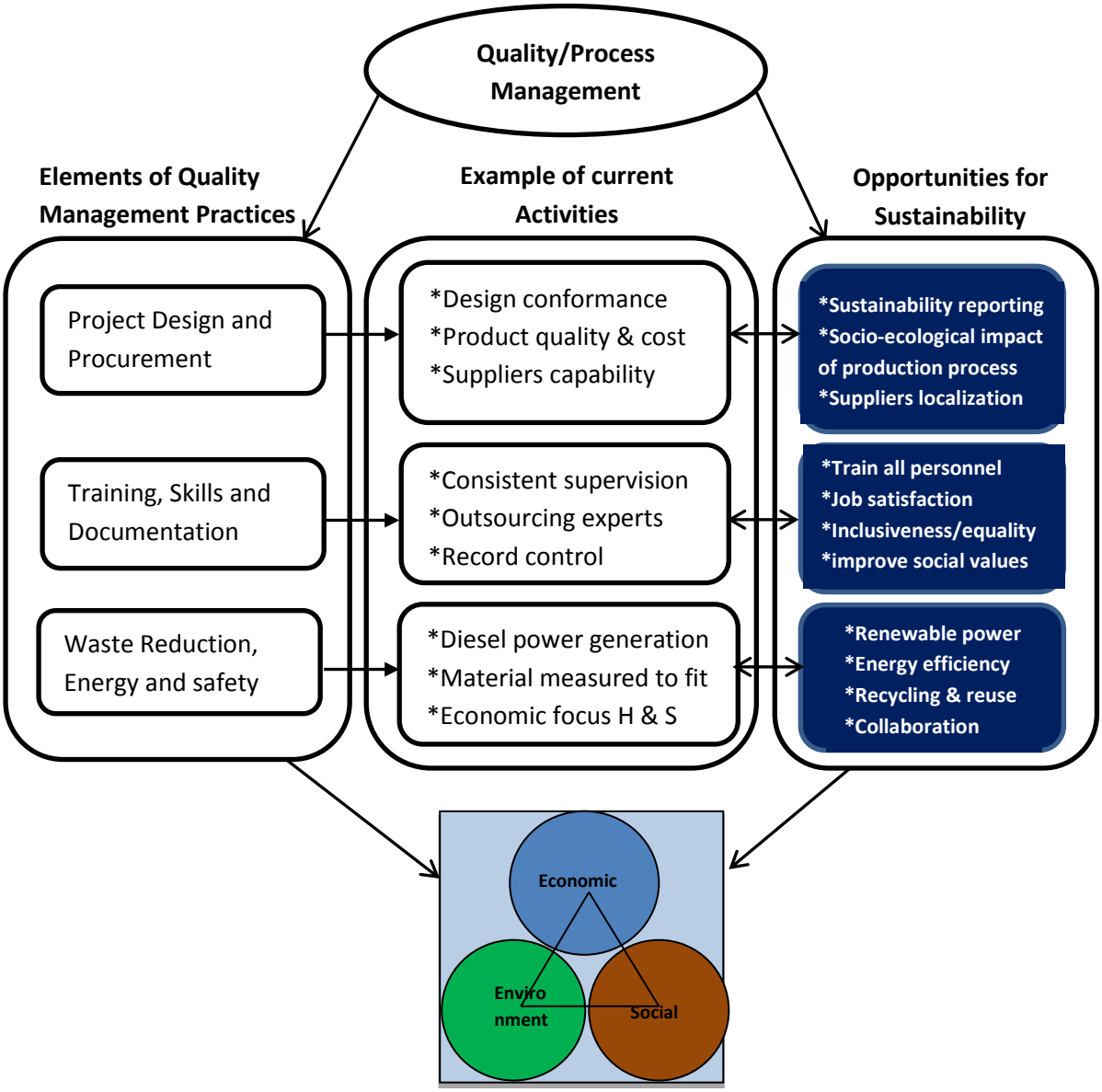


Figure 12: Quality management activities developed to enhance sustainable construction

Author such as McCabe (1998) argued that quality management, especially total quality management (TQM) brings about improvement in the project processes and products. Leveraging on the quality movement in the industry, a realignment of the process and structure of these quality management activities to improve socio-environmental practices is necessary to move towards sustainable practices. This does not require a complete change in process, but rather re-engineer the quality control processes to embrace the inherent socio-economic values without affecting the economic interest; rather it enhances the economic value.

Chapter 8

8 Conclusions and Recommendation

8.1 Introduction

This thesis looked at how construction organization in Nigeria can improve the level at which sustainability is embedded in their practices. It identifies the challenges to sustainable construction practice and developed a strategy to improve sustainability in the way companies initiate and deliver projects. This chapter draws together the major findings of the thesis and present the contributions of this study. It provides an understanding of the complexities associated with sustainability and construction in Nigeria and identifies opportunity for sustainable practices. Considering the complexities of sustainability and construction in Nigeria, it is not a situation where there are immediate cause-and-effect solutions to modifying construction operations to enhance sustainable practices, but rather a systemic solution is required, and there is need to move the entire system. This study identifies the various leverage points where to start moving the system. It utilizes a dynamic multi-level system approach for sustainability transition, to show how construction practices in Nigeria can migrate from the current traditional practices to a more socio-environmental path. This study argues that the first point of leverage is to renew the thinking from which the present system arises. More thought and attention is needed to improve awareness and education of sustainable construction from the standpoint of the benefits of sustainable practices. This would serve as catalyst for change that would affect the entire system. Another point of leverage is the quality movement in Nigeria. The present practices that ensure high-quality in the industry have potential for increased socio-environmental performance, but are limited due to the traditional practices focused solely on economic values. By adjusting the present economic-led quality management processes to embrace the latent socio-environmental values contained within it, will work positively for the attainment of sustainable construction practices.

8.2 Review of the Research Question, Method and Contribution to Knowledge

The construction industry contributes substantially to the development of most countries; it provides employment and facilitates economic growth. However, it is one of the largest destroyers of the natural environment, its activities account for about one third of global natural resource consumption, pollution and waste generation. These activities have resulted in various adverse environmental and social effects, such as climate change, energy loss, land degradation, social inequalities and conflicts, and various types of pollution (see section 2.4). In addition, construction procurement systems and the activities of companies that deliver construction projects are driven substantially by economic value. As a result of the impact of these activities, the construction sector is facing increasing pressure to adopt more sustainable practices to achieve better environmental and social performance in addition to their traditional economic functions. Several sustainable construction strategies and models have been developed to guide construction processes to mitigate adverse socio-environmental impacts (see section 1.1, 2.7.1, and 7.5). However, this has not yielded the anticipated change in practices in most developing countries including Nigeria. Amongst the

various sustainability transition strategies and models for change, the social technical sustainability transition model was further explored in this study as it closely reflects the multi-level change required in Nigeria's construction industry. However, the complexities of Nigeria's construction industry appear not well represented in the model. This situation is further compounded when these sustainability strategies or frameworks do not fit with the particular circumstances of the surrounding situation, especially in a society where practitioners/companies show apathy towards sustainable construction. The economics of the construction systems significantly influence actions and behaviour of actors. If the practitioners and companies that deliver construction projects are unsure of the benefit of adopting these strategies they are likely to stick to the long established traditional practices.

Construction activities in Nigeria are based on long established traditional practices that are inherently unsustainable. The huge number of on-going building and infrastructure development projects and overall development-need presents opportunity to follow sustainable development path. But, the systems and structure of activities in the construction industry such as the contract administration practice, government policies and regulatory framework and the construction business environment do not expressly support sustainability (see section 2.5.1, 5.2, 6.2.2 and 6.2.4). The outcome of this situation is low uptake of sustainable practices, which leads to an overall increase in environmental and social damage. However, it is necessary for construction companies and other stakeholders in the industry to operate in such a manner that will minimise, or as much as possible, eliminate the possibility of further socio-environmental damage.

This research aimed to explore the extent to which sustainability is considered and applied in construction practices in Nigeria. It focused on how companies can improve their practices to further embrace sustainability, by looking at the construction governance environment and the current operational approach of companies, and exploring opportunities that lie within it. The primary research was set within a critical realist philosophy which has a physical and socially construct of reality with the possibility for practical improvement guided the methodological approach of the research. This approach to knowledge conceptualization was useful to understand the current situation, the rational for present practices and the factors that influence the actions of the construction companies and professionals in the industry. Through understanding of the causal factor and context within which present construction reality occur the researcher was able to identify how initiate change to improve the situation. A two-stage data collection and analysis methodology was used to conduct the primary research. First a survey was conducted using a sustainability assessment model to gain insight into the current situation, and the extent to which companies have the desire to improve. The second stage involved interview of the companies' management teams, and some regulatory institutions, to investigate the rationale for the current practices and possible approaches to introduce change to more fully embrace the ethos of sustainability. The first stage of this primary research provided information on the current practices of the companies investigated and

the level to which sustainability is embedded in their practices. This serves as a scoping review to gain insight into the current situation in the construction industry. The survey data gave little indication of the rationale for the current practices, thus the second stage was required which involved interviews of the management team of the companies and government regulatory institutions to understand the underpinning rationale for the current practices and identify opportunity for change.

The sustainability assessment survey of the nine projects investigated provided information on the extent sustainability is considered and applied in the project management practices of the participating companies, and also identified existing problems related to their perception and desire to address or improve their socio-environmental practices. These problems include the pattern of natural resource extraction and waste generation, energy consumption, inadequate training, issues of employee care and a general unwillingness or low desire to improve current processes. The companies are more susceptible to improve economic values as the performance of economic sustainability was relatively higher than socio-environmental sustainability. Except for economic sustainability, the survey indicates that constructions companies show little interest to improve their practices towards addressing socio-environmental concerns (see section 4.2.2 and 6.2.2).

The interviews of 31 representatives from the management teams of the companies, clients and regulatory institutions provided information about the opportunities for, and barriers to, sustainable construction practices in Nigeria. The data indicate that the construction industry faces several challenges such as the level of awareness and understanding of sustainable construction, perception of construction delivery, stakeholders' commitment to sustainability and values, capacity to deal with sustainable construction issues, and difficulties of developing and implementing regulations that support sustainable construction. The interview respondents perceived that sustainable construction is not a priority in project delivery, as it may be detrimental to the company's economic goals and the urgent building and infrastructure development needs of society. Consequently, sustainability is not explicitly embedded into the value system of the local construction practices. This is evidenced in the general lack of commitment and political will to implement and enforce socio-environmental values in the operations and governance of construction activities in the industry. The results showed that the companies demonstrated a significant degree of awareness and commitment to quality, and has a great desire for continues quality improvement in their practices. However, the main motives behind this behaviour were economic interest and for the company's reputation (see section 5.3.2 and 7.3). This behaviour is connected to the stakeholders' level of understanding and the thinking from which the present construction system arises. This study argues that the first and most effective point of leverage for change in the industry is to renew the thinking that created the present practices; this will be a catalyst for change that will flow throughout the entire system in the construction industry. Adequate information and education plays a

significant role to achieve this, especially information communicated from the viewpoint of the benefits of sustainable construction.

This study argues that change in the perception and decision-making processes will result in a value shift that will encourage movement of the whole system towards the path of sustainability. Through system approach, the social technical sustainability transition model was utilized to determine how to create change in the construction industry. However, the complexities of Nigeria's construction system appear not to be well represented by transition theory (see section 7.6). This research provides a model to improve sustainability in construction practices in Nigeria; this model is a development that encompasses the aspects that are overlooked in the socio-technical transition theory. The model presented in this research suggests that by renewing the thinking of stakeholders through education and information from the perspective of the benefits of sustainable construction, together with active involvement of socio-ecological stakeholders in the decision making processes, would facilitate change in key stakeholders' perception of construction and this would provide opportunity for value shift. Value shift is the hub that will enable commitment to develop capacity and infrastructure for sustainable practices, and this will encourage development and implementation of regulations to support sustainable construction.

The transition theory assumptions that relate to adequate sustainability information, capability of the niches to influence change, together with the co-evolution tendencies of the niches and the supporting systems to bring about transition(see section 7.5), do not adequately describe the case of the Nigerian construction system. In the Nigerian context, the inability of the niches to effectively initiate change due to the configuration of the systems in the industry, together with the absence of active and functional institutions to support a transition towards sustainability make it difficult to effectively utilize the transition theory. The socio-technical transition theories assume co-evolution of the social and technical systems, this require sustainability education, research and innovation which appear to be lacking in the construction industry, reducing the possibility of transition through this pathway. The socio-technical transition model focused on bottom-up approach to change, downplaying the role of top-bottom approach in transitions. It places undue emphasis on regime change and policy development beginning from the niches, overlooking changes that operate downward. However, in a Nigeria context, multiple-level change is required, and a combination of top-bottom and bottom-up approach simultaneously occurring is more likely to move the system towards sustainable construction due to the configuration of the construction industry and apparent class system in the society.

In this research an opportunity for change has been identified based on the high priority placed on 'quality' in the management and delivery of projects. The clients, companies and regulatory institutions identified 'quality' as the main criterion for construction operation and project delivery (see section 5.3 and 6.3). By further exploring elements of sustainability embedded in the quality management systems, an opportunity to embrace sustainable

construction is apparent. Based on the research data and the movement for continuous improvement in quality management by the companies, the research argues for an adjustment of the quality management system from the singular, economic-led process currently dominating the construction practice, to an approach that embraces socio-environmental values. To enable this, the research focuses attention on latent social and environmental functions contained within traditional quality management processes, and their potential to act as a bridge between traditional and sustainable construction practices. In this way, it intends to encourage companies to view quality management processes less as a wholly economic process, and more as a sustainability-related one. Likewise, more attention needs to be given to the economic benefits of social and environmental sustainability, in order to provide an incentive for companies to implement these practices. Since this approach mainly calls for a shift in how the existing quality management systems is viewed, it presents opportunity for less resistance to change by the companies and practitioners, as opposed to the design of an entire new process.

To facilitate this shift, the research presented the framework for change through explanatory model that represents the traditional quality management system (which focuses on product quality and economic benefits), while at the same time highlighting the interconnections between economic, environmental and social issues. The insight into the practice of companies provided at the interview stage was used to explore how companies could change to support more socio-environmental practices. The companies were found to be generally less receptive to environmental values and practices where these were not perceived as being useful for delivering financial gain. This model acknowledges the high priority attached to economic considerations by companies, but also ensures that wider social and environmental issues are not overlooked. Various elements of quality management were identified in the model, which was traditionally viewed from an economic perspective by companies, but also has the potential to deliver environmental and social benefits.

The transition from poor quality management and project delivery to the present more improved quality standard in the construction industry was significantly influenced by the benefits and economic interest of the companies and actors in the industry. The quality change experienced in the industry could also occur for sustainability. Construction companies could embrace environmental and social practices not as symbolic gestures of goodwill, but as part of an active strategy aimed at enhancing quality management and economic performance. They can share responsibility for sustainable practices by demanding integration of these additional elements of quality considerations from their suppliers, as well as collaborating and supporting flexible working relationships and shared values. They can develop collaborations with partners that also adhere to similar socio-environmental values and practices in their operations. The social and environmental benefits of the adjusted quality management system can then be promoted to potential clients and other stakeholders in ways that appeal to their economic interests, rather than

from a strictly socio-environmental standpoint. Further, engagement in shared learning with clients, regulators and those involved in supply chains can also be pursued.

8.3 How the Research Aims and Objectives Were Achieved

The research aimed to determine how construction organizations in Nigeria can improve the level at which they consider and apply sustainability in their practices. Six objectives were set out to address this research aim, and the processes of achieving these objectives were described throughout this thesis. The following sections summarise how the aims and objectives were achieved.

Objective 1 - To critically review literature on sustainability and construction, and establish the meaning of sustainable practice in different contexts and explore theories of change

The research presented literature on the meaning and interpretations of 'sustainability' and 'construction', and provided insight into the main descriptions of sustainable construction and how the concept is applied in practice. This literature revealed the different interpretations of sustainability and construction, and identified elements of sustainable construction practices. It also presented literature on construction practices in Nigeria to gain insight into the current debate and system of operation in Nigeria's construction industry. It also provided the various models, frameworks and strategies for sustainability transition in different contexts - the developed and developing countries – to understand how best to introduce change into the present construction system and practices in Nigeria. The literature showed the different perspectives and approach for sustainable practices, thus requiring a selection of issues the researcher found useful for the fulfilment of the research aim.

Objective 2 - To investigate current practice regarding construction organizations in Nigeria

While objective 1 focused on establishing the meaning of sustainable construction practices, objective 2 tried to find out the current situation by assessing the extent to which companies in Nigeria consider and apply sustainability, and how it is embedded in their practices. In order to achieve this objective, the research provided insight into construction activities of companies by conducting a sustainability assessment survey. The assessment questionnaire provided information on the companies' sustainability strategy, and the extent to which economic, social and environmental sustainability are considered and applied in the companies' practices. This provided data from which the current practices and the companies' sustainability performance could be interpreted. The assessment was limited to nine projects from three different companies; this however serves as a scoping review to gain insight into the current situation regarding the extent to which companies in the construction industry consider and apply sustainability in their practices.

Objective 3 - To determine the drivers and barriers to sustainable practices in Nigeria

Through interview of the management teams of the construction companies, clients and regulatory institutions, information was gained on rationale for the current practices. The interviews provided information on their understanding, motivation, commitment and strategy for sustainable construction. From this, the factors that influence the actions and behaviour of the construction companies and actors in the industry were identified and analysed, using the Nvivo 10 software application. These factors were cross-referenced with the literature and classified into themes which represent the barriers and opportunities of sustainable construction. The themes are based on the relationship between the different parts of the research data, both the survey and interviews, and they present the key issues to sustainable construction within the Nigerian context.

Objective 4 - To provide an understanding of the complexities associated with sustainable construction in Nigeria

In order to achieve this objective, a narrative of the primary research data is presented to gain understanding of the degree of complexities associated with embedding and implementing sustainable construction in Nigeria. This narrative is solely based on the findings from both the survey and interview data. It builds a picture of the business environment and the system that govern construction operations in Nigeria and its impact on the uptake of sustainable construction practices. It discusses the activities of certain aspects of the system such as the government, the construction industry and the companies, and presents the complex challenges associated with sustainability and construction in Nigeria.

Objective 5 - To develop a strategy for change towards sustainable construction practices in Nigeria.

Based on a review of diverse theories of change, an explanatory model based on system approach was created using ideas from various change theories with properties from the research data to show how a more-effective change that would flow across the entire system can occur. This research argues that this strategy can assist stakeholders in their understanding and operationalization of sustainable practices in the construction industry and acts as catalyst for change. This strategy might look complex and broad; however, it introduces an effective approach to cultural change in Nigeria's construction sector. It also provides visualisation of the possibilities of change as well as a route to positive decision making towards sustainable practices.

8.4 Contribution of this Research

The research achieves its aim of presenting how construction organizations in Nigeria can improve the level at which they embed sustainability in their practices. In this, it makes a number of contributions to existing knowledge. First, it presents the extent to which construction companies consider sustainability and how it is embedded in construction

practices in Nigeria. Although studies have revealed poor sustainability performance of construction in developing countries and in sub-Saharan Africa, there is yet limited knowledge on the level to which the three main tenets of sustainability (economic, social and environmental sustainability) are considered and applied in practice by companies in Nigeria's construction industry prior to this research.

Secondly, this research showed for the first time, the determinant of the current practices through a detailed description of the governance environment of sustainability and construction in Nigeria. It provides an in-depth understanding of the complexities associated with integrating sustainability in Nigeria's construction industry. Through a systems approach, it identified the interactions and interconnectedness of the different parts of the construction system and its impact on companies' behaviour. It identified the opportunities and barriers to sustainable practices and the factors that influence the actions of actors in the system. First, low understanding and awareness of sustainable construction informs the policies and practices that drives the operations of actors in the industry. This connects to the weak regulations and empowerment of institutions to enforce and implement regulations that support sustainable practices. In addition to this, factors relating to values and construction perception significantly influenced the commitment of key stakeholders. The government (which is also the main client) does not expressly demand sustainable practices, and with the absence and/or ineffective enforcement of sustainability policies and legislation, companies and actors in the industry show apathy towards socio-environmental sustainability in project delivery. Together with this, the challenges of corruption, insecurity, improper coordination of construction activities, cost-benefit uncertainty, inadequate training, skills and funding to support sustainable construction present additional layer of difficulties. Consequently, there is a general low interest towards uptake of sustainable construction in Nigeria. Opportunities for change were identified based on the economic interest and quality movement in the industry (see section 5.3.1 and 5.3.2). High priority is placed on 'quality' in the management and delivery of projects and with quality as the main criteria for contracts awards, all participants acknowledged quality is not compromised. The companies perceive improved quality management in project delivery provides competitive advantage (see section 5.2.3);through broadening of the quality managements practices to embrace socio-environmental values inherent in the traditional economic-led quality management processes presents opportunity for sustainability (see section 7.7.5).

The third and more important contribution of this research shows how change from the traditional practices to sustainable construction can be achieved both at the macro level (construction industry as a whole) and at the micro level (company level). The system model that was created and presented in Figure 9 is a significant development in this field both for practical change and for conceptual representation. It explores the complexities and the dynamic nature of Nigeria's construction system which is not well represented by the current sustainability transition theory. The model for change presented in this study is a development of the sustainability transition theory (addition to the aspect that was

overlooked). The approach integrates the different properties and elements of sustainable construction into a single framework, it identified the most effective point for change intervention that may well flow through the entire system and presents the various drivers and catalysts of change. It argues that by changing the thinking from which the present system arises, it would provide opportunity for change that will affect the entire system. Information and education through the standpoint of sustainable construction benefits will facilitate change in stakeholder perceptions of construction, creating value shift which in turn will encourage political will, commitment, and demand for sustainable practices. This could eventually result to empowerment of institutions to support and implement sustainable construction regulations.

At the company level, the study shows that the current practices which are focused on product quality, although they have potential for socio-environmental performance, are limited due to the conventional practice focused economic value. Nevertheless, this study reveals that the prevalent economic-led approaches to quality management do have latent socio-environmental values which can work positively for attainment of sustainable construction (see sections 2.6 and 7.7.5). Thus, companies' decision-making, which is currently dominated by economic values, can be influenced to see the associated benefits of embracing socio-environmental values and practices. The construction companies can become more encouraged to embrace the socio-environmental opportunity inherent in current quality management processes, if they can perceive that environmental values and practices have the potential for the achievement of the conventional economic benefits. The research indicates that the transition from a traditional to socio-environmental forms of construction practices does not so much require wholesale change, but rather a modification of how conventionally construction practices are viewed by companies and professional delivery construction projects.

This thesis shows how change towards sustainable construction can be achieved. Through explanatory model this study showed how sustainable practices can be achieved in Nigeria's construction industry. It identified the various points of intervention for multi-level change to move the construction system towards the path of sustainability. It argues that the most effective point of intervention that will facilitate change that will affect the entire system is to change thinking from which the present system arises. Beyond changing stakeholders' values and perception of construction, this study acknowledges that understanding of the psychology of decision making is only a part of the change process as this will involve broader social, economic and regulatory forces that influence construction practices. As there are multiple aspects involved that need to co-occur, requiring change through top-bottom and bottom-up pathways. This study suggests that change in perception is needed as a baseline intervention to initiate change that will trigger other changes. In view of the importance of sustainable construction and the potential mechanism for intervening, there is need for governance, legislation and policy modifications. The people that are going to help achieve these goals in Nigeria are the construction professionals, thus change in

perception of these professional will enhance the application and implementation of other interventions.

The contributions of this research may well provide positive impact on the actions of actors in the industry; it will enhance understanding of sustainable development by providing a knowledge foundation for sustainable practices and facilitate the creation of new opportunity for the development of socio-environmental sustainability in the construction industry. This could inform future policy development and practice based intervention that addresses the particular circumstance with sustainability and construction in Nigeria. The information and contribution from this research could help in development of issues relating to knowledge and implementation of sustainable practices, this could stimulate debates amongst practitioners and shape wider discourse in the field of sustainability and construction in developing countries. By providing evidenced based-research and identifying the step needed to improve sustainable construction practices in the industry; it will help to advance the quality of decision making for legislative and regulatory intervention in Nigeria. The outcome of this study would help improve planning and delivery of construction project in Nigeria. It does this by providing robust, timely and relevant information drawn from this research finding, and this may well have positive influence on construction quality standards and legislation of quality requirements in Nigeria to enhance socio-environmental values.

8.5 Limitations

As with most research, there are limitations to the findings from this study, especially in relation to the methodological approach. First, there are limitations that are associated with the ability to generalize the outcome of this research. In conducting this study, the critical realist philosophical stance was chosen as a framework because this research is not just about objectively describing the present reality, neither is it about the subjective interpretation of the perceptions of different participants. Rather, it is about understanding the causes of the present situation and identifying how to improve them. In this philosophical stance, emphasis is not on generalizability of the findings; but, to understand the causal factors, identify opportunity for change and develop a strategy to improve the present practices. By understanding the causal factors for the actions or inaction of actors in the industry and the context within which these actions occur, it was possible to identify how to improve the situation. However, the limitation necessitates caution to be exercised in the interpretation and generalisation of the findings. Although knowledge from this research can be generalized to situations with similar sustainability barriers and causal factors based on the concepts of relativity (Flyvbjerg, 2006), it really only refers to large multi nationals in Nigeria. The work would suggest that a similar result could be found in most developing countries especially countries in sub-Saharan Africa; however to support this more work is required specifically investigating the transferability of the model. Thus, instead of generalizability, a key important indicator of this research should be transferability. Bell (2010) point out that generalisation is only one of the ways to gain or accumulate knowledge.

Second, this research is limited to multinational companies delivering government building and infrastructural projects; it focused on nine projects from three multinational companies operating in Nigeria. Arguably, results based on study of the practices of three companies may not provide a fair representation of the overall population of companies operating in the construction industry. Focus on multinational companies is deliberate because it is anticipated that investigation of practices of companies with no knowledge /familiarity with the concept of sustainable construction will add another layer of complexity to this research. The present research does not seek to evaluate and interpret construction practices, but rather to gain broad insight into the current situation with regards to sustainability and construction practices in the industry and from this develop a strategy for improvement. As mentioned in section 3.5, an important criterion for the selection of case study was the ability of the participants to provide informed answers to the research questions which explore the wider issues of sustainable construction. Therefore, Government projects managed by multinational companies with professional employees that have knowledge of sustainability issues were selected. Yin (2003) points out that the type of questions, the degree of focus of the contemporary issue and the time available for the study are important condition for selection of case study. This suggests more work is required to investigate other companies, specifically local firms for a fair representation of the overall population to gain in-depth insight into the practices of construction companies in Nigeria.

Third, the fact that the concept of sustainable construction is based on value and factual components, without a unified meaning or interpretation presents a potential limitation to the quality of the research. This study however, limits the interpretation of sustainability to the three main tenets; economic, social and environmental concerns to determine the company's performance. Since values are intangible and cannot be directly detected and measured, then this work interpreted values from practices and interview replies. This is a legitimate approach however it does rely on the position of the researcher. This research infers value from the actions, commitment and behaviour exhibited by the companies and within and among the construction stakeholders. As Kim (2011) and Khazoranchi et al (2007) point out; organizational values are evidenced by practices. Though, it was not explicit whether the participant's responses to the questions represented the perspectives of the companies or was based on individual perspectives as the interviewees tend to switch from individual and companies perspectives in their responses. The researcher had to extrapolate the views of interviewees from the company perspective based on the notion that the action of individuals in a company is guided by the corporate policies and practices.

8.6 Recommendation for Future Research

This present research identified the opportunity inherent in the quality movement in the industry to model a transition strategy by which the traditional economic-led perspective of quality management can be adjusted to a more socio-environmentally inclined approach. The quality configuration and management process in the industry could be investigated

further to gain a more in-depth insight into the companies' quality management practices and the quality management systems in the industry. This will help to identify specific areas requiring modification/adjustment to improve social and environmental practices of construction stakeholders in the industry.

Findings in this present research indicate sustainability is more closely associated with economic concerns, and socio-environmental practices have significant economic benefit in the short and long term perspectives. Further research is needed to explore the economic benefit of embedding socio-environmental values in construction practices in Nigeria. This would strengthen the economic significance of socio-environmental practices and further incentivise companies towards the uptake of sustainable construction practices.

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Appendix A

Interview Transcripts 17 – 30th August 2014

Date: 18/08/2014

Location: Abuja, Nigeria

Length: **[00:30]**

Interviewee: .....

Interviewer: Esezobor Emmanuel Love

(Start of Interview)

E: What is your understanding of sustainable construction?

In this part of the world we are yet to really understand what construction is all about. The way you do it for Mr A is the same way you do it for Mr B even it is a different kind of construction activity. You do a building for Mr A and go to Mr B you see it as the same kind of building, for example, if I use 10mm bar here….it is always the same 10mm bar, we still have that same kind of believe here. But this not how it should be, for us to be really be into this we really have to enforce some standard……some rules that would differentiate who should be practicing and who should not be practicing.

E: Does the company take the issues of sustainability seriously?

Sure….This is a multinational it's not local construction, we take all we do with all seriousness. Sustainability to us means quality, because if it falls we have to be responsible for the cost of reinstating it. So we have to work towards our goals to make sure that everything works according to plan.

E: How do you consider sustainability in your practice?

We us tested standards and procedures, we adopt already established used standards and procedures of work and ensure that we don't deviate from it rather we continue to improve on those practices, and we employ professionals in areas where we don't have the manpower to look into such aspect of the work. And then we also make use of modern tools, in any area of construction where we think we are behind we go for the best equipment around.

E: Do you have specific sustainable strategy in the company?

Not exactly, for example when you compare to it to something like health and safety (HSC) where everybody is reminded of the need to be save in the site, the aspect of construction here is really not like that compare to the actual expected standard. At the construction site local people are only told what to do base on the situation at hand, there is no specific sustainability strategy.

E: What in opinion is the challenge to actually have and implement sustainability strategy in the company?

The major challenge here is lack of qualified manpower….. Even the expatriates that are also coming in here most of them are not qualified. Also the corruption in the country is hampering issues. Where you need the company to do things right in some areas, some individuals who are after their own personal benefit and put their interest above the general public will want to subdue every others person because they are in power or directly responsible to monitor or approve of certain activities, so they will want things to be done in their way. These are the challenges we are facing.

E: In your opinion, how do you thinks this can be address?

First we have to fight corruption, until we kill corruption every other thing will not work.

E: What environmental practice does your company observe and why?

Emm […]emm […]

Are there specific policies regarding the use of natural resources?

For the company, we work according to the rules. On the issue of the environment, the federal ministry of environment is there to regulate issue concerning the environmental impact assessment, environmental rehabilitation plans and all that. But these organizations are passive themselves, very passive. Only recently they are trying to be active, but I still consider them to be passive because they are practically not enforcing anything. For this reasons, it gives the company room to practice and do whatever they like. To the company it's okay because they are profit oriented, and the more the body or authority responsible for enforcing environmental issue are not enforcing it the more money they can make by going around these issues. On the issues of natural resources like the aggregates such as sand we acquire to do the roads, there are also different body in charge for that, although they are more active, but yet not effective because there is no way of measuring what is taking out of the construction site or for use or taking it to other place. The whole environmental issues or concerns are not just working, everybody does what they like. All these organizations are not working together to ensure that construction activities or environmental issues are properly addressed. Thus, everybody works according to what they think or believe to achieve what they want, the more money they can get is what is more important to them. For example, collection of aggregates/laterites, the company is

supposed to pay the government in form of royalty. But since nobody is monitoring the companies can take 20tones and pay for only 10 tones because there is no way of measuring it and the ministry in charge is not doing anything about it.

E: How does the project promote smart use of natural resource and try to minimize waste?

We try not to waste any of the resources because the more waste the more money we are losing. Presently we are not under check from anybody we have to check ourselves because it affects our income. So we ensure that waste is minimized for profit reasons by making sure that every segment of the construction works according to plan. On site we have instruments and do measurement to ensure waste is reduced to its barest minimum, this is mainly for profit/company's benefit.

E: Are there plans within the company to improve your methods of waste reeducation, especially to minimize waste of non-renewable resources?

For now we are not looking at improving our methods because we believe the method we have is adequate.

E: Do you have policy for material selection?

Yes [...] we make sure we do the design first and based on the design we make sure that the right materials are selected and available. We select materials that certify our need based on design requirement. Our need/standard is based on quality.

E: Do you consider the impact of the material selected on the environment/society or you are more interested in meeting your quality standard?

We consider the impact of material used to the society because we are part of the society. Our main focal point is quality. We try to consider British standard.

E: Does the project have any specific policy or strategy to reduce energy consumption?

We run every site on generating sets, because the country has epileptic power supply. Our policy is practically to run every site on generating set. There is no way we can minimize whatever usage because the generator has to be working 24/7, you can't rely on national grid otherwise you be in the process of doing some important things just then electricity goes off and you will have to start all over again. The generator keeps running 24 hours because there are some equipment that we need to keep running, like the laboratory need electricity 24/7. We also have site where our security are always there and they need light around the site to make sure that criminal don't do away with our equipment's. Also we have some staffs that live within the site, particularly the sites that are located far off from the community where people live, we build camp for the workers so generator need to run to provide electricity for them.

E: How does the project or your company promote smart use of energy and reduce pollution?

Yes we have such arrangement, but the problem some time is the change over from the big generating set to the smaller ones. In some of the site we don't have automated system to make such changes and we don't have inverter that can keep the power supply to those vital equipment's when there to change over from one source to the other. For this reasons we leave the generator running continuously. Although we sometimes run site that require higher capacity supply with larger generators and the smaller site we run with small generators.

E: Do you do design and built?

No we don't, we only do construction. However, we don't just accept you design. We cross check to ensure that your design fine and everything is ok. We review the design to ensure that all is okay, you know we are human and even the consultants make mistake. We also do feasibility study, we go to the site to check and ensure that the design is do able.

Does this apply to other big construction companies?

Yes, all of the big companies here operate under the same principle. We are all in the same environment and the same things are affecting us. We are all facing the same problems.

E: In your construction processes, do you consider biodiversity?

Yes, we do that. It will even cost us more to try and bulldoze everything around you, so we leave of them for environmental reasons

Do you have policies or standard for labour practice?

In this country we have the minimum standards for workers' wages that is what we maintain and try not to go below the minimum. Anything above it is okay for us; we try not to go below the minimum.

E: What social practices does your company observe?

We ensure workers are safe on site

How do you address the issues of health and safety in your project?

Before now people don't even talk about health and safety in construction apart from the oil and gas industry, gradually it is coming into the construction industry. But it is in construction you need it the most because this where the hazard really is. Ministry of labour is working towards creating unified standards where all construction companies would have to fall in, to make sure that workers are being protected because the rate of accidents in the site is becoming too high. Also the companies too are working toward it, particularly

because of the insurance compensations. The kind of expenses they are incurring for compensating toward injuries is high so they are trying to improve and work in line with HSE policies of the federal ministry of labour.

E: What do you think are the challenges to improve the present health and safety concerns in the sites?

The challenges are even the workers themselves, most the workers will tell you I can't put on the helmet its making me feel uncomfortable, if I use the hand gloves I can't hold the tools firmly, the boots is not allowing me to move freely, all these are the kind of complain you get from the workers, but it is actually meet for their own safety. Some other workers you provide safety equipment for them they go home and don't come with it to work. Some even go to the extent of selling them off. Although this process is just starting we believe with time they will get to understand the importance/need for the safety equipment. We intend to enforce it by telling them if you don't wear it or come to work with it you might be dismissed, because by their not putting on safety equipment is also putting us in problems.

E: Do you also require your suppliers and sub-contractors to meet this standard?

For now no, but is part of the things we plan to enforce. Because if anything happen to them within our construction site we have to be responsible, all these we plan to enforce.

E: Does the company provide training for staffs?

No, it is not effective. It only when some organization comes and maybe they request to do training for some category of staff that the company takes it serious. But to have a schedule for training staff or for specified period is not done.

E: What do you think are the reasons for the company behaviour?

The thing is just for economic reasons. And sometimes they tell you if you train them now some other companies will take them off you. This is also because of poor wages, if you train some body and the person is now aware of his/her potential and some other company is offering a better opportunity/pay they are bound to leave. For this reasons some company don't want to even train anybody. They just want you to do the work; they provide something like emm […] indoctrination. This is how it's being done and this is how I want you to do it and that's it. But to send you somewhere to obtain quality training where they will issue certificate or it likes most of the construction companies are not doing it.

E: In your opinion how can this issue be address?

If we can create something like the local content law, like the way it's being applied in the oil and gas it will go a long way to improve on the quality of construction personnel.

E: Do you have contract agreement with employee that addresses this issue?

The contract agreement in this company did cover such issues. Clauses like that are not in it, however, if you know the value of your worker, particularly the one you have trained you should be able to give them good incentives to encourage them to stay with you.

E: Do you take social responsibility toward s the community you operate in?

Yes, that is something that is being taking seriously now. For now I know of the federal ministry of mines [...] where ever you have quarry you must have community development agreement signed with the community even before you do anything. In construction it is expected that you do same, but I am not aware of any law at the moment that say we must do so. Most companies are not doing it, on our own we are doing our best to provide social responsibility towards the community we operate in. but in all our quarry activities we take social responsibility towards the community where the quarry is sited.

E: How and to what extent does your company engage with this community?

For example you have a damp located in a community. The community might be resettle and provided with means of livelihood, because you have taken over there farm land source income. Also we try to engage them for the period of the project, anyone within the community that is qualified will be employed and place according to their qualification. We access every employable person within the community and place them where they belong. That also provide some guarantee that the community will not come and disturb work on site. This approach is taken to avoid problems with the community. The company provide social responsibility towards the company not because the law require the to do, but to avoid disturbance from the community

E: How do you address issues such as bribery and corruption in the industry?

In this part of the world corruption is still very much high, both in the ministry and everywhere. There is really no way you can tackle this, all you do is to have a good relationship with around and give the best price in your quotation, give competitive price then the rest is left for the ministry. But you cannot really say how you handle it because everybody has their own way of going around things. Bribery and corruption is a major challenge but every company know how they work it out.

E: Within the company how do you deal bribery and corruption?

We ensure that we have good communication with the client, if you have good relationship with the client I think you have an edge over the others, but beside that we do PR although to a limit if not it becomes bribe. The key factor is to have a good relationship with the client. We can lobby them on personal capacity like friends, school mates, you have known the client for a long time etc. there is no amount of money you are going to give, a richer company might do more so personal relation is what's more important.

E: How do you deal with the issues of tip and bribery between the sub-contractor and supply chain?

There is just no control over that; we don't have means of checking that. There is just no way you can do it. The supplier comes with whatever is going to supply, there is already approved rate and that is what is in the invoice, whatever he does with who is paying for the goods or who is receiving the goods nobody will know about it because it is not recorded anywhere. These are silent kind of activities that there is no way of knowing or tracing it.

E: What criteria do you consider for project selection? Is it based on long, short or medium term?

For us we look for short term contract, the once we can do within a short period and receive our money. Any long term contract is a risk because change of government in any part of the country is a problem. Once there is change of government you might run into problem with the new government. Anything we can do within one to three year we aim towards that. However the short term contract turns out to be long term because of delays in payments.

E: Do you consider options for flexibility and future changes in project delivery?

Not quite, our project and design is fix

E: Do you have any criteria for selecting suppliers and sub-contractors?

For now we don't have any criteria for selection, because there are limited good contractors and supplier. What we do is that we make use of old hands, the once we already know in terms of honesty and our previous experience with them. You can get some contractors and they become funny once contract have been awarded to them you start having problems with them. We prefer the use of old hand we already know and have worked with before.

E: Do you consider the impact of the contractors /suppliers activities on the environment and society?

No we don't check all that. All we are checking is to ensure the work is within our contract price and the quality of their work is good, we are not interested in any other thing.

E: Thank you.

Appendix B

Survey Questionnaire

Section 1: Questions about the Respondent and Project

1. *What is your gender?*

A. Male

B. Female

2. *What is your age?*

A. 20 – 30 Years

B. 31 – 40 Years

C. 41 – 50 Years

D. 51 -60 Years

E. Over 60 Years

2. *What is your position?*

A. Project director

B. Project manager

C. Operations manager

D. Engineer

E. Architect

F. Quantity Surveyor

G. Other.....

3. *What is the approximate size of the project budget you were or are involved with?*

A. Less than 1 Billion Naira

B. 1 - 5 Billion Naira

C. 6 - 10 Billion Naira

D. Over 10 Billion Naira

E. Other.....

4**.** *Does the organization you currently work for/most recently worked for have a sustainability strategy?*

A. Yes

B. No

C. Don't know

E. Other.....

5. *Does your organization have any form of sustainability reporting*?

A. Yes, as a part or section of the regular company reports (e.g. the Annual Report).

B. Yes, as a separate periodic sustainability report in a self-developed format.

C. Yes, as a separate periodic sustainability report in a format that is based on the sustainability reporting guidelines of the Global Reporting Initiative (GRI)

D. No, does not have any specific form of sustainability reporting.

E. Don't know

F. Other.....

6**.** *Do progress reports for projects reflect indicators of social, economic and environmental sustainability?*

A. The project does not formally report progress.

B. Projects progress reports reflect indicators of social, economic and environmental sustainability with respect to used physical resources.

C. Progress reports reflect indicators of social, economic, and environmental sustainability with respect to the project delivery process

D. Progress reports reflect indicators of social, economic and environmental sustainability with respect to the project deliverable or result.

E. Don't know

F. Other.....

Section 2: Assessment of Sustainability Questions

Economic Sustainability

7**. Flexibility** - *To what extent does the project allow options for future changes and flexibility?*

(Please tick twice for both actual and desired situation)

Actual Desired

A. Designs are optimal as possible, future decisions options are not a design criteria.

B. Decisions regarding materials, resources, suppliers, and project process are made to allow for flexibility in the execution of the project.

C. The exact requirements of the project goal, result and deliverables are made as late as possible to allow for flexibility in the execution of the project.

D. Don't know

E. Other.....

8. **Procurement** - *Based on which criteria are suppliers for the project selected?*
Actual Desired

A. Suppliers are selected based on price.

B. Based on location to minimize transport, and their own use of natural resources and policies to enhance environmental sustainability.

C. Based on how their Know-how and partnership to help the project to be delivered in a more sustainable way.

D. Don't know

E. Other.....

Environmental Sustainability

9. **Materials** - *Based on which criteria are materials for project selected?*
Actual Desired

A. Based on technical and functional requirements and their cost.

B. Materials are also selected based on waste they cause in and for the project, and energy consumption/pollution incorporated in the materials because of their production process.

C. In addition to option A and B, materials are selected based on reuse capabilities.

D. Don't know

E. Other.....

10. **Energy** - *Do the projects you were and/or involved in have any specific policies regarding its energy consumption?*
Actual Desired

A. The project does not have specific policies on energy consumption.

B. There are policies in the project to promote the smart use of energy and where possible, energy saving equipment is used.

C. Minimizing energy consumption is one of the parameters in the design of the project delivery processes and result.

D. Don't know

E. Other.....

11. **Natural Resources** - *Does the project have any specific policies regarding the consumption of Natural resources?*
Actual Desired

A. There are no specific policies on natural resource consumption.

B. There are policies in the project to promote the smart use of natural resources

C. ○ ○ Minimizing natural resources consumption and pollution is one of the parameters in the design of the project delivery processes.

D. ○ Don't know

E. ○ Other.....

12. **Waste** - *In what way do the projects try to minimize its waste?*
Actual Desired

A. ○ ○ No specific policies on this point.

B. ○ ○ Waste in the project is separated in recyclable and non-recyclable. The project has policies to minimize waste.

C. ○ ○ The project delivery processes are designed to minimize waste and necessary waste is as much as possible recycled in the project itself.

D. ○ Don't know

E. ○ Other.....

Social Sustainability

13. **Labour practices**-*To what extent do the projects apply policies or standards for labour practices?*
Actual Desired

A. ○ ○ Project complies with applicable standards and regulations on labour practices

B. ○ ○ The project also requires its suppliers and partners to practice good labour practices

C. ○ ○ The project actively re-designs its delivery processes in a way that labour practices are improved and/or on a high level.

D. ○ Don't know

E. ○ Other.....

14. **Health and safety** - *To what extent do the projects apply policies or standards for health and safety?*
Actual Desired

A. ○ ○ Projects comply with applicable standards and regulations on health and safety.

B. ○ ○ Project suppliers and partners also required to practice good health and safety practices.

C. ○ ○ Project actively re-designs its delivery processes and results in a way that health and safety risks are minimized.

D. ○ ○ Project's deliverable and result is designed to improve health and safety conditions in the company and community in which the carried out.

E. ○ Other.....

15. **Training, education and organizational learning** - *To what extent do the projects include training, education and development of stakeholders?*
Actual Desired

A. ○ ○ Activities for training and education of end users are part of project's deliverables

B. ○ ○ Projects includes activities for training and education of individual and team members for improved performance

C. ○ ○ Projects include activities for training and education of individual, team members, partners and stakeholders for improved performance after the project has finished.

D. ○ Don't know.

E. ○ Other.....

16. **Society and customers** - *To what extent do the projects take a social responsibility towards the society it operates in?*
Actual Desired

A. ○ ○ Project recognizes social responsibility towards stakeholders in the society it operates in.

B. ○ ○ Also requires its suppliers and partners to take on social responsibility towards the external stakeholders in the society they operate in.

C. ○ ○ The project actively re-designs its delivery processes and results in a way that translates its social responsibility towards the external stakeholders in the society it operates in.

D. ○ Don't know

E. ○ Other.....

17. **Anti-competitive behaviour** - *To what extent do the projects reject tips and anti-competitive behaviour?*
Actual Desired

A. ○ ○ Rejects tips and anti-competitive behaviour and holds team members accountable.

B. ○ ○ Also requires its suppliers and partners to reject tips and anti-competitive behaviour.

C. ○ ○ Actively re-designs its delivery process, and results in ways that tips and anticompetitive behaviour is prevented in the organization.

D. ○ Don't know

E. ○ Other.....

Thank you for completing this survey