HEALTH AND SAFETY KNOWLEDGE TRANSFER AND DIFFUSION FROM THE CONSTRUCTION INDUSTRY TO THE COMMUNITY AS A CORPORATE SOCIAL RESPONSIBILITY

By

Justice Williams

(MSc. Construction Management, PGDip. Occupational Safety Health and Environmental Management, BSc. Construction Technology, HND Building Technology)

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DECLARATION

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma at Kwame Nkrumah University of Science and Technology, Kumasi or any other educational institution, except where due acknowledgment is made in the thesis.

JUSTICE WILLIAMS	……..	……..
Student & ID (PG 5793416)	Signature	Date

Certified by:

REV. PROF. F.D.K. FUGAR	……	……..…
First Supervisor	Signature	Date

PROF. E. ADINYIRA	…….	……..……..
Second Supervisor	Signature	Date

Certified by:

PROF. B.K. BAIDEN	……..	……
Head of Department	Signature	Date

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ABSTRACT

Clear evidences have shown that poor state of health and safety cultural practices have existed among Ghanaian citizenry. This has created much debate among government, academics, religious bodies, opinion leaders and the media, thereby calling for immediate action to improve the situation. Reports from some national institutions like The National Statistical Service Report, (2016) and the Ghana National Fire Service Incident Report, (2016) have pointed out the urgent need to improve the state of Health and safety in the country. The reports have acknowledged that ignorance and negligence rank high as causes of most health and safety problems reported in the country. In recent years, awareness of Health and safety in the construction industry has increased. Meanwhile, these construction companies operate in the communities and are socially expected to go beyond the execution of their projects and engage in corporate social responsibility (CSR) as a give back to society. However, contractors complain about several factors that affect their ability to fulfil this expectation. Therefore, the aim of this study is to develop a framework for the transfer of health and safety knowledge and its diffusion into Ghanaian communities by construction companies as a corporate social responsibility. In order to facilitate the understanding of the processes of transferring knowledge from a construction company to the Ghanaian communities, two theories were integrated: innovation diffusion theory and knowledge transfer and conversion theory. Through a questionnaire survey and semistructured face-to-face interviews, both quantitative and qualitative data were collected from road and building contractors of all classes across the country. The data were analysed using chi-square test of independence, one sample t-test, cumulative scale analysis and factor analysis for the quantitative data while thematic analysis was used for the qualitative data. Findings from both the quantitative and qualitative studies confirmed the improvement of health and safety knowledge in the Ghanaian construction industry. The study found that road contractors are better performers in Health and safety than building contractors. Furthermore, the study established that the maturity of health and safety culture in the Ghanaian construction industry is at its first stage of the health and safety culture maturity ladder. The study further found six major challenges confronted by Ghanaian contractors engaged in corporate social responsibility. Topmost among these are the view that Ghanaian contractors have of

CSR as avoidable expense, the absence of a legal framework to guide CSR implementation and lack of incorporation of CSR into the Vision and Mission Statements of organisations. The study also identified five knowledge transfer enablers and four barriers to knowledge transfer from the Ghanaian construction firms to the communities. Six enablers were also found to be significant in diffusion of knowledge in the Ghanaian communities by contractors with four associated barriers. The findings from the study resulted in the development of stage by stage knowledge transfer and diffusion framework for facilitating transfer of knowledge and its subsequent diffusion from construction companies to the communities as a corporate social responsibility to construction companies. The study contributed immensely to the academia where it tests, extends and integrates innovation diffusion theory and Nonaka and Takeuchi's knowledge conversion and transfer theory to a new context thereby helping to better explain external knowledge transfer and diffusion from the construction company to the community. Practically, the dynamic factors in integrating innovation decision processes, knowledge transfer and conversion processes, knowledge transfer influencers and complexities and knowledge diffusion influencers and complexities would assist researchers to understand external knowledge transfer from the perspectives of construction companies to the communities. Further, the framework proposed provides a practical step towards actions and activities required to be institutionalised to enhance the transfer process. Therefore, the findings of this study can be used as a practical guide for construction companies to transfer knowledge from the industry to any community in which they find themselves.

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LIST OF ABBREVIATION

ABCECG	Association of Building and Civil Engineering Contractors of Ghana
ASROC	Association of Road Contractors
BSc	Bachelor of Science
CSR	Corporate Social Responsibility
EFA	Exploratory Factor Analysis
EU-OSHA	European Agency for Safety and Health at Work
GCI	Ghanaian Construction Industry
GDP	Gross Domestic Product
H&S	Health and Safety
HSE	Health and Safety Executive
IAEA	International Atomic Energy Agency
ILO	International Labour Organisation
KMO	Kaiser-Meyer-Olkin
MRH	Ministry of Roads and Highways
MWH	Ministry of Works and Housing
NGO	Non-Governmental Organisation
OHS	Organisation Health and Service
OHSAS	Occupational Health and Safety Assessment Series
PC	Principal Component
PEB	Pre-Engineered Building
SECI	socialisation, Externalisation, Combination and Internalisation
SME	Small and Medium Enterprise
SSKTF	Stage-By-Stage Knowledge Transfer Framework
UK	United Kingdom
UN	United Nation
UNESCO	United Nations Educational, Scientific and Cultural Organisation US United State

DEDICATION

I dedicate this thesis to my wife and children, Constance Obenewaa Williams (my Wife) Seyram Williams, Mawuena Williams, Aseye Williams and Nutifafa Williams (Children) Eric Koko (brother) Rowland Selorm Aggor (uncle). My father Samuel Ograh and all my brothers and sisters.

You have all been so supportive and made a lot of sacrifices throughout my PhD journey, may the good Lord himself bless you all.

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CHAPTER ONE

GENERAL INTRODUCTION TO THE STUDY

1.1 RESEARCH BACKGROUND

In recent years, health and safety in the construction industry have improved significantly. This progress has been attributed to the increased in the adaptation of good safety policies and techniques implemented by construction companies (Esmaeili et al., 2012). Many researchers noted that these improvements are as a result of increased in the adaptation of highly effective injury prevention strategies (Jaselskies et al., 1996; Gambatese and Hallowell, 2011). However, these improvements have been centred on injury prevention in the construction industry alone with no such links of them to the benefits of communities affected by the activities of the construction companies (Williams et al., 2019). The adaptation of strategies that have improved the construction industry's safety performance can be considered as safety innovations or knowledge transfer (Kale and Arditi, 2010). Innovation is described as any use of a nontrivial change and improvement in a method, product, or system that is novel to the organisation implementing the change (Slaughter, 1998). Two main innovation categories are discussed in the main body of innovation literature; technological and administrative. While technology generally covers engineering and science. Administration innovation usually includes advancement in management and business practices (Kale and Arditi, 2010). Injury prevention approaches, such as work threat identification or drug abuse interventions, which have increased safety efficiency, are good examples of management innovation because they are directly related to management practices (Esmaeili et al., 2012).

Knowledge transfer has received considerable attention since the introduction of the

SECI model by Nonaka and Takeuchi (1995). Effective transfer of knowledge between project members is critical to avoid similar mistakes, improve work efficiency and reduce the risk of failure (Nil et al., 2018). Unusually for an engineering projectmanagement organisation, the knowledge issues include both general knowledge (such as management, technology, economy, law, computer, psychology, sociology, and organisational behaviour) and professional knowledge (building methods, resources, procedures, experiences, and the information needed (Nil et al., 2018).

On the other hand, the diffusion of innovation has been receiving immense interest from a wide variety of disciplines such as management, economics, marketing and sociology for more than four decades. This fascination has brought forth a rich literature on the subject. The emerging picture from the literature is that cumulative adaptation of an innovation follows a general 'S' shaped curve consisting of a phase of initiation and implementation with growth, a rapidly increasing phase of adaptation, and a phase of saturation with exponential growth (Mahajan et al., 1990). Sexton (2004) argued that adopting innovations is often driven by how such design gives a technical performance, cost benefits and minimal disruption to the standard product range.

Diffusion theory of innovation investigates how new ideas move through a given social structure. Early research on diffusion investigated a wide range of innovations within diverse homogeneous social systems such as tribes and communities. Those previous studies focused on personal innovation adaptation actions that included knowledge, persuasions, decisions, implementation, and confirmation (Rogers, 196, 1995). Rogers (1995) acknowledged the critical constituents of the diffusion cycle as communication, time and social systems. He further argued that the adaptation process of a decisionmaking unit is the most crucial element in the diffusion paradigm.

James (2012) noted, on the other hand, that, knowledge transfer appears to be one of the subjects most debated in the field of information management. Unlike the diffusion of innovation, a universal principle or mechanism for the transmission of information has yet to exist. However, whatever context it occurs, and the styles and sources of knowledge, there is a strong awareness that it is an interaction between people. Rogers (1995) added that communication lies at the heart of the information transfer cycle, and this has contributed to the notion that both the diffusion of innovation and information transfer must somehow connect.

Shifting attention on the role of business in society have led companies to look beyond pure profit maximization as the broader implications of operations and contribute to the community (Smith, 2015). Amponsah-Tawiah and Dartey-Baah (2011) noted that corporate social responsibility is an organisation's strategic decision to consciously intervene in the aspects of society that have the potential to militate against the achievement of corporate objectives. The World Bank business for sustainable development (1998) describes corporate social responsibility as. The effort of companies to contribute to economic growth, collaborating with workers, their families, the local community and society as a whole to improve the quality of life, in ways that are good for business and good for growth. Wood et al. (1994) argue that the basic idea of corporate social responsibility is that business and community are interwoven rather than separate entities.

According to Ajala (2005), corporate social responsibility allows companies to establish credibility and impact their corporate image and reputation. She further states that an organisation that fulfils its social obligations on an ongoing basis becomes a community member. Corporate social responsibility is scarce within the Ghanaian construction industry, and few academic studies have advanced this field, key issues

such as typology of CSR projects and problems remain unexplored (Lichtenstein et al., 2013). The authors suggested that understanding of the problems with CSR is essential to the development of a CSR program capable of delivering tangibles that would optimise societal benefits over the long term. The increased need for construction organisations to engage in CSR also stems from the obvious potential benefits that it brings. The business case for CSR is seen as focusing on a wide range of possible services, including enhanced financial performance and competitiveness, decreased operating costs, long-term sustainability for businesses and their employees, increased employee engagement and involvement, increased capacity for creativity, good community relations, increased credibility and brand value (Jones et al., 2006).

Ofori (2012), noted that the construction industry is broad and geographically dispersed, making the construction industry an essential tool for raising awareness among the Ghanaian public about health and safety. Construction companies are expected socially to go beyond the execution of their awarded projects and to make a conscious effort to make up for the environmental and many other losses incurred by communities affected by their activities, as businesses and communities are interwoven rather than distinct entities (Wood, 1991).

1.2 PROBLEM STATEMENT

The pursuit of health and safety improvement among the Ghanaian public has increased significantly in recent years, ascribable to the Ghanaian community's increased perception of being considered one of the worst performers in health and safety awareness. Health and safety in the Ghanaian society is weak and desperately required attention (Annan et al., 2015; Addai et al., 2016). Some authors have noted that the majority of Ghana's domestic accidents are as a result of ignorance and negligence

(Quartey and Puplampu, 2014; Annan et al., 2014). Addai et al. (2016) also emphasized the need for action among the Ghanaian public to enhance their safety. The performance of health and safety in the construction industry has improved in recent years (Esmaeili et al., 2012). But that of the Ghanaian community has not improved in any way (Williams et al., 2019). Construction firms operate in the communities and are socially expected to go beyond the execution of their awarded project and engage in CSR as a return to society. But most construction firms are unable to do so due to challenges militating against them (Williams et al., 2020). Hence the need to identify these challenges militating against Ghanaian contractors from carrying out their corporate social responsibility and finding more innovative ways for construction organisations in Ghana to achieve their corporate social responsibility more cost-effectively and sustainably, while at the same time creating awareness of health and safety among the Ghanaian public.

1.3 GAPS IN KNOWLEDGE

A knowledge gap is an item or piece of information that is incomplete, or that is yet to be discussed in the literature of which a study seeks to address. Hence, the gaps in the literature that this study aims to address are as follows.

1. There is no clarity in the literature as to how health and safety can be linked to CSR and to evaluate its diffusion process.
2. Literature is silent on a framework for transferring safety knowledge from the construction industry to the community.
3. Corporate social responsibility legislation in Ghana is non-existent, and only a few academic studies have advanced the field. Therefore, crucial issues such as CSR typology and challenges remain unexplored (Lichtenstein et al., 2013).

4. There is no CSR framework capable of delivering tangibles that would enhance long term societal benefits in the Ghanaian construction industry (Lichtenstein et al., 2013).

1.4 RESEARCH QUESTIONS

One of the essential segments of a research voyage is a research question. The questions that this research is aiming to investigate are:

1. *What is the state of health and safety in the construction industry in Ghana?*
2. *What are the enablers and barriers to a successful health and safety knowledge transfer process?*
3. *What are the enablers and barriers to a successful health and safety knowledge diffusion process?*
4. *How can health and safety culture of the construction industry be transferred to the local communities in which they operate?*
5. *What corporate social responsibility challenges are Ghanaian Construction Companies faced with?*
6. *What framework would transfer health and safety knowledge to communities in Ghana as part of the corporate social responsibilities of contractors*

1.5 AIM AND OBJECTIVES

This study aims to develop a framework for the transfer of health and safety knowledge into Ghanaian communities by construction companies as a corporate social responsibility.

To achieve the aim above the study pursued the following objectives,

1. To analyse the state of health and safety in the Ghanaian construction industry, highlighting performances and their improvement efforts.
2. To establish important enablers for the transfer of health and safety knowledge from the construction industry to the Ghanaian community.
3. To establish barriers to the transfer of knowledge from the construction industry to the Ghanaian community.
4. To establish important enablers of a diffusion process in the Ghanaian community.
5. To establish critical barriers to a successful health and safety diffusion process in the Ghanaian community.
6. To examine corporate social responsibility challenges Ghanaian construction companies are faced with.
7. To develop a framework to guide the transfer and diffusion of health and safety knowledge into project host communities by construction companies.

1.6 SCOPE OF RESEARCH

This research focuses on the construction sector in Ghanaian. Nevertheless, the study draws on analyses of other nation's construction industries. This thesis limits itself to the formal construction industry. Within the formal sector, there are a large number of company classifications based on the Ministry of Works and Housing (MWH) and the Ministry of Roads and Highways (MRH) (Tengan et al., 2014), contractors listed with the Ministry of Roads and Highways and the Ministry of Works and Housing would be included in the study for the purposes of this report.

1.7 JUSTIFICATION FOR RESEARCH

There are countless benefits of this research to the construction industry, Government and the entire community as a whole. This research has the potential of providing solutions for construction companies to carry out their corporate social responsibility engagement with little budgetary constraint. Therefore, increasing their profit margins and fostering a good relationship between the companies and one of their significant stakeholders which is the community. This research provides an innovative way of transferring or creating health and safety knowledge and awareness amongst Ghanaian citizenry to help prevent most of the domestic, industrial and institutional accidents while improving their wellbeing. The research also has benefits for the Government in the following ways.

Domestic accidents put pressure on the national purse by way of paying hospital bills by the national health insurance authority, payment of insurances and compensations to accident victims and destruction of national monuments due to, for example, fire outbreaks resulting in additional expenses on the Government. This research has the potential of eliminating much risk associated with these situations, because of the awareness by the citizenry in the area of health and safety.

The research also has benefits for the industry by increasing the awareness level of the community in which any company finds itself. Therefore, eliminating man-hour losses due to accidents, thus increasing productivity, which would, in turn, lead to an increase in profit margins and completion of projects on schedule. To the academia, the framework developed in this work provides researchers with a better understanding of external knowledge transfer from the construction industry. It would also save as a practical guide for explaining knowledge transfer from the construction industry to students.

1.8 METHODOLOGY

The research used complementary three-phase research methods. In the preliminary phase, background information on corporate social responsibility, diffusion, knowledge transfer, and construction health and safety were gathered through literature. These helped to develop a theoretical framework capturing key industry-relevant issues. Pragmatics worldview was adopted as the central paradigm for this research. Within the overall pragmatic framework, both quantitative and qualitative enquiries were incorporated to facilitate understanding of how construction companies can transfer H and S knowledge to the communities in which they operate, towards the development of a framework to guide its diffusion process. This resulted in an overall mixed research method, in particular, adopting the explanatory sequential approach where a quantitative inquiry precedes a qualitative enquiry. Creswell (2009) believes that where, for example, the researcher wishes to both generalize the findings to a population and to develop a detailed picture of the meaning of a phenomenon. The researcher may first conduct quantitative research, examine the results and then build on the results to explain them in more detail through qualitative research. Therefore, a close-ended questionnaire was developed, supplemented with a case study, to collect field data.

These are usually done by examining variables with a large sample of individuals through the creation of an instrument (e.g. a questionnaire) and subsequent administration to the sample.

1.9 STRUCTURE OF THE STUDY

Chapter 1 of the thesis is about presenting the whole work. It discusses the context of the subject area, putting the research in perspective, the gaps that exist and the justification for this research. This chapter also discusses the research goal and

objectives, the research questions that the study aims to address, the nature of the research and the design of the research.

Chapter 2 presents an in-depth literature review of construction health and safety in general and in the Ghanaian context, making a case for its improvements. It also explains the structure of the Ghanaian construction industry by telling its significance and its contribution to the Ghanaian economy.

Chapter 3 continues the literature review by looking at the state of corporate social responsibility performance in general, Ghana and the construction industry. The chapter also reviews various definitions of CSR and comes out with a working definition of corporate social responsibility for the study.

Chapter 4 of the thesis presents a review of the theories of knowledge transfer and diffusion to provide the research with a conceptual framework of knowledge transfer and diffusion, which is the focus of the study. It also presents a review of literature of knowledge transfer and diffusion in the construction industry.

Chapter 5 presents the research strategy, approach and methods adopted for this research as well as a description of the entire research process. It first discusses the research approach comprising the philosophical considerations, strategy and design of the research. The author did this by identifying existing philosophical positions, strategies and designs, identifying choices made for this research. It further describes the kind of data and nature of data collection adopted at various stages of the research. The techniques of data analysis adopted are then discussed and justified, as well as how the collected data is presented in the thesis. The design and validation of the framework are also discussed.

Chapter 6 presents data analysis, finding and discussion of the quantitative study relating to finding the enablers and barriers to knowledge transfer and diffusion. The best practices of health and safety in the Ghanaian construction industry and corporate social responsibility challenges confronting the Ghanaian construction industry and also the kind of CSR activities Ghanaian contractors are engaged.

Chapter 7 also presents data analysis, findings and discussion of the qualitative study which is a case study of the Ghanaian community and the construction industry, to understand how knowledge is transferred in the two units of analysis.

Chapter 8 is mainly concerned with the design of health and safety knowledge transfer and diffusion framework. It starts with the need for the framework to set the tone for discussions on the design and validation of the framework.

Chapter 9 draws the curtain on the research by concluding the whole work was highlighting the achievements and providing answers to the aim, objectives, research questions and implication for the industry practice. It outlines the limitations of the research and makes a recommendation for further research.

CHAPTER TWO

HEALTH AND SAFETY IN THE CONSTRUCTION INDUSTRY

2.1 INTRODUCTION

This chapter explains the nature of the construction industry in general and the construction industry in Ghana in particular. It also addresses the activities and processes, along with its contributions to the economy of Ghana. The chapter deals with health and safety in the construction industry, its challenges and the changes.

Furthermore, the chapter examines the construction industry's performance, contribution and impact in all economies.

2.2 THE CONSTRUCTION INDUSTRY

The construction industry is expected to play a large part in Ghana's economic growth. It also provides services, which leads to improvements in the citizens quality of life (Ofori, 2012). According to the Ghana National Commission of UNESCO report, (2010) the construction industry in Ghana, as in other parts of the world, is an enormous and vital segment in economic development. Its further states that construction is inevitable and cuts across all sectors and is among the top drivers of the economy no matter what one does in this country. Subramani and Lordsonmillar, (2014) noted that the construction industry is usually large, complex and distinct from other industries. The entrance of the construction industry into every nation's national and social life where this happens is noteworthy (Ofori, 2012). Due to the constant rise in the need for infrastructural facilities such as homes, shops, schools, hospitals, office spaces and the like, the construction sector is continuing to expand (Benny and Jaishree, 2017). The construction industry is divided into two very different categories: General Construction and Engineering Construction. Most construction companies focus on one of these groups (Bennett and Bennett, 2003). The author also noted that the third category of contractors is the specialist trading contractor, who usually works as a subcontractor for a general or prime contractor responsible for building the whole project (Bennett and Bennett, 2003).

2.2.1 The nature of the construction industry

The construction industry is described as a group of firms involved in building real estate, homes, and public and private facilities (Anaman et al., 2007). Subramani and Lordsonmillar (2014) noted that the construction industry is usually big, complex and unlike other industries. It is notable how important the construction industry is for the national and social life of any nation in which it exists. The number of buildings built annually for commercial, residential, and office purposes has increased. The construction sector continues to expand due to the constant rise in the need for infrastructural facilities such as houses. The construction industry also deals with all economic activities aimed at constructing, renovating, restoring or increasing fixed assets, improving the infrastructure quality of the land and other engineering works such as highways, bridges, etc.

2.2.2 The Ghanaian Construction Industry

In achieving socio-economic development objectives, the construction industry plays an important role by providing shelter, infrastructure and jobs, thereby contributing to the overall gross domestic products. (Dadzie, 2013 as cited in Agyekum et al., 2018).

In Ghana there are two construction ministries responsible for the activities of the Ghanaian construction industry. These are; the ministry of works and housing (W&H) which is responsible for housing and the ministry of roads and highways (MRH) responsible for roads and civil related activity. These two ministries are responsible for the formulation and co-ordinating of policies and programmes for the growth of the country's infrastructure facilities and also monitor and measure the performance of the public and private agencies concerning the implementation and accomplishment of these policies and programs.

The Ghanaian building construction firms comprise a large number of enterprises of various sizes as registered and categorised by the Ministry of Works and Housing (W&H) as D1K1, D2K2, D3K3 and D4K4. Based on factors such as annual turnover, equipment holding and personnel, the D1K1 class of contractors are the larger firms, whereas D2K2 construction firms are medium and D3K3 and D4K4 are small firms (Edmonds et al., 1984). The larger firms, according to W&H register as financial class 1, capable of undertaking projects of any value, class 2 (the medium firms) are capable of undertaking projects up to US$500, 000 or GH¢750, 000.00. In comparison, smaller firms (financial class 3) are also capable of undertaking projects up to US$200, 000 or GH¢ 300,000.00 or class 4 to undertake projects up to US$75, 000 or GH¢112, 500.00 (Danso, 2010).

2.2.3 Importance of the Construction Industry in the National Economy

The construction industry is an essential component of the economy of every nation (Ofori, 2012). Muiruri and Mulinge (2014) added that the construction industry constitutes a significant part of the economy in many nations, and is also seen as a driver of economic development, particularly in developing countries. The authors further argued that the construction industry is important because of the results and outcomes of its operations, elaborating that the construction industry contributes to the socioeconomic development of the country by providing the buildings that are used in the production of all the economic products. Further Muiruli and Mulinge (2014) argues that the construction industry plays an important role in the socio-economic development of every country.

The industry's activities have a great deal of importance in achieving national socioeconomic development goals of providing infrastructure and jobs. It constructs all hospitals, schools, townships, offices, housing and other facilities, urban infrastructure such as water supply, sewerage, drainage, highways, roads, ports, railways, airports, energy systems, irrigation and telecommunications (Ofori, 2012). In most developing countries, the construction industry contributes up to 11 per cent of gross domestic products (GDP) (Giang and Pheng, (2010), as cited in Muiruli and Mulinge, 2014).

According to Ofori (2012), every country's construction industry is the backbone, as it forms the routes to promote all productive activities by allowing the distribution of goods and services within and outside the country. The products designed to provide social and welfare services often include incentives for people to improve their standard of living. He further argues that the construction industry can affect the profitability of companies within any nation's economy, and can also affect the ability of the nation to attract foreign investment. Research has shown that the construction industry in Ghana has enormous potential for stimulating economic growth, improving project exports and creating jobs. The construction industry in Ghana happens to be one of the fastestgrowing sectors of the economy.

A vibrant Ghanaian construction industry which mobilizes human and local material resources during pre-and post-building is an important means to promote local jobs and stimulate economic growth (Anaman and Osei-Amponsah, 2007). The authors further argued that this industry should be given special attention as one of the main drivers of economic growth in Ghana, with the construction industry currently being the third largest sector of the economy. As in any country in the world, Ghana's construction industry is an important segment of the economy, involves a variety of players, and has

broad relationships with other activities such as manufacturing, materials supply, energy, finance, labour, and equipment.

2.3 CONSTRUCTION HEALTH AND SAFETY IN DEVELOPING COUNTRIES

The construction industry in developing countries and, for that matter, the world over is perceived as a dangerous industry. Because of this, there has been a lot of accident prevention measures and education in the construction industry all over the world. In the construction industry, however, incidents continue to occur day in day out, of which the Ghanaian construction industry is no exception. In particular, the Ghanaian construction industry has witnessed a lot of construction activities in the country, whether it be road or infrastructure construction. As dynamic as the construction industry is, there has emerged a set of new construction methods in the country. For example, a pre-engineered building (PEB) for industrial as well as commercial buildings, while high-rise buildings are becoming popular in the country. Undoubtedly, these new construction concepts in the country are new to Ghana's construction industry craftsmen, operatives, customers, and construction managers, and thus present new risks and hazards as well. Construction is a project-based industry and differs from one location to another, with different sets of workers, customers, duration and environment making it difficult to transfer the experiences and knowledge gained from previous projects to subsequent ones. The type of work done often differs from commercial, manufacturing, and residential, along with different professional groups engaged in the same function.

2.3.1 The State of Health and Safety in the Construction Industry

The construction industry has historically been considered among the highest-risk industries. Effective safety management in construction projects is a core consideration for all types of facilities that are responsible for protecting and optimizing human resource efficiency (Othman, 2017). Abdelhamid and Everett (2000) noted that the construction industry's growth was overshadowed by regularly occurring accidents or injuries. Chang (2012) argued that work-related injuries arise either because of lack of knowledge, supervision, lack of means to conduct a job safely, mistakes in judgment, carelessness in making decisions, or utter irresponsibility. Because of the difficulty and unpredictable complexity of the tasks, the construction industry ranks high in the levels of severe and fatal workplace injuries (Albert et al., 2014). Subramani and Lordsonmillar (2014) noted that the construction industry has many unique features that directly impact the risk of an accident. The trade pattern of job in the construction industry is ever-changing. Furthermore, the authors postulated that the activities and physical circumstances, and even the workers, are constantly changing, unlike in factories where process, procedure and operations are usually repeated. They further noted that timings and schedules in the construction industry differ greatly from place to place. The ever-changing nature of the operatives, machinery, work schedules and even places makes the construction industry vulnerable to accidents and raises the industry's risk levels. Therefore, it is worth knowing that health and safety management in the construction industry is both an economic and a humanitarian concern which needs all stakeholders to be involved.

Zou (2011) noted earlier that, engaging in health and safety management is important for site management teams as they are responsible for implementing relevant safety activities and leading other project stakeholders with different backgrounds and expectations to maintain security. Health and safety is one of the major challenges

facing the construction sector worldwide (Othman et al., 2017). Increasing health and safety concerns have become necessary due to the increased use of heavy plants, involving different types and quantity of materials and equipment, complex construction procedures and operation, multi-interface of different workforce performing various aspects of the project at once.

2.3.2 Health and safety improvements in the Construction Industry

Over the last decades, health and safety performance in the construction industry has improved significantly (Esmaeili et al., 2012). The fatality rate specifically decreased from 71 to 11.6 per 100,000 workers between 1973 and 2004. This progress was due to the increased adoption by construction companies of good safety policies and techniques (Esmaeili et al., 2012). Besides, it is noted that these improvements in the health and safety performance of the construction industry are the result of a greater adaptation of highly effective injury prevention strategies (Jaselskies et al., 1996).

Hundreds of different injury prevention techniques now exist, practically (HSE, 2011). This means that the safety performance of the construction industry has improved in so many ways, but it is still believed to be one of the world's most dangerous industries. In this respect, however, there is so much room for improvement, especially in a developing country such as Ghana. For many years, safety professionals have been mindful that the majority of workplace accidents are triggered by unsafe behaviour (Subramani and Lordsonmillar, 2014).

Muiruri and Mulinger (2014), indicate that in Kenya, health and safety issues are intensified by the extremely diverse range of people with different stages of training, ethnic background among workers as the majority of workers migrate from rural to urban centres, cultural differences between employers (contractors) and workers performing real work at construction sites and delivering different types of services. For

most developing countries, this claim is no different, due to high illiteracy levels coupled with rural-urban migration leading to population growth in urban areas with different cultural and language barriers. Sanchez et al. (2017) studied published articles from 1930 to 2016 on occupational health and safety in the construction sector. Their work revealed more attention was paid to occupational health and safety studies in the last 15 years. The authors observed that a safety culture should be instilled in order for a construction company to prevent on-site accidents. Jaselskis et al. (1996) noted that there is interest in improving the safety of the site for humanitarian reasons and due to the increasing cost of workers ' compensation in the case of injury caused by accident. On the other hand, Kheni et al. (2008) suggest that contractors in developing countries are limited by a lack of resources, which has a negative impact on health and safety management. To sum up, to the financial constraints, Addo-Abedi (1999), as cited in Kheni et al. (2008) stated that nearly all local construction companies operating in Ghana are run by owners and their spouses, and sometimes their children or other close relatives, as family businesses. They further argued that because the Ghanaian local construction companies ' organisational structure has the owner as of the sole decisionmaker and often he or she is charged with multiple management functions, resulting in poor performance in areas like health and safety.

Numerous factors have been identified, which might affect the management of H&S on construction sites in developing countries. They include poor infrastructure, lack of adequate H&S supervision, laws and regulations, low levels of worker literacy, lack of adequate systems for monitoring and reporting, inefficient tendering, extreme weather conditions and corruption (Borys, 2012; Idoro, 2011). Construction managers tend to believe, according to Muiruri and Mulinger (2014), that the introduction and execution of measures that ensure health and safety in the construction sector will result in higher costs, and thus lower profitability. Nevertheless, it has been shown that investment

in the health and safety of construction increases profitability by increasing productivity rates, promoting employee morale and decreasing attrition (Mohamed, 2002). Kheni et al. (2008) noted that, if the influence of the political, economic, and socio-cultural environment is not well understood, any attempt to conceive a response to health and safety issues in developing countries and especially Ghana in this regard is bound to fail. Because developing countries have to formulate their own safety policies and standards to suit their own environment. Kuada et al. (2013) postulated that consideration of their cultural environment is important for developing countries because it is a determinant for the successful transfer of managerial skills and knowledge.

2.4 THE GHANAIAN HEALTH AND SAFETY SITUATION

The need for improvements in health and safety amongst the Ghanaian communities has become paramount. The reason that Ghana's citizens and their workers are not insulated from daily exposure to workplace-related hazards such as environmental hazards, physical hazards, biological hazards, psychosocial hazards and ergonomic hazards.

Ghana is gradually becoming an industrialized nation, according to Asumeng et al. (2015), and that transformation has exposed a significant percentage of the workforce to numerous health and safety hazards.

Annan et al. (2015) conclude that Ghana's rising industrialization is an indication of an increasing number of Ghanaians being exposed to physical, environmental, biological, and psychological hazards at work. As these authors have pointed out, it is time for H and S to be seriously considered in Ghana, because people have moved away from traditional manual labour to mechanisation in most of their daily lives as the country is moving rapidly towards industrialisation. Quartey and Puplampu (2012) described the country's troubling nature of health and safety, as workers complain of a lack of effective policies, services and procedures to protect their well-being. Ghana, as a

country, does not have an overall national OHS strategy with all these issues (Annan et al., 2015). The few legal regulations in Ghana require major adjustments to meet international standards and specifications (Ghana Health Service Report, 2007). Numerous avoidable domestic, industrial and institutional fire outbreaks have been related recently to people's ignorance and carelessness, combined with vehicle collision (Ghana National Fire Service Incident Report, 2016; Addai et al., 2016; Annan et al., 2014). Alkilani et al. (2013) argue that health and safety education and efficiency in developing countries are low, and therefore calls for change.

Some researchers, including Laryea and Mensah (2010), Kheni et al. (2008) and AddoAbedi (1999) discussed improvements in health and safety in the construction industry. Quartey and Puplampu (2012) also focused on health and safety improvement in shipping and manufacturing workers. Addai et al. (2016), Asumeng et al. (2015) and Annan et al. (2014) all tackled issues of general improvement in occupational health and safety in the nation. Nevertheless, none of these studies explored similarities within the construction industry's H&S hazards and that of the Ghanaian populations, and lessons that can be exchanged between the two.

2.4.1 Health and Safety Awareness in the Ghanaian Society

Consciousness, as defined by the Concise Oxford Dictionary, is being "conscious in the first place, not ignorant, knowledgeable and well informed". According to (Paulin and Suneson,2012) knowledge is, among other things, awareness or familiarity gained through experience, the range of information given by a person, and a theoretical or practical understanding of a subject or language. Therefore, health and safety improvement or awareness in the Ghanaian community can be said to be the state of knowing the risks, hazards and their associated consequences in the working environment.

All in all, it's worth noting that determining the hazards associated with the Ghanaian community and making them aware of their existence is the beginning to mitigate their effect on them even when they happen. The first point of solving the much-identified ignorance and negligence in literature as the cause of health and safety issues in the country is to use the construction industry as a benchmark. Lance et al. (2016) argue that a potential area for benchmarking other organisation's best practices in occupational safety and health in the construction sector. This means that health and safety in the construction industry have improved significantly amidst its risky nature, and that is worth emulating by developing countries such as Ghana. Additionally, activities cut across the nation; there is construction wherever one goes or whatever one does in this country. It also employs skilled and non-skilled labour, wherever it occurs, and is thus a right channel for communicating health and safety awareness to reach out to all masses.

2.4.2 Health and safety studies in Ghana

The Ghanaian workplace situation cannot be separated from that of the community, because the people living in these neighbourhoods are the same people working in the organisations. Improving the citizenry's awareness of health and safety will also go a long way towards improving that of the workplace. Anaman and Osei-Asamoah (2007) believe that poor working conditions will affect the workers living in the environment, as many actors have the same working and living environments. Kheni (2008) also corroborates this point by suggesting that workers ' families can also be exposed in a variety of ways to health and safety hazards: they may be exposed to contaminants that could be on workers ' clothes.

2.4.3 Regulations governing occupational health and safety in Ghana

The concept of occupational health and safety has been conceived in Ghana long before the introduction of the factories, offices, and shops Act 1970 (Annan et al., 2015). Some of the regulations governing occupational health and safety related issues in Ghana are, the Mining and Minerals Regulations 1970 LI 665, the Workmen's Compensation Law1987, the Ghana Health Services and Teaching Hospitals Act 526 (1999), the Ghana Labour Act 2003 (Act 651), the Radiation Protection Instrument LI 1559 of 1993, which is an amendment of the Ghana Atomic Energy Act 204 of 1963, the Environmental Protection Agency Act 1994 (Act 490), which has components that include, but are not limited to the Pesticide Control and Management Act 1996 (Act 528), seeking to protect not only the environment but also persons, as well as the National Road Safety Commission Act 1999 (Act 567), (Annan et al., 2015). Figure 2.1, below shows the Administration of health and safety in Ghana.

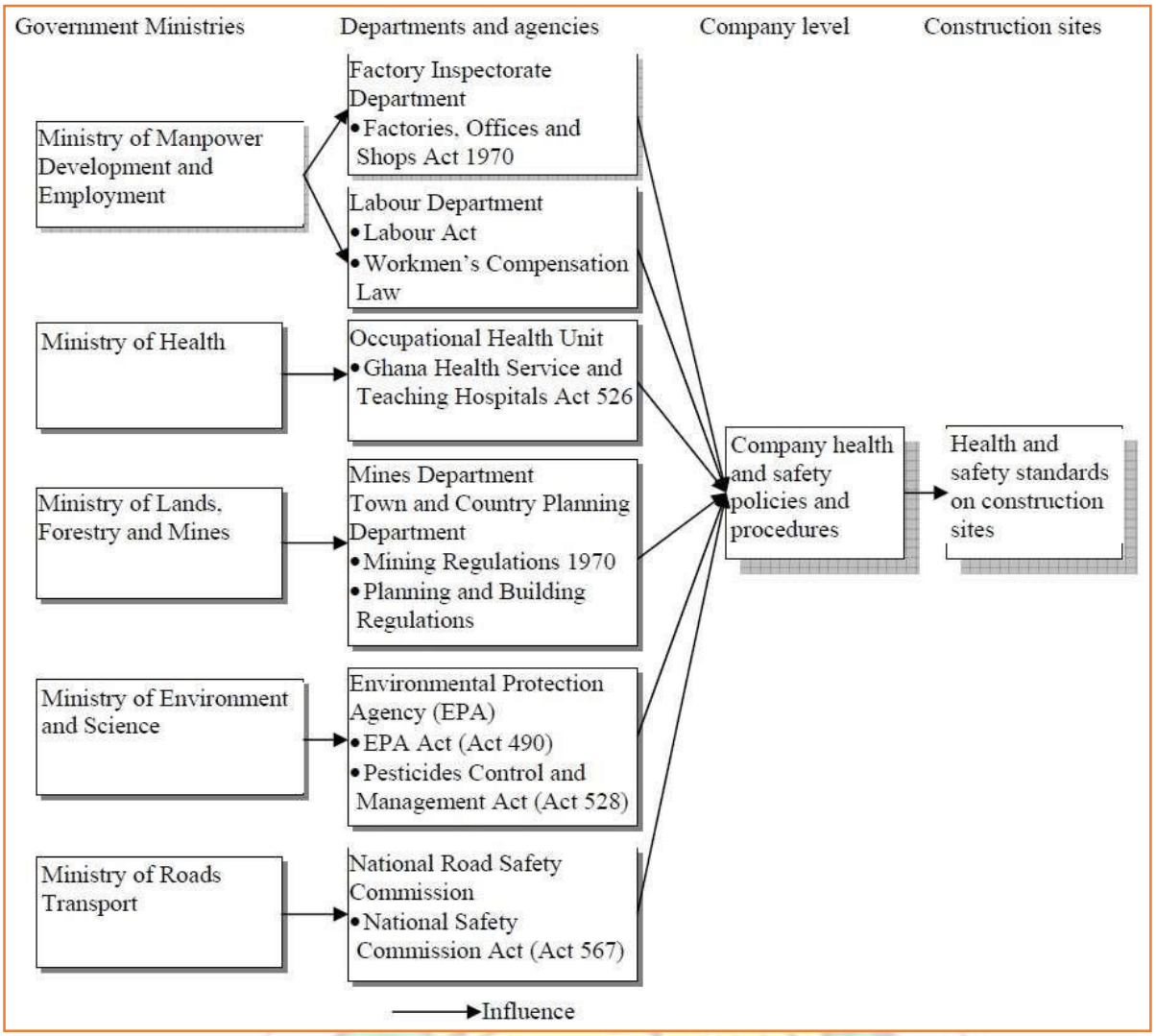

Figure 2. 1: Administration of health and safety in Ghana (Adopted from Kheni, 2008)

2.5 ORGANISATIONAL SAFETY CULTURE

An organisation's safety culture is considered to be the products of individual and group values, attitudes, perceptions, competencies and patterns of behaviour, which determine the commitment and the style and skill of health and safety management of an organisation (HSE, 1993). Neal (2000) argued that safety culture could be understood as the aspects or parts of an organisational culture influencing attitudes and behaviours that have an impact on the organisation's level of safety. Occupational health and safety play an important role in establishing a positive concept of a work environment in the safety culture (Tymvios and Gambatese, 2016).

It is established that more than 2.3 million people die each year as a result of occupational accidents or work-related diseases and that 317 million accidents occur on the job worldwide annually (International Labour Organisation, 2016). Improving the safety of construction sites should therefore be a top priority for all construction companies that operate in the country. Every project's success factor is indeed measured in terms of timely completion, budget and good buildability. Nonetheless, poor health and safety culture can adversely influence cost, delivery time and quality of projects. This assertion was shared by Okanga (2016), who argued that effective safety management was significantly linked to colossal cost reduction, efficiency, improvement, and returns on shareholder investments. Therefore, unless a safety culture is effectively adopted as part of the organisational culture and incorporated into the conceptualisation, design, programming and implementation of a project, frequent accidents and incidents can easily undermine the competitiveness, survival and sustainability of a construction company (Alsamadani et al., 2013; Jebb, 2015 and Okanga, 2016). Project owners can pick only contractors who have demonstrated an excellent safety record (Jebb, 2015).

Tymvios and Gambatese (2016) also argued that the creation of a safety culture within the organisation is one of the effective ways for efficient safety management. Also, the Canadian Centre for Research and Training in Construction (2016) argued that there is a positive safety culture when shared values and beliefs drive decisions, actions and day-to-day practices to prevent injury and disease in the workplace. They further argued that people in workplaces with a positive safety culture believe that safety and health are a priority, that leaders are driving improvement and that staff are the most valuable resource for an organisation. In the construction health and safety literature, however, it is explicitly clear that the concept of safety culture is a new concept in the construction

industry (Rafiq et al., 2007; Chan, 2016; Kartikawai and Djunaidi, 2018). The organisational safety culture does affect not only the productivity of an organisation but also the competition between similar core businesses (Kartikawati and Djunaidi, 2018). According to Ahmady et al. (2016) According to a positive safety culture can go hand in hand with a quality improvement culture if in its development involves all workers at every stage. But if in its development, a quality culture is used as a marketing strategy or as an attempt to reduce the cost of safety, the results will neglect the safety issues. According to Cesarini et al. (2013), for an organisation to build a safety culture that is deeply integrated with the organisational culture, systematic safety management theories suggest the process to be regulated by the following steps: an examination of the state of the safety culture of an organisation, identification and reinforcement of areas of weakness, monitoring and assessment.

2.5.1 Origins of Organisational Safety Culture

The first survey in the field of safety culture started with the study of the International Atomic Energy Agency following the 1986 Chernobyl disaster. Lack of safety culture was reported as the cause of the accident in this study (Wu et al., 2010). Since the Piper Alpha tragedy, which caused very significant damage to the company in terms of reputation and financial damage, safety culture has been of great concern (IAEA, 1991 as cited in Bordin et al., 2018). In all these disasters, it has been seen that employee behaviour has affected the safety performance outcome (Flin et al., 1998). To fully understand the concept of the safety culture, an understanding of the organisational culture is necessary. According to Hofstede et al. (2010), there are two approaches towards organisational culture: one states that culture is something that an organisation "is" while the other states that culture is something an organisation "has". They further

noted that the “is” approach is mainly found in academic groups, and the “has” involves the possibility of changing the culture and is favoured by managers and management consultants.

2.5.2 Safety culture and safety climate

Studies of organisational culture and safety climate emerged in Zohar (1980) which described the concept of a climate of safety as "a combination of holistic perceptions of the work environment shared by workers." IAEA also describes safety culture as "a result of individuals and groups' patterns of value, attitudes, competencies, and behaviours that influence the adequacy, style, and persistence of the organisation's health and safety plans. The IAEA argues that the concept of safety culture and climate is separate but that they have also been used most of the time interchangeably. Beus et al. (2019) believe that despite the functional importance of the safety environment and growing popularity in the eyes of researchers and practitioners, its conceptualization and measurements have suffered from a lack of clarification, as well as a widespread failure to understand the multi-level complexity of the constructions. Cox and Cox (1991) treat the concept of the climate of safety as a reflection of the concept of safety culture that expands the attitude and conduct of employees. Cesarini et al. (2013) suggest that the definition of safety culture is wider than climate because it encompasses certain typical buildings such as places, beliefs and behaviours. Hale (2000) indicates that the concept of safety culture is broader than safety climate because it includes some traditional beliefs, such as positions, values and behaviours.

2.5.3 Definition of Safety culture

Kartikawati and Diunaidi (2018) describe the safety culture of an organisation as the standards, opinions, actions, rituals and methods that its participants disseminate.

Ahmady et al. (2016) also agree that safety culture is a system of beliefs held by a company's members that is also a hierarchy of interrelated values transmitted through tales, myths and slogans. Safety culture is a set of beliefs, standards, attitudes, labels, roles and social, management and technical practices that shape management and employee's safe behaviours and practices (Cesarini et al., 2013).

Safety culture is the observable degree of engagement by which all company members can channel their attention and actions towards daily safety enhancement (Cooper, 2002). Those elements of organisational culture that will influence the right attitudes and behaviours that improve wellbeing (Mohamed, 2002). The attitudes, beliefs and perceptions that natural groups share in defining standards and values that determine how they act and react in relation to systems of risk and risk control (Neal and Griffin, 2000). A sub-aspect of organisational culture that affects workers attitudes and behaviours regarding an organisation's ongoing performance in safety (Mohammed, 2002).

2.5.4 Safety climate in construction

Safety climate, according to Zohar, (2010), is the sum of employee's shared perceptions of policies, procedures, and practices relating to safety in their working environment. Safety climate, according to Vinodkumar and Bhasi, (2009), provides a snapshot of an organisation's state of safety. Safety climate has been discussed in the construction industry (Dedobbeleer and Be'land, 1991). There is empirical evidence to support a positive connection between securing the work environment and safety performance of building organisations, consistent with studies in other fields (Gillen et al., 2002). In Hong Kong, Siu et al. (2004) analysed how construction workers viewed their safety responses, their contemporaries, managers, and their supervisors, finding that

aggregated safety climate ratings were directly related to self-reported injury rates. Zou (2011) also states that two environment dimensions (management engagement and coworker effect) had a considerably greater impact on self-reported safety behaviours than employees personal training and safety experiences.

The culture of safety can be approached from three different angles: educational or anthropological, theoretical or psychological, and realistic or experiential (Hale and Guldenmund, 2010).

2.5.5 Educational or anthropological approach

This method emphasis is on historical problems such as data on accidents and government decisions (Hale and Guldenmund, 2010). This is a descriptive approach aimed at identifying and understanding the safety culture rather than analysing this, promoting progress and improvement. Specific data collection methods are used for this purpose, based on anthropological and sociological studies (Institute for Quality of Life, 2017). According to the Institute for Quality of Life (2017), this means the gathering of data and knowledge by fieldwork in the organisation, using strategies such as observation to produce a summary of the usual objects of an organisation; record analysis to expose the items or values of the organisation; frequent interviews with company management and security experts. Open group meetings (focus group interviews, focus group discussions) to share findings and assumptions and help to gain greater insight into an organisation.

2.5.6 Analytical or psychological approach

This approach is the most prevalent and prevailing in safety culture evaluations and focuses primarily on the environment of organisational safety. Workers are asked to

complete a clear, structured questionnaire, i.e. to offer their impression, opinion or interpretation of certain safety-related dimensions shared by co-workers (Institute for Quality of Life, 2017).

2.5.7 Pragmatic or Experience-based Approach

This methodology encourages evaluating an enterprise's current state of maturity with respect to safety culture, assigning a ranking to it on a predefined culture maturity ladder showing different levels or phases of cultural maturity. The goal is to identify and address what needs to be done to enhance the company's safety culture to a higher level of maturity (Institute for Quality of Life, 2017).

2.6 SAFETY CULTURE MODELS

So many theoretical models have defined safety culture literature; while some models describe cultural elements, others try to clarify the safety culture/climate relationship and the health outcomes. Many models in the field also identify the variables that interact to cause a safety incident in the workplace, and the role culture plays in these interactions. According to the study of the Institute for Quality of Life (2017), although the safety climate was relatively well conceptualized, this was mostly disconnected from a broader perspective on safety culture so that hypothetical advancement was parallel rather than synergetic. Below is an overview of some of the popular safety models in the safety culture and climate literature.

2.6.1 Safety culture change and maturity models

Many researchers have highlighted the importance of safety culture maturity in strong risk industries (Bordin et al., 2019). It is a widely used model for categorizing high-risk industries and improving safety (Foster and Hoult, 2013). Westrum (1993) first

mentioned it in his model, categorizing safety culture maturity into three stages, namely pathological, bureaucratic, and generative.

And highlighted the information flow as the most central issue for the protection of the organisation. Hudson (2007) generalised the Westrums model to five stages: Pathological, Reactive, Calculative, Proactive and Generative and re-named it as "safety maturity ladder, as shown in figure 2.2 below." This model was used in many industries, including oil, aviation, health care (Foster and Hoult, 2013), and construction, to explain the safety maturity. According to Foster and Hoult (2013), the model is comparable to a journey as there has been a strong focus on the continuous improvement and efficiency of standards, rather than pure conformity.

Furthermore, the authors noted that the model was considered by organisations to be a practical and valuable method to recognize strengths and weaknesses within their systems. Also, the safety culture maturity ladder has reflected the element of individual and organisational improvement and maturity regarding protection management (Hudson, 2007). This approach focuses less on cultural material or culture mapping to safety outcomes but seeks to describe how individuals and organisations are moving through levels of improvement in their approach to security and risk management (Kartikawati and Djunaidi, 2018).

According to Hudson (2007), any organisation's safety culture needs to change through these five stages; step one Pathological is the period where safety is the worker's duty, and safety is a company priority that is not protected by the policy. Stages, where there is little concern about why accidents happen and how to avoid accidents. In general, pathological levels avoid reporting. Phase two Reactive is the phase where a corporation begins to take safety seriously. The attention of management is given when there is an accident/incident. Process three Calculative is the phase in which the safety

management system is run on an existing database. Management has the main role and doesn't require staff to participate in decision-making actively. Workers will feel safe if it conforms to the user manual. Stage four Proactive is a stage that sees uncertainty as a challenge to move the workers, where policies are not top-down at all in the organisation.

Stage five is the stage in which constructive involvement has arisen at all worker levels. Security is not a separate thing but an integral part of the business. It is characterized by not being happy with quickly obtained results, high feedback and perceived change as a good thing that must occur (Hudson, 2007; Kartikawati and Djunaidi, 2018).

Hudson (2007) also used this paradigm to present the safety culture in a big international oil company (re-named the "HSE culture ladder," 2007). called the' Hearts and Minds ' initiative, used the HSE cultural ladder as a communication tool to help senior management build its safety culture and track progress over time (Institute of Life Quality, 2017). The first model to be discussed in the literature on safety culture here reflects the aspect of individual and organisational change and maturity as regards security management. The approach focuses less on cultural material or mapping of culture to safety results. Still, it seeks to explain how individuals and organisations move through stages of transition concerning their approach to protection and risk management.

Figure 2. 2: The Evolution of Safety Cultures (Adopted from Hudson, 2007).

2.6.2 Reason's Safety Pyramid Model (1990)

Reason's model is a well-known model of accident causation, which describes the association between active failures (human errors, mistakes, operational violations) and latent pathogens (existing system conditions resulting from management decisions, e.g. understaffing), increasing the likelihood of an accident. Although safety culture is not explicitly defined, Reason's model implies a cultural influence through the latent condition pathways sees figure 2.3 below. In other words, the overall safety culture represents how protection is resourced and handled and how it is operationalised in policies and procedures. This is described in more detail in Zohar's (2010) extension of the model.

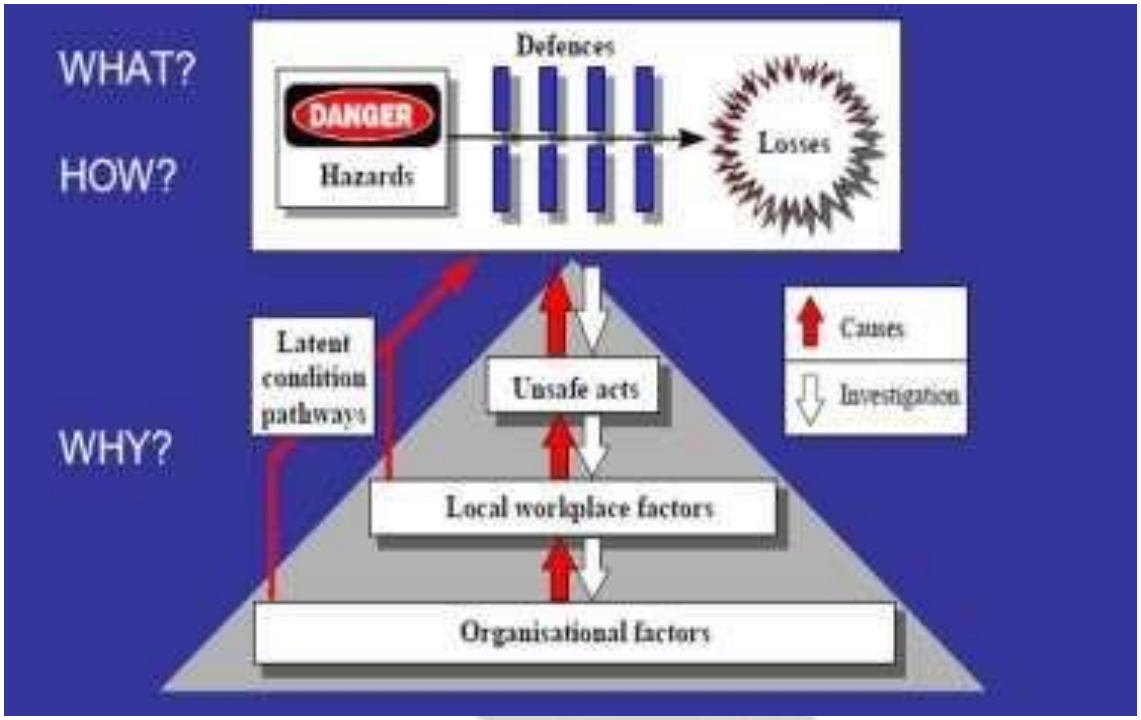

Figure 2. 3: Safety Pyramid Model (Source: Reasons, 1997)

2.6.3 Zohar's 2010 Safety Climate and Safety Pyramid Model

Zohar (2010) proposed a conceptual model, based on the Reason (1997) Safety Pyramid model, which connects organisational climate literature with safety management literature. As shown in Figure 2.4 Zohar (2010) suggests that integrating a filter' of the organisational and safety environment into the model would allow it to be used in a preventive context rather than just as an incident analysis tool.

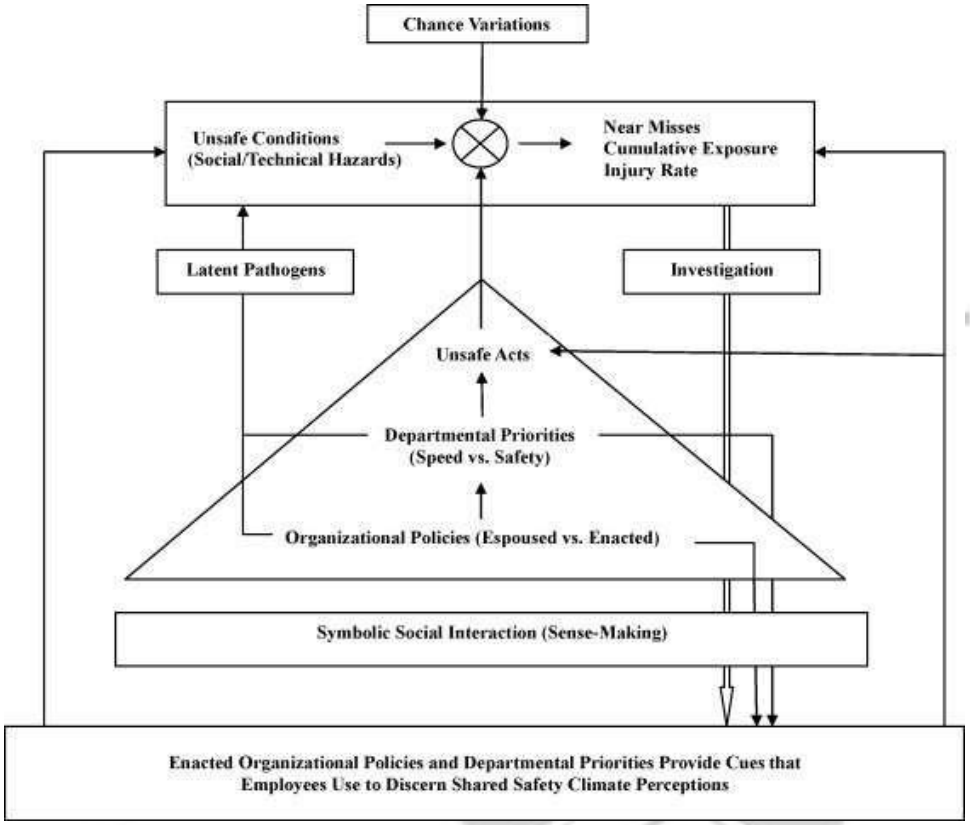

Figure 2. 4: Safety Climate and Safety Pyramid Model (Adopted from Zohar (2010)

2.6.4 The construction accident causality (ConAC) model

Another example of models of accident causation is the construction-specific causation model released by the UK Health and Safety Executive (Haslam et al., 2003). The model was derived from research into construction accidents from the viewpoint of the victims and supervisors of accidents. The model is not different from Zohar's (2010).

2.6.5 Cooper's (2000) Reciprocal Model of Safety Culture

Cooper's reciprocal model includes person, behaviour and situation factors, not different from Geller's (1994) model. Cooper stresses the model's comprehensive nature, including subjective internal psychological factors, measurable safety-related behaviours and objective situational factors. It is also argued that the model encourages methodological triangulation (combining methodologies for cross-validating each of the

results obtained), a practice often advocated by others in the field (e.g., Guldenmund, 2000). Methodological triangulation is argued to be crucial to investigating multifaceted structures since each method is inherently constrained in what it can say about each facet.

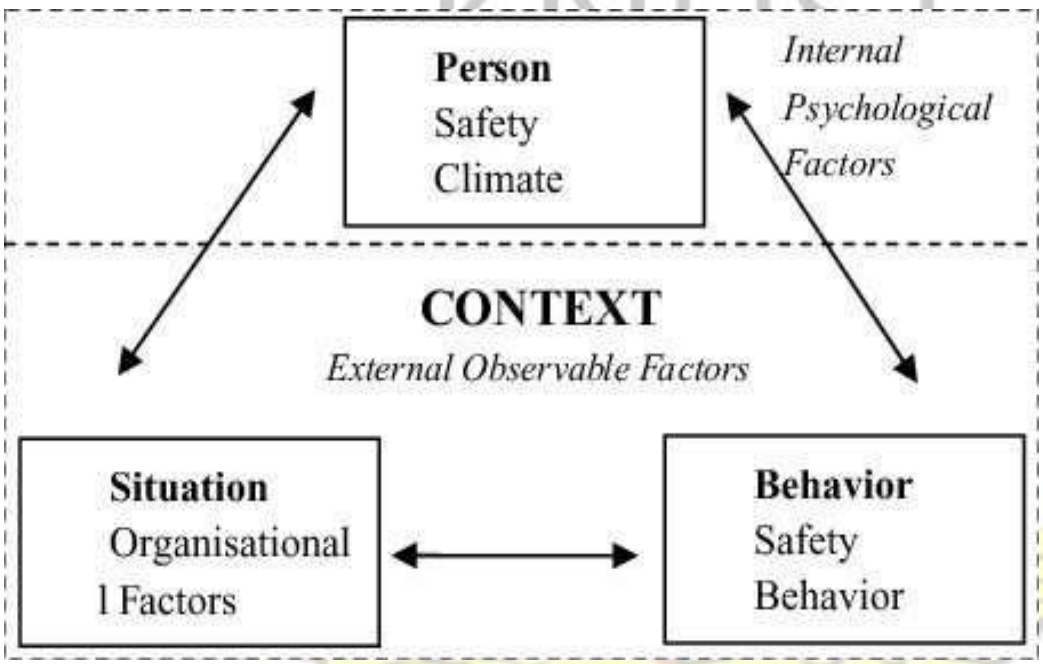

Figure 2. 5: Reciprocal Model of Safety Culture (Source: Cooper's, 2000)

2.6.6 Choudhry et al. (2007) Model of Construction Safety Culture

Choudhry et al. (2007) provide a conceptual construction safety culture model, which aims to integrate three related concepts of safety climate, behaviour - based safety, and safety management system. Indeed, the model is essentially an extension of the reciprocal safety culture model of Cooper (2000), which has been expanded to include construction-specific descriptions of each component (person, circumstance, and behaviour). Adapting the model's language to the industry would promote the effective translation of critical concepts into project work tasks.

2.6.7 Reason's (1997) Components of Safety Culture

Reason (1997) includes a chapter on' engineering safety culture' in his book on managing the risks of organisational accidents. Reason tailors his message to a' safety professional' audience rather than an academic audience, and the subsequent discussion outlines the four components of the safety culture as specifically implemented in high - risk industries*:*

Reporting culture: A good organisational environment is where people are able to report their errors and near-misses. Over-all, the safety focus areas relevant to reducing incident rates are divided into three categories.

The first method used in the 1980s was a strategy whereby companies tried to reduce their levels of injuries by developing technologies, such as equipment and structures to avoid hazards and prevent employees from joining the line of ire.

A Systems Approach is the second focus. In the early 2000s, it focused on improving employee skills through training, risk assessment and introduction of management systems such as ILO 2001 and OHSAS 18001. However, injuries often occurred in organisations that we're actively developing their systems and technology. They were able to control better their safety equipment, engineering designs, employee competence and management systems, but it turned out to be very difficult to control culture and behaviour. The third highlight is the approach to culture, which focuses on leadership, safety attitudes and people.

2.7 HAZARDS ASSOCIATED WITH THE CONSTRUCTION INDUSTRY AND THE GHANAIAN COMMUNITY

Every organisation has a responsibility to provide safe working conditions and atmosphere for employees who are free from threats, risks and diseases (Quartey and Puplampu, 2012). They further

posited that instead of employers investing in the health and safety of their workers, they instead would invest in equipment, machines, cars and factories to the negligence of their workers.

Quartey and Puplampu (2012) noted that industry and country cannot be different in terms of health and safety and therefore concluded that both the industry and the government faced a range of health and safety problems, such as employee negative attitudes and management challenges.

Construction industry workers are exposed to so many types of health and safety risks. Exposures vary from job to job, from trade to trade and from task to task, and these hazards are similar to those that are already revealed to the Ghanaian public in their daily activities (Williams et al., 2018). The construction industry is complex and varies from time to time, causing workers to be exposed to the hazards directly associated with their employment, as well as other immediate environmental hazards. Some of the activities in the construction industry include; 1. Land identification and demarcation. 2. Excavation work. 3. Brick and Blockwork. 4. Concreting work. 5. Formwork. 6. 7. Iron fabrication. 8. Roofing works. 9. Painting and decoration work Etc.

Each of these activities of work has its peculiar hazards associated with them and has been classified as follows; a. Physical hazards b. Biological hazards, c. Psychosocial hazards d. Chemical hazards and Ergonomic hazards. Williams et al. (2019) conducted a study to identify similarities in safety hazards within the construction industry and that of the Ghanaian community. Several hazards in the construction industry were found to be presented in the Ghanaian community. These are shown in Table 2.1 below. Based on the similarities found in hazards present in the two social systems (the construction industry and the Ghanaian community). The authors recommended that the methods used in mitigating health and safety hazards in the construction industry, that has to lead

to the improvement in the industry's health and safety should be adopted in the Ghanaian communities as well.

Table 2. 1: Hazards associated in the construction industry and the Ghanaian community

Types of construction hazards	Peculiar hazards associated with each type
PHYSICAL HAZARDS	1. Collision
	2. Confined space
	3. Slips and trips
	4. Falls from heights
	5. Being struck by objects
	6. Workplace transport
	7. Equipment related injury
	8. Noise and vibration
	9. Heat and cold temperatures
	10. Radiation both ionising and non-ionising 11. Barometric pressures –
	12. hypobaric and hyperbaric pressures
BIOLOGICAL HAZARDS	1. Micro – organisms
	2. Toxic substances of biological origin
	3. Animal attacks
	4. Development of histoplasmosis due to site clearance and excavation.
	5. Lung infection due to soil fungus.
	6. Exposure to contagious disease e.g. tuberculosis, influenza from other workers
	7. Poison ivy and other plants present toxic substances causing skin eruption.
	8. Carcinogens from wood dust
	9. Animal attacks (snakes bites, bee stings)
CHEMICAL HAZARDS	1. Dusts
	2. Fumes
	3. Mists
	4. Vapours
	5. Gases
	6. Liquids
ERGONOMIC HAZARDS	1. Musculoskeletal disorders
	2. Manual handling
PSYCHOLOGICAL HAZARDS	1. Lack of dependability 2. Employment insecurity

Source: Williams et al, (2019)

2.8 LINKING HAZARD OF THE CONSTRUCTION INDUSTRY TO THE GHANAIAN COMMUNITY

2.8.1 Physical hazards

Noise is very much associated with demolition. Vehicle engines, winches, rivet guns, pneumatic hammers, power saws, etc., used on construction sites make a lot of noise. Heat and cold arise as a result of most construction work being done in the open, i.e. workers are exposed to the elements. Exposure to heat or cold may result in hypothermia or hyperglycaemia, i.e. heat stress. Non-ionising radiation (UV radiation) sources include the sun and electric arc welding. Sources of ionising radiation include x-ray equipment used to inspect welds.

2.8.2 Biological Hazards

Biological exposure is usually caused by exposure to contagious microorganisms, biologically derived toxic substances or animal attacks. Building site clearers and excavators may develop histoplasmosis, an infection of the lungs caused by a soil fungus. So, the Ghanaian community is unknowingly exposed to infectious microorganisms, toxic substances of biological origin through the clearing of farmlands, planting of crops, fetching firewood for cooking and the like. Exposure to contagious diseases – tuberculosis, influenza - from other workers (construction workers) and neighbours (Ghanaian community), poison ivy and other plants present toxic substances which can cause skin eruptions, some wood dust are known carcinogenic. In contrast, others (e.g. redwood) are allergenic. Animal attacks (snake bites, bee stings, etc.) due to the disturbance of their habitat is also known. Underwater workers risk being attacked by sharks or other fishes. All these risks are common among the Ghanaian community and the construction industry as well.

2.8.3 Chemical Hazards

Exposure, therefore, occurs by inhalation (during normal breathing or smoking) and skin absorption (e.g. pesticides for wood preservation, organic solvents). Chemicals may occur in liquid or semi-liquid form (e.g. glues or adhesives, coal tar), and maybe ingested with food or with a drink. Exposure may result in systemic poisoning or organ poisoning, e.g. skin dermatitis. Illnesses associated with chemical exposure include silicosis among sandblasters, tunnel builders, and rock drillers as a result of exposure to silica dust, asbestosis among demolition workers due to asbestos exposure.

Most of these hazards are also associated with the Ghanaian community through the spraying of insecticides and weedicides on farms and homes, cutting of wood for cooking and inhalation of smoke during cooking in the home and for heating.

2.8.4 Ergonomic Hazards

Musculoskeletal disorders commonly in the form of sprains and strains are very common among construction workers. Other incapacitating musculoskeletal disorders comprise tendinitis, carpal tunnel syndrome and low back pain may occur as a result of traumatic injury, repetitive forceful movements, awkward postures or over-exertion, workers assume very awkward postures while at work manual handling characterise a lot of construction work activities The hazards associated with manual handling are therefore very common in the form of poor postures. The most common hazards among the Ghanaian public and causing so much harm to them include ergonomic hazards. Ghana is a developing country in which whatever a person does, he or she is exposed to one manual hazard or the other, since almost all activities carried out here are manualbased, from farming, transporting farm produce, fishing, cooking, washing, cleaning, small scale mining, right to the market places and even offices of work. It is

one of the hazards of which the reduction or mitigation of its severity can alleviate life-threatening disorders and improve the quality of life among the Ghanaian citizenry.

2.8.5 Psychological Hazards

Psychosocial hazards arise from industrial employment social organisation. Casual construction workers, for example, have no control over the work they do. Most citizens of Ghana are unemployed, and those who are employed are mostly casual workers who have no control over their work. There is intense pressure on construction projects to finish within schedule while people are just looking for something to do daily. Due to the lack of stable social support networks in the big cities due to urbanization, the majority of residents live away from their family.

2.9 MAKING A CASE FOR THE NEED FOR TRANSFERRING HEALTH AND SAFETY INTO THE LOCAL COMMUNITY BY THE CONSTRUCTION COMPANIES

The nature of health and safety in Ghanaian society, as indicated in the National Statistical Service Report (2016), demonstrates the need for improvement in the wellbeing of construction workers. For most unindustrialised nations, the state of health and safety is still largely undeveloped. Each nation has to provide its people with a healthy and secure atmosphere free of risks, hazards and diseases, so action needs to be placed in place to shield the Ghanaian worker from preventable health and safety hazards.

Quartey and Puplampu (2012) argue that with globalization and trade liberalization in most developing countries, including Ghana, it is important to build structures and frameworks to protect employees in all industries. They further noted that the country's

health and safety problems seem troubling due to the absence of active policies, services, and procedures that protect the well-being of the working population. The above postulation means that health and safety legislation should be in a place that requires not only organisations in the country to protect their employees alone but also the health and safety and well-being of their families and the community.

According to Hymel et al. (2011), a substantial proportion of adults devote the most of their working hours at work, making the workplaces an ideal setting for regular connection with large segments of the population. Pescud et al. (2015) also believe that the workplace offers an opportunity to tailor programs and health messages to meet the specific needs of the segment of the industry and demographic groups.

2.10 LINKING CONSTRUCTION HEALTH AND SAFETY TO CORPORATE SOCIAL RESPONSIBILITY.

The relation between health and safety and corporate social responsibility is this: According to Quartey and Puplampu (2012), a sick, unhappy and extremely tense employee cannot assist in increasing shareholder value and dividends. Building industry personnel are mostly recruited from the project's local communities because of the improved promotion of inclusion of local content in procurement processes. It means a healthier community means a healthy workforce, and that also means a healthy business, while increasing shareholder expectations and advanced corporate goals.

According to Esmaeili et al. (2012), in recent years, the health and safety policies of construction companies working within communities have increased worldwide. But in no way have those of the Ghanaian Society increased. Building projects are known for their negative impact on the environment, so these building companies are expected to contribute positively to the communities around the project site as a contribution to

society, as Wood (1991) noted that businesses and societies are interwoven rather than separate entities. According to Quartey and Puplampu (2012), employment and social policy which promotes social justice and emphasizes employees legal and human rights incorporate principles of corporate social responsibility.

CHAPTER THREE

CORPORATE SOCIAL RESPONSIBILITY (CSR)

3.1 INTRODUCTION

This chapter explores the concept of corporate social responsibility in general and, in the sense of the construction industry in particular, amplifies the need and benefits of CSR to the construction industry and to the GCI. In order to contextualize a concept for this review, the chapter puts together some examples of corporate social responsibility found in the literature. The chapter continues to explore typologies of CSR as well as challenges facing the construction industry in general and the Ghanaian construction industry in particular, thus delving into the success of CSR in the construction sector. The review led to a working definition of corporate social responsibility as follows: *For this study: corporate social responsibility is an organisation's conscious effort to contribute to the well-being and development of the lives of its workers, their families, and the community as a whole while taking advantage of a peaceful environment to achieve its corporate objectives.*

3.2 THE TERM 'CORPORATE SOCIAL RESPONSIBILITY.'

So many authors have employed the term 'corporate social responsibility in several ways. Corporate social responsibility is a corporate duty to create wealth in ways that avoid harming, protecting, or enhancing social assets (Steiner and Steiner, 2005). The term is also used with corporate governance, corporate citizenship, corporate accountability, and business ethics interchangeably (Duman et al., 2016). Corporate social responsibility is an ethical, non-legislative, non-driven approach to promoting responsible conduct within organisations to achieve desired results (Amponsah-Tawiah and Dartey-Baah, 2011). Haddock (2005) also suggested that corporate social responsibility provides a voluntary framework for companies to absorb broader social or environmental issues, as well as better stakeholder relations. Others also view

corporate social responsibility as the actions of a company which lead to sustainable development through the activities of the company (Forstater et al., 2002). Companies recognize that they should be accountable not only for their financial performance but also for the impact their actions have on society and the environment (Watts and Holmes, 2003). McWilliams and Siegel (2000) provided an interesting view of corporate social responsibility, arguing that it is an activity that seeks to advance a social benefit beyond the company's interests and that is mandated by law.

3.2.1 Corporate Social Responsibility Definitions

Corporate social responsibility has a long historical tradition. Nonetheless, it is difficult to define because it has a multidimensional and ambiguous meaning that can mean things that are different from different organisations (Duman et al., 2016). Singh et al. (2015) argue that the unclear nature of corporate social responsibility, combined with pressure on companies to embrace it, meant that organisations had to express the term in order to meet consumer demands. Duman et al. (2016) further argue that the absence of a common concept of corporate social responsibility makes it difficult to interpret and compare the results from different studies since they usually refer to different industries. Dahlsrud (2006) suggested that while corporate social responsibility is widely recognised and is of increasing interest in business circles around the world, there is still no consensus on its concept, course, structure and operations. Loosemore and Lim (2017) supported this argument by adding that corporate social responsibility in the construction industry remains fragmented and not conceptualized.

In all these setbacks, some researchers have defined corporate social responsibility in their own context. Amponsah-Tawiah and Dartey-Baah (2011) see corporate social responsibility as being the strategic decision of an organisation to voluntarily act upon

the societal factors that have the potential to hinder against the fulfilment of corporate goals. Aguinis (2011) Sees corporate social responsibility as context-specific actions and policies that take the stakeholders into account. At the same time, Barnard (1938) opines that corporate social responsibility is the analysis of economic, legal, moral, social and physical facets of the business environment.

For the World Bank Business Council for Sustainable Development (2006), Corporate social responsibility is an organisation's contribution to economic development, partnering with employees, their families, the local community and the society as a whole to enhance the quality of their lives, in ways that are good for business and good for growth. This definition concludes everything and creates a valuable significance to the debate because the underlining factor of corporate social responsibility is to bring improvement and relief to wherever a construction company finds itself. In this way, the company or corporate entity would always feel welcome to these communities anytime and enjoy a peaceful environment to carry out its activities successfully in a more co-operative setting. It is a recognised fact in corporate social responsibility literature that stakeholders believe companies are responsible for them in some ways.

Similarly, they look around to assess the degree to which these firms have fulfilled responsibilities such as school building, feeder road construction, boreholes, and the like in the communities where these firms are located.

3.3 CORPORATE SOCIAL RESPONSIBILITY IN DEVELOPING COUNTRIES

Historically, in many developing nations, the act of corporate social responsibility is foreign, and remains so in some countries even today (Amponsah-Tawiah and DarteyBaah, 2011). Work

that looks at the practices of corporate social responsibility has generally concentrated on businesses in more developed economies such as the US, UK, Australia and the like (Tilt, 2016). But the situation is changing as researchers begin to operate towards awareness of the concept corporate social responsibility in developing nations, particularly as these countries are experiencing growth and shifting towards a more capitalist orientation (Suminiani et al., 2007 as cited in Tilt, 2016).

Organisations or companies that work in these countries should give back to these communities in order to develop their good corporate citizenship. In addition, much of the world's population lives in developing countries where each has its own specific social, political, and environmental problems (UN 2013, as cited in Tilt, 2016).

These states are in the process of industrialisation and are often marked by weak governments, higher rates of unemployment, insufficient technical capability and inadequate income distribution, poor water supply and underused output factors (Tilt, 2016). In a developing country like Ghana, activities in corporate social responsibility are led by foreign organisations. Belal and Momin (2009) examined and categorized corporate social responsibility in developing countries into three:

1. Studies of the volume or scale of corporate social responsibility reportage.
2. Studies of how managers perceive corporate social responsibility and
3. Studies of the perception of corporate social responsibility reporting by stakeholders.

3.3.1 Corporate Social Responsibility in Ghana

CSR initiatives in Ghana are essentially seen as strategic decisions taken by businesses to voluntarily resolve the social problems; they have the potential to militate against the achievement of their corporate goals (Amponsah-Tawiah and Dartey-Baah, 2011).

These writers have added that in Ghana, the concept of corporate social responsibility appears to concentrate on the external world and ignore the internal context from which workers work.

The Ghanaian government has proactively authorized friendly practices in the country regarding corporate social responsibility (Atuguba and Dowuona-Hammond, 2006). They further argue that the Ghanaian government has promoted corporate social responsibility through legislation that defines minimum standards for business performance. Oppong (2014a) argues that most CSR initiatives, in terms of impact and size of social investments, are done by the telecommunication companies, banking institutions, and companies in the extractive industries such as mining, oil and gas.

The author added that the companies engaged in Ghana's CSR performance are foreignowned. The author further argues that CSR commitments are mainly based on education, health, climate, social entrepreneurship, and the growth of sports due to the current rising problems. Ofori and Hinson (2007) posited that companies in Ghana focus on a few areas such as training, safety, environmental development, health conservation, consumer protection and philanthropy and that very multinational companies ' subsidiaries are strategic, moral and ethical in their approach to CSR. Ofori and Hinson (2007) further contend that the corporate environment in Ghana is varied. Limited liability companies, limited by guarantee companies, non-Ghanaian companies registered as external companies in Ghana, as well as state-owned corporations, are on that level.

Most companies in Ghana fall into the category of SMEs and are estimated to account for 92 per cent of Ghana's commercial enterprises (Adjei et al., 2014). What this means is that very few companies in Ghana are multinationals. It is viewed that multinational

organisations in the country follow CSR initiatives in the areas of economic growth, health and education, assistance to minorities, and entrepreneurial development (Ofori and Hinson, 2007).

In developing countries like Ghana, western theories on CSR have limitations in their application Dartey-Baah and Amponsah-Tawiah, 2011). They argue further that, as a result of the differences in drivers or causes of CSR in the West and Africa, as well as cultural and managerial characteristics in Africa. It could be attributed to the fact that Western societies, where the emphasis is placed on standards such as self-expression, subjective well-being and quality of life, as opposed to developing societies where the emphasis is placed on economic and physical protection. As a result, there is a minimal social pressure on governments and businesses to be socially responsible, as is often encouraged in developing societies to prepare comprehensive laws Dartey-Baah and Amponsah-Tawiah, 2011).

It has been identified that Ghanaian organisations have a positive attitude to corporate social responsibility, and these places are largely shaped by ethical values, both private and social (Ofori, 2008). Ofori (2008) reported that Ghanaian managers consider societal requirements over organisational reimbursements as the most important influence of their corporate social responsibility deliberations. He further reported that 61% of managers in his study reported that improvement in the image of their companies was the most important benefit they derive from corporate social responsibility activities compared with only 15 % and 4 % who indicated that an increase in sales of goods and financial rewards were the benefits derived from corporate social responsibility activities.

Additional his study showed that company reputation was ranked the most important driving factor while the company benefit was ranked as the fourth. (Oppong, 2014a).

Looking at Oppong's (2014a) results, it means that better financial performance is not considered to be the primary justification for corporate social responsibility. DarteyBaah and Amponsah-Tawiah (2011) have found that companies conducting their corporate social responsibility activities in Ghana tended to be owned by foreigners. These writers observed that many of Ghana's foreign-owned companies originated in countries like Australia, Belgium, Canada, Denmark, France, Germany, Italy, Japan, Korea, the Netherlands, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. It also means that the construction industry is falling behind in the country's performance of corporate social responsibility, though it is among the industries whose activities have the greatest direct effect on the environment and the people.

3.3.2 Corporate Social Responsibility Performance in Ghana

A number of construction companies operating in Ghana have invested in CSR in one way or the other. Oppong (2014a) opined that it is not easy to measure the precise result of the CSR initiatives as little or no impact assessment or outcome evaluation has been conducted by the companies themselves. One may, therefore resolve that the initiatives have not experienced any substantial impact on the livelihood of the communities purposed to be beneficiaries of the funding. Ofori and Hinson (2007) opined that corporate social responsibility was essentially a philosophy around the relationship between business and society. Some researchers like Adjei et al. (2014) noted that CSR initiatives undertaken by companies tended to be informed by a philosophy of basic needs approach to development as opposed to basic means approach. They further stated that the former tends to identify the developmental challenges of the communities and attempts to provide the communities with those material needs whereas latter tends to

focus on identifying why the communities are unable to provide for themselves basic social services. This shows that their focus appears not to be on really making a difference with long-term impact on the communities in which they work.

3.3.3 The Need for Corporate Social Responsibility in the Construction Industry It has recently become a matter of great concern for conservationists and policymakers to see the construction industry deal more effectively with its climate (Loosemore and Lim, 2017). Petrovic-Lazarevic (2008) conducted a study in Australia's construction industry and found that Australia's large companies establish corporate social responsibility in society to preserve a reputation of being a good corporate citizen. Other scholars in CSR literature also suggested that today's corporate social responsibility is no longer conceived as a purely moral obligation but as a strategic strategy for increasing productivity and achieving mutual ideals with the societies where such institutions are doing business (Porter and Kramer, 2011; Battaglia et al., 2014; Loosemore and Teck Heng Lim, 2017). In the Ghanaian construction industry, regulation of corporate social responsibility is non-existence, and only a few academic works have continued in this area so that key issues like typologies of corporate social projects and problems remain unexplored (Lichtenstein et al., 2013). The authors further argue that awareness of these issues is important for establishing a system of corporate social responsibility capable of providing concrete long-term societal benefits while increasing the performance of companies by leveraging capital and competencies.

Furthermore, research into corporate social responsibility in the construction industry has been shown to have grown in recent years. Only it remains fragmented and conceptualized, and little awareness exists of the relationship between corporate social responsibility and organisational efficiency, the types of corporate social responsibility

strategies employed, and the strategic motivations behind them (Loosemore and Teck Heng Lim, 2017). Watts et al. (2015) argued that the record of corporate social responsibility in the construction industry is becoming increasingly important for a company. It also suggested that not only are clients socially conscious, expecting a demonstrable record of corporate social responsibility, but it is expected by the wider community.

To further strengthen the case for the need for CSR in the construction industry, ThorpeJones et al. (2010) suggested that CSR could be used as a means of improving intractable superficial problems such as the lack of diversity in the construction industry. Similarly, Loosemore and Phua (2011) corroborated Ness statement (2010) by critically examining corporate social responsibility in the construction industry, which revealed common rhetoric regarding "doing the right thing," while business strategies were actually driven by the "bottom cable." Uwuigbe and Uadiale (2011) indicated that corporate companies should be held accountable for maintaining a sustainable climate, as their operations have environmental stress.

3.4 CORPORATE SOCIAL RESPONSIBILITY IN THE CONSTRUCTION INDUSTRY

Corporate social responsibility is becoming increasingly inevitable in the construction industry and for that matter any business entity. It has become very imperative as societies, employees and clients who are generally socially conscious expect firms to prove they are good corporate citizens by honouring their social obligation. Construction projects put intrinsic and significant demand for contractors to keep their corporate obligations (Griffith, 2011). The author further suggested that such roles affect both the construction companies ' strategic corporate management strategy, their financial management, procedures, and practices used to handle their projects.

Campbell (2007) found that corporate social responsibility generated a lot of controversy due to the different ways' organisations approached it, and the reasons given for doing so. There would be different motivations, goals and principles in different industries which would influence the manner in which corporate social obligation is conducted. Most importantly, it is good to note that building activities are carried out within the communities, so in one way or the other, whatever they do impacts on society. It makes it important for the construction firms to represent the community when they get into the business. Nkrumah (2013) postulated that the CSR activities are undertaken by Ghanaian SMEs actually reflected their CSR orientation.

3.4.1 Corporate Social Responsibility Challenges in the Construction Industry

Loosemore and Phua (2011) critically reviewed CSR in the construction industry and exposed widespread rhetoric around "doing the right thing", when in reality business strategies were driven by the "bottom-line". Through several case studies of leading international firms from across the construction supply chain, Loosemore and Phua (2011) exposed a number of barriers to effective CSR in the construction industry, including established cultures and ways of working, confusion of what CSR means, lack of leadership and management skills, lack of CSR data, scepticism about returns on investment, supply chain resistance, and sceptical clients. According to Loosemore and Phua (2011), the growing literature on CSR in construction had several problems. Firstly, it was naively pitching CSR as a wholesale solution for all firms without truly understanding the specific business environment in which it was applied. Secondly, a highly formalized CSR strategy did not necessarily suit every firm. Thirdly, the growing numbers of papers uncritically philosophizing on the need for construction firms to adopt some form of CSR initiative were not supported by sufficient evidence of how

firms should strategically pursue and operationalize CSR to achieve sustained competitive advantage and improved performance.

It has been established in the literature that it is perhaps prior financial performance that determines the willingness of corporate social responsibility initiatives in the Ghanaian construction industry (Lichtenstein et al., 2013). This also accounts for why Ghanaian construction companies, of which majority are owned by local indigenes, hardly fulfil their corporate social initiatives due to low capital base and profitability, relative to the foreign-owned companies. Be it as it may, some Ghanaian construction companies do engage in corporate social responsibility but on a lower scale largely due to financial constraints. For instance, in a study by Nkrumah (2013), she revealed that the management of CSR among Ghanaian SME is seen as just helping the community. She quoted a participant in the study who, in describing CSR, said: "To my understanding CSR is trying to assist the community, assisting needy children, those who cannot feed themselves, and paying of school fees of students in need."

Ofori and Hinson (2007) reported that each company responds in its own unique way to CSR issues. The degree and extent of their response is influenced by factors such as the specific company's size, the particular industry, the firm's business culture, and stakeholder demands and how historically progressive the company is in engaging in CSR. In simple terms, a contractor needs a socially responsible organisational approach which structures both corporate and operational management functions and applies them to the delivery of its business processes. In this way the vision, values, policies and objectives of CSR can be configured and embedded within the routine operations of the business.

The challenges faced by construction companies within today's complex and competitive market environment are products of economic and non-economic related

forces (Barde and Tela, 2011). They further opine that for construction companies to survive and prosper, they must plan their activities in such manner that they strike a balance amongst the economic, social, legal and other relevant forces. It is therefore imperative for construction companies to strive to reconcile the conflicting interests of their various stakeholders such as shareholders, government, creditors and the community (Barde and Tela, 2015).

CHAPTER FOUR

KNOWLEDGE TRANSFER AND DIFFUSION

4.1 INTRODUCTION

This chapter provides the background on theoretical foundations of this thesis, the factors and information that affect the creation and adoption of new knowledge, the factors relating to effective development efforts in knowledge transfer and past work in this field. It also tackles external knowledge transfer from the construction industry to the community. Also presented is a conceptual framework of the study, demonstrating how knowledge can be successfully transferred and diffused. The two main theories that provide theoretical foundations for this study are Innovation Diffusion theory by Rogers, supported by Nonaka and Takeuchi's Knowledge Creation and Sharing theory. Rogers theory was adopted for this study because it has been used in similar studies in Ghana by Ashiboe-Mensah (2012) and Agbesi (2019). Also, this theory has been applied in diffusing knowledge in similar countries like Ghana. Rogers innovation diffusion theory is the most popular adopting theory in the past 30 years when it comes to the diffusion of technology (Taesung, 2015). Also, this theory has been applied in most disciplines such as political science, public health, communication, history, economics and technology (Dooley 1999; Stuart 2000). According to Nil et al. (2018) knowledge transfer has received considerable attention since the introduction of the SECI model by Nonaka and Tekeuchi (1995). Also, these theories were adopted over others because the two theories are both linear and are based on person to interaction.

4.2 OPERATIONAL DEFINITIONS OF KNOWLEDGE TRANSFER AND DIFFUSION.

4.2.1 Knowledge transfer

Knowledge transfer in this study refers to the ability of an individual, or group of persons to succeed in applying skills of a training or new information received to their work environment or daily routines successfully. Whiles Diffusion, is the ability of new knowledge or information transferred to reach the entire social system or population

targeted for a specific transfer program through interactions based on formal and informal social networks within the social system over a period of time.

4.3 THEORETICAL BACKGROUND ON KNOWLEDGE TRANSFER

The concept of organisational knowledge as a basis for global competitiveness is of significant theoretical importance (Liyanage et al., 2009). Unstructured knowledge transfers routinely take place within and across organisational boundaries, whether or not the process is being actively managed (Davenport and Prusak, 1998). Some researchers argue that after appropriate knowledge has been selected, transfer of such knowledge is an unsure process (Gilbert and Cordey-Hayes, 1996; Nonaka and Nitsuguchi, 2001; Liyanage et al., 2009). They further suggest that for knowledge to be transferred successfully, a context of understanding should comprise mechanisms for both knowledge sharing and adoption.

There are many conceptual frameworks on knowledge transfer and management in the organisation. Some of the theories and frameworks on organisational knowledge transfer found in literature are (Remenyi et al, 2002; Alavi and Leidner, 2001; Szulanski, 2000; Argote and Ingram, 2000; Epple et al., 1996 and Attewell, 1992).

These authors looked at the ability to transfer and manage knowledge from one unit to another in an organisation alone, which they all concluded to have contributed to the organisational growth and performance. Other authors such as Nonaka (1994); Argote and Ingram (2000) as well as Liyanage et al. (2009) tend to look at how organisational knowledge is transferred through the various units and managed within the organisation in the area of business management. Shibeika (2014); Fellows and Liu (2012); Esmaeili et al. (2012); Kale and Arditi (2010); Taylor (2007), Dubois and Gadde (2002) as well as Arditi and Tangkar (1997) were some other researchers who also looked at innovation diffusion in the construction industry. These and many other researchers have done

extensive work in the area of knowledge management and transfer in the construction industry, organisational behaviour, human management, diffusion studies and technological innovation management.

But all their works have been centred within the organisation or inter / intra firm alone, not linking this organisational knowledge to the communities neighbouring these organisations. Szulanski (1999) argues that mere possession within an organisation of a potentially valuable information does not necessarily mean that other parts of the establishment profit from this knowledge.

The construction industry is noted for its fragmented nature coupled with various project stakeholders from inception, finance, design, procurement, construction and post construction stage. Authors such as Manley (2008); Sun and Ren (2014) find the construction industry as one of the most difficult social networks in terms of knowledge transfer, because of its multiple stakeholder involvement. Although the fragmented and various stakeholders are seen as major barriers to knowledge transfer in the construction industry, these weaknesses are as well major strengths in the diffusion paradigm. When it comes to knowledge transfer beyond the organisational settings, and reaching out to different professionals and non-professionals throughout different project settings, the construction industry stands tall in this area

4.4 WHAT DOES KNOWLEDGE MEAN?

It is vital to appreciate the idea of having new knowledge before addressing knowledge transfer and its variables. It is important to understand what knowledge really means for a deeper understanding of the meaning of issues such as knowledge transfer variables, and the need to seek knowledge that is vital. The concept of knowledge transfer in the

construction industry is seen as a competitive advantage (Bellini et al., 2016). According to Nonaka and Takeuchi (1995), knowledge, as opposed to information, is about actions, beliefs and commitment, as it depends on individuals' perspective or intent. What knowledge and information have in common is about meaning? knowledge and information must be viewed in specific contexts and relationships as they depend on specific situations and evolve dynamically through individuals' social interactions (Nonaka and Takeuchi, 1995). Information is a dynamic mixture of structured experiences, value, contextual information, and feedback from experts that provide a basis for evaluating and integrating new observations and information (Davenport and Prusak 2000). Dubois and Gadde (2002) claimed that knowledge leads to a knower who can give it to his immediate environment, e.g. teams, networks, and other environments. Davenport and Prusak (2000) argued that knowledge is embedded in information, and that in effect information is extracted from data. For many companies' awareness is a key factor (Lindner and Wald, 2011). Knowledge management can be seen as a continuing social accomplishment (Hui-Min, 2009). The knowledge transfer process consists of several steps which begin with knowledge creation, for example from individual experience. Following the creation of knowledge, the use, transfer and sharing follows, and finally the storage of knowledge in a way that is easy to obtain for further use (Lindner and Wald, 2011).

4.4.1 Knowledge transfer definition

In etymology, the term "transfer" derives from the verb "to transition," which is composed of the prefix "trans," a Latin word meaning "to the other side or beyond," and "ferre," a Latin verb meaning "to bring." "Etymologically, to carry means to the other side" or "to carry beyond" (Faye et al., 2008). Tardif (1999), as cited in Faye et al. (2008)

is of the opinion that the principle of transfer is defined by the inaccuracy and vagueness of semantics. Transfer means, according to the author, a change of clubs in sport, while in law it refers to the transfer of a good or right between men. In the economic field, it means the transfer of resources from one sector to another (financial, human, material) from one sector to another. Knowledge is available information that is new to the people or organisations for whom it is intended; it includes research findings, prevention guides, manufacturing processes, work methods, and innovations (Roy et al., 2003). Knowledge comes from perception or from experience acquired in circumstances and by various means that is kept in memory (Piaget, 1970).

4.4.2 The need for Knowledge Transfer

Knowledge transfer and management in organisations throughout the world is seen as competitive advantage. It is what the organisation knows, how it uses what it knows and how fast it can discover something new, be it in acquisition of technology for innovation, or business activities development (Davenport and Prusak, 1998). Studies have been undertaken in this area to examine knowledge transfer and management process in the organisation. The concept of organisational knowledge as a foundation for global competitiveness is of significant theoretical importance (Liyanage et al., 2009). Unstructured transfer of information happens regularly within and across organisational boundaries, whether or not the process is being actively managed or not (Davenport and Prusak 1998). Some researchers argue that transferring such knowledge is an unsure process after selecting a suitable body of knowledge, (Gilbert and CordeyHayes, 1996; Nonaka and Nitsuguchi, 2001 and Liyanage et al., 2009). They also suggest that for the successful transfer of knowledge, a context of understanding should include mechanisms for the sharing and adoption of knowledge.

4.5 FORMS OF KNOWLEDGE

The knowledge distinction dates from the philosopher Polanyi (1966). He said knowledge could be divided into two arrangements: explicit knowledge and tacit knowledge. Some scholars have argued that tacit and explicit knowledge is not wholly separate but complementary to one another (Nonaka and Tekeuchi, 1995; Nonaka and Nishiguchi, 2001; Chini, 2004). They further propose the development and expansion of human knowledge through social interaction between tacit and explicit knowledge. This implies that these two knowledge transfer processes must be present in order for there to be transfer of knowledge in any way or form. Clegg et al. (2002) also clarified this by adding that knowledge is often divided into two distinct categories: tacit and explicit knowledge.

4.5.1 Tacit Knowledge

According to Polanyi (1966) tacit knowledge is information that cannot be represented or conveyed easily. It is a consciousness that is not verbalized, intuitive and unarticulated. Dreyfus and Dreyfus (2005) contended that the term tacit knowledge received little recognition until Michael Polanyi's writings (1962, 1966) were published. The author noted that people in a variety of settings (e.g., music, craftsmanship, manufacturing, medicine, sports) often had a hard time explaining the beliefs on which their actions were based. Polanyi noted that it is common for individuals to do something, while being unable to explain how they did it at the same time. For example, swimmers stay afloat by controlling their breathing, yet most swimmers are unaware of this, and cannot understand how they adjust their breathing to stay afloat. Bicyclists stay balanced on a bike by adjusting their bike's curvature in proportion to the degree of

inbalance divided by the square of their speed, a rule that is followed by all bicyclists but few can describe. In the end, these examples (and many more) led Polanyi to believe that individuals often "know more than they can tell" (Polyani, 1966).

It is knowledge that exists in human brain, thus according to Nonaka and Takeuchi (2001) cannot be easily captured or codified. Bellini et al. (2016) argued that implicit knowledge is intangible and subject matter, embedded in the memories, values and know-how of individuals and difficult to formalize or express in words. Implicit awareness in general is complicated and difficult to understand and propagate most of the time, but it adds more value to the holder as compared with explicit knowledge. Polanyi's insights into the notion of tacit knowledge were first introduced by Nelson and Winter (1982) to the management literature and later popularised by the adherents of the information-based view (Nonaka and Takeuchi, 1995; Spender, 1996). Several academic books have concentrated on tacit organisational knowledge (Ambrosini, 2003; Collins, 2010) and the concept plays at least some role in most knowledge-oriented research and management (Grant, 2006; Inkpen 1998; Nonaka and von Krogh, 2009).

4.5.1.1 Tacit Knowledge as a Strategic Resource

Much of the attention given to tacit knowledge by management researchers stems from the idea that such knowledge is an important source of competitive success (Nonaka and von Krogh, 2009). Berman et al. (2002) opine that the stock of tacit knowledge within an organisation positively influenced performance. Moreover, Shamsie and Mannor (2013) found that productive and administrative forms of tacit knowledge had a positive impact on organisational performance.

4.5.1.2 Tacit Knowledge Complexity Issues

There are factors that contribute to the issues of uncertainty associated with implicit knowledge. Inherently, tacit awareness is rooted in people's minds (Argote and Ingram, 2000). Individual tacit knowledge orientation poses scalability problems for businesses that depend on tacit knowledge because individuals are limited in the number of tasks they can perform efficiently at any given time (Kogut and Zander, 1992). These limitations derive from the individuals ' limited mental capacity. The transfer of tacit knowledge between individuals is a slow and difficult process due to the inherent difficulties of articulation associated with these knowledges.

4.5.2 Explicit Knowledge

According to Michael Polanyi (1966), Explicit knowledge is the information that can be conveyed in a formal language and shared easily between individuals and social circles. This is information that can be codified and understood in books, databases, and libraries by systematic and methodical language. Specific information can be described from a specific way of expressing. The concept, proposition, formulas, symbols, and graphical form can clearly state this. It can be easily distributed and represented in terms and numbers (Jian SUN and Xu REN, 2014). Bellini (2016) posited that explicit knowledge is systemic and formal, and can be transmitted through structured procedures.

4.6 CONCEPTS AND VOCABULARY IN KNOWLEDGE TRANSFER

According to Faye et al. (2008) there are essentially three common terms used to define knowledge transfer: knowledge transfer, communication and sharing, and knowledge sharing and use. They all referred to the notion of "transfer" according to the authors but relate to different perspectives, objectives, and interests. Certain terms used in

conjunction with "transfer" are: transfer of results from research, transfer of learning, transfer of technology and transfer of organisation.

The transfer of knowledge can be divided into three primary approaches, which are linear transfer, bidirectional transfer and interactive transfer. Scientists and specialists in linear transfer create knowledge that is passed unidirectionally on to users. Bidirectional transfer is where the exchange process between scientists and consumers is growing in importance. It's about recognizing requirements and addressing potential consumer concerns. And third, interactive transfer is where the exchange process is central (Faye et al., 2008).

4.7 KNOWLEDGE TRANSFER IN CONTEXT.

Knowledge transfer is seen as a central player in the growth of each business, and the construction industry in this regard. Knowledge transfer is a field of knowledge management which involves knowledge transfer across the boundaries created by specific knowledge domains (Carlile and Rebentisch, 2003). Bagheri et al. (2015) argue that knowledge transfer refers to the process by which actors share knowledge through ongoing interactions among themselves.

The concept of transferring knowledge is also taken from the field of innovation. Transfer of knowledge is the transfer of information from one individual, to another person (Liyanage et al., 2009). Liyanage et al. (2009) specifies that there must be more than one party involved in a transfer process. According to the authors there must be a source (the original knowledge holder) and the destination (where the information is passed to). Knowledge transfer according to Bagheri et al. (2015) is a process of establishing trans-specialist understanding through the creation of overlapping knowledge.

Several scholars also see the transfer of knowledge as a cycle of knowledge assimilation, adoption, alteration, transformation and dissemination (Bresman et al., 1999; Nonaka and Takeuchi, 1995). Information transfer is the process of reconstruction and storage of vague and complex procedures so that they can be modified and used in future projects (Hui-Min, 2009). Lindner and Wald (2010) claim that there exist many factors, several of which are interrelated, affect the degree of knowledge transfer. They also suggest that knowledge management should be centralized within an organisation, as this makes it easier to legitimize the time and resources devoted to knowledge transfer.

4.7.1 Knowledge Transfer and Utilization

An effective knowledge transfer should result in accumulation or assimilation of new knowledge by the receiving unit (Nonaka and Takeuchi, 1995; Nonaka, 1994). Transfer of knowledge involves either working closely with others and sharing what one knows, or actively referring to others for learning what they know. When people identify knowledge that is critical to them in a social setting, they can utilize knowledge transfer systems to acquire that knowledge. They can then improve it by re-inventing it, and make it available to others who need it through diffusion. Since the transfer of knowledge involves networking and encourages close ties with people to share knowledge within and between a social system, it can be identified as an act of communication. Communication theory describes the element which is involved in much transfer according to Edward and Cordey-Hayes (2000).

4.7.2 Knowledge Transfer Process

When it comes to knowledge transfer, it is claimed that knowledge can be transferred from one process to another and a four-stage process is proposed for this conversion. Nonaka and Takeuchi (1995) defined the conversion process as spiral, from the conversion of tacit knowledge to explicit knowledge to the subsequent conversion of explicit knowledge to tacit knowledge.

Tacit knowledge like another organisational knowledge, however, resides in the human mind, and is tough to articulate. This could therefore be transformed when the knowledge holder gets the opportunity to communicate with the receiver. Actual movement of knowledge from the transferee to the transferor takes place through a process that could be called knowledge routing.

Likewise, Inkpen et al. (2001) labelled expats as a medium for routing information to the alliances from parent companies. Western-land expatriates are likely to be relatively expensive, suggesting that local consultants could be employed to transfer managerial knowledge to alliances. Apart from cost savings, the local environment experience will draw in the awareness reconstruction to match the less troublesome local environment. Knowledge dissemination is knowledge transmitted to a partner within the context of an association that remains mostly in the minds of people who are seen as agents of the learning process.

4.7.3 Transfer of learning

The definition "brings into play psychological processes and mechanisms relevant to the memorization, comprehension (or apprehension), assimilation and application of the acquired knowledge" In this sense, cognitive processes are emphasized, since the purpose of knowledge transfer is to' identify how to encode, organize, even automate, then remember and enable information to be transferred' (Orleron, 1971, as cited in Roy et al., 1993). Focus is on the mechanisms that transfer knowledge or skills acquired in a

source activity to a target activity. Transfer therefore refers to the displacement of the knowledge acquired between two different situations: the learning context (the source) and the context of the application (the target).

4.7.4 Organisational transfer

Organisational transition applies to acquired knowledge or skills that are perceived as a tool to be shared and applied within an enterprise for performance improvements. Organisational change has two types: intra-organisational and inter-organisational. It is the process through which the experience of another is influenced by one unit for example group, department, or division (Argote and Ingram, 2000).

4.8 KNOWLEDGE CONVERSION AND TRANSMISSION.

According to Nonaka and Takeuchi (1995) new knowledge is created through the interaction between explicit (information that can be expressed in words and numbers and conveyed in data form) and tacit (information that is highly personal and hard to formalise, making it difficult to share with others). Nonaka and Takeuchi (1995) demonstrate that there is a spiralling cycle occurring as a tacit and explicit exchange of knowledge, resulting in four phases of knowledge transfer within an organisation as shown in figure 4.1. The first step is that of Socialisation, which involves exchanging tacit knowledge between individuals through shared actions such as just being together, spending time and living in the same environment. The second phase is that of externalisation, which includes transmitting tacit knowledge and its translations into comprehensible forms which others can understand. The next process is the Combination phase, which involves transforming explicit knowledge into more complex explicit knowledge sets. The core issues in this phase are communication and

diffusion processes, and knowledge systematisation. The final phase is that of internalisation, where the internalisation of newly created information is the transformation of explicit knowledge into tacit knowledge of the organisation. It is important to stress that the above four phases have a cyclic / spiral relationship and allow us to understand the "actualisation of knowledge within social institutions" (Nonaka and Takeuchi, 1995).

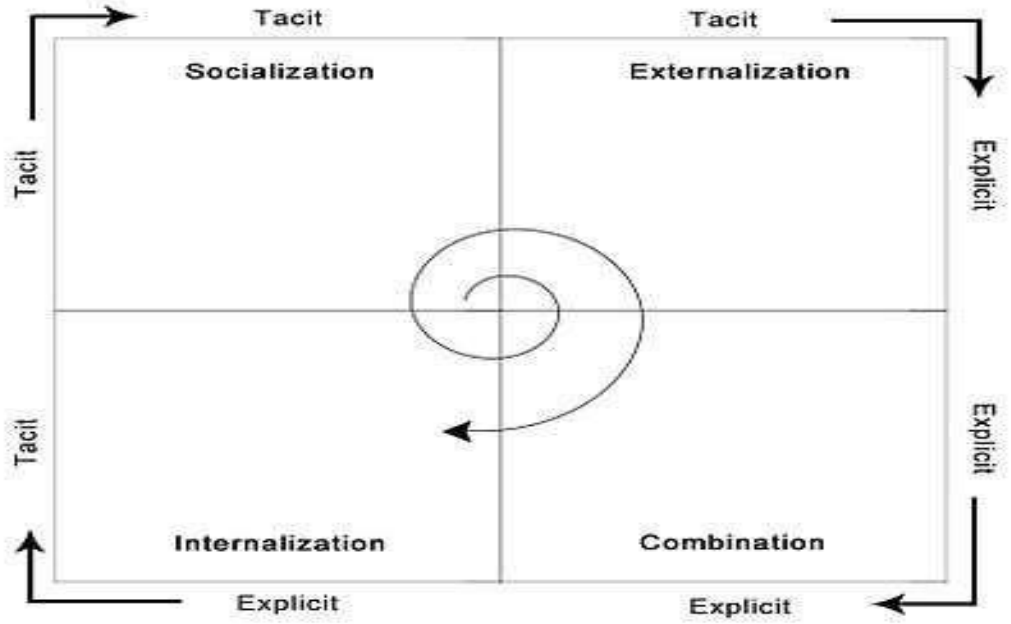

Figure 4. 1: SECI Knowledge Conversion Model *(Adopted from Nonaka and Takeuchi, 1995).*

4.9 ENABLERS OF KNOWLEDGE TRANSFER

For an organisation to transfer successfully its valuable knowledge within or outside the organisation, there must be a channel of communicating this found knowledge and enablers to facilitate the transfer process. In order to understand the smooth transfer of knowledge, this section shall review some enablers that are able to aid the smooth transfer of organisational knowledge.

4.9.1 Organisational leadership.

Leadership plays a pivotal part in establishing standards for attaining the transfer of organisational knowledge. Lee et al. (2008) postulates that an information technology work environment or a community that promotes the technological practices of its employees is called an organisational infrastructure.

4.9.2 Organisational incentive system

Nonaka and Takeuchi (1995) mention that the organisational structure can either encourage or block the transfer of knowledge. Davenport and Prusak (1998) say that successful organisational knowledge transfer that integrates a standardized system and versatile structure would lead to knowledge development projects being implemented. Argote and Ingram (2001) believe that an incentive system can motivate employees to work on the transfer of knowledge in order to obtain rewards from knowledge creation, knowledge sharing and cross-departmental cooperation.

4.9.3 Organisational members

Pieris et al. (2003) believe that knowledge transfer requirement is a strategy where an organisation's members are willing to plan and contribute to its success. Zahra and George (2002) suggest that organisational policy is the most important factor promoting the transfer. Realizing the organisational policy and knowledge transfer scheme is truly significant. Another important player that we should pay attention to is leadership. Many scholars believe the introduction of a project to create and transfer knowledge is a kind of reformation. The support given by senior managers therefore determines the success of these knowledge transfer projects (Liebowitz, 1999). Furthermore, Davenport and Prusak (1998) conclude that among the critical factors that determined the success of knowledge projects, from 31 knowledge management cases, the most important enablers was the support given by the senior managers.

4.9.4 Organisational culture.

Organisational culture is an array of values, beliefs, patterns of behaviour, and symbols that have several facets. Significant literature and studies indicate that organisational culture is a critical factor controlling the transfer of information or the intensity of knowledge sharing (Gold et al., 2001).

4.10 THE NEED FOR CONSTRUCTION-SPECIFIC KNOWLEDGE TRANSFER

The need for a construction-specific transfer of knowledge stems from its fragmented nature. When it comes to knowledge transfer it is also noted as a very complex industry. Jian Sun and Xu Ren (2014) support this claim by arguing that construction project teams are temporary and consist of multidisciplinary groups. The author further suggest that the parties concerned are moving on to new and separate projects after a project has been completed. Because a result, knowledge gained or transferred is lost, and at the end of that project, the lessons learned are dispersed (Jian Sun and Xu Ren, 2014).

This author's statement means that the aim of expertise transfer and assimilation is undermined after one project has been completed, since teams involved in the awareness transfer exercise are temporary unlike other industries. In addition, knowledge transfer in other industries cannot be completely implemented in the construction industry as it is too focused on transmitting and handling inter/intra-firm knowledge by itself. Bosch and Postma (2010) noted that it is difficult to transfer the knowledge of the collaborative network in the construction project because it depends on the ease of communication and familiarity of the overall relationship between the source unit and the recipient unit.

Lindner and Wald (2001) also added that construction organisations often lack natural learning mechanisms which complicate knowledge transfer. Hence the need for construction-specific knowledge transfer which builds on knowledge transfer experiences in other industries. Factors like global competition, strategic alliances, business strategies and project delays as well as community involvement in today's construction projects have led companies to come out with innovative ways to enhance their organisational practice. Therefore, knowledge transfer should be seen as an innovation because it introduces new ideas that are novel to the institutions involve in the transfer program and its employees.

4.11 INNOVATION DIFFUSION

4.11.1 Definition of Diffusion

Diffusion is the process by which the members of a social network transmit an idea over time through certain networks (Rogers, 1995). Diffusion is also referred to as the mechanism by which technical novelty and administrative innovation are inculcated into work procedures and embraced by a specific group or throughout the organisation (Green and Heyner, 2000). Howard and Moore (1988) also see diffusion as the dissemination of an innovation across a social system. Diffusion then can be said to be an examination of the pace of adoption by a population of potential adopters of an innovation.

Peansupap and Walker (2005a) also agree that propagation is the mechanism through which technical and managerial innovation are incorporated into work processes and implemented by a specific group or throughout the organisation. James (2009) had an interesting view of diffusion; he proposed that diffusion is the process by which cultures and societies shift and progress, and went on to argue that diffusion is a natural social phenomenon that occurs with or without theory to explain it.

He further argued that whether the invention includes a new idea, a new pattern of behaviour or a new technology, it is also a natural phenomenon that explains the spread of an entity in time and space. Looking at all the definitions except James (2009), there is one thing that runs through, which is that diffusion occurs when the new idea reaches the entire population or target group and not just the early adopters or innovators.

Diffusion, according to Koebel (1999) requires expressing a new idea to the intended adopters. According to Rogers (1995), this is a particular type of contact in that the communications are about new ideas. Rogers (1995) defines communication as a process in which participants create and share information to reach a mutual understanding with each other. It means that two or more people exchange information with each other in order to move towards each other or part of it (Rogers, 1995; Toole, 1998; Sexton, 2004).

According to James (2009), the theory of innovation diffusion has tried to explain the individual decisions or intentions to adopt. Such decisions apply to well-defined innovations, and the population of adoption is fairly homogeneous and has well-defined limits. Diffusion theory has been regarded predominantly as a model of change that focuses on individual decision-making (Ashley, 2009; as cited in Taesung, 2015), but it does not contribute to the assumption that new knowledge or product needs to be disseminated to reach the last person. Alternatively, one can speed up the rate of diffusion by different segments of the population through more comprehensive and more efficient contact and outreach.

4.11.2 Innovation Decision Theory

Innovation decision theory states that diffusion is a process that occurs over time, and can be separated into five stages as shown in figure 4.2. Knowledge, decision,

persuasion, implementation and confirmation phases (Rogers, 1995). Potential innovation adopters, according to this theory, need to be aware of the innovation, be persuaded of the merits of innovation, agree to support and implement the innovation, and confirm, reaffirm or reject the decision to innovate.

Innovation decision: is the process through which an individual or a decision-making unit moves from initial understanding of innovation to creating a willingness to accept or reject the new idea (Rogers, 1995). Rogers further proposed that the innovation decision-making process consists of a series of actions and choices over time through which an individual or organisation considers a new idea and determines whether to integrate it into current practice or not. In his ground-breaking work on the diffusion of innovation, Rogers (1995) argues that individual decisions on an idea are not an act but a process that takes place over time and consists of a series of actions.

Knowledge Stage: It starts when the decision-making unit is exposed to new knowledge, and has an understanding of how it works (Rogers and Shoemaker, 1971;

Rogers, 1995). Rogers further claimed that a person plays a passive role in being exposed to awareness of information, quite by chance, since one cannot actively seek innovation until one knows it exists.

Persuasion Stage: It is where person develops a favourable or unfavourable attitude towards innovation in a decision-making process. Whereas mental activity at the knowledge stage was primarily cognitive or intellectual, the main type of thinking at the persuasion stage is performance or feeling. He or she cannot start forming an attitude towards it until the individual is aware of a new idea (Rogers and Shoemaker, 1971; Rogers, 1995)

Rogers (1995) further noted that at the stage of persuasion, a person becomes more engaged with the concept psychologically; he or she is finding information about the new idea

Decision stage: The decision stage in the decision-making process is when an individual or a decision-making unit takes part in activities that lead to the likelihood of accepting or rejecting innovation. Adoption is a decision to make full use of an invention or to reject innovation as the best course of action available (Rogers 1995). Rogers claims that most people are not going to adopt an idea without first attempting it on a probationary basis to assess its usefulness in their own case. He also points out that this small-scale experiment is often part of the decision to be made to reduce uncertainty about the innovation from the adopter point.

Implementation stage: Implementation happens when an entity or decision-making unit makes use of an invention. The cycle of innovation-decision had been a purely mental exercise until the implementation stage (Rogers, 1995). Rogers postulates that there is still some degree of uncertainty at the implementation level about the potential consequences of the invention, even though the decision to adopt had been made beforehand. Because a person would like to know the answers to such a question as' where do I get the new idea?' How do I use it?' And what operational issues am I going to face and how can I solve them? As a consequence, actively looking for information usually takes place at the implementation stage, too.

Confirmation stage: A person or a decision-making unit seeks affirmation at the confirmation stage of an innovation decision already made but may reverse that decision if he/she is exposed to contradictory innovation messages (Rogers 1995). Potential innovation adopters, according to this theory, need to learn about the innovation, be

convinced of the value of the innovation, agree to adopt and support, reaffirm or reject the innovation decision.

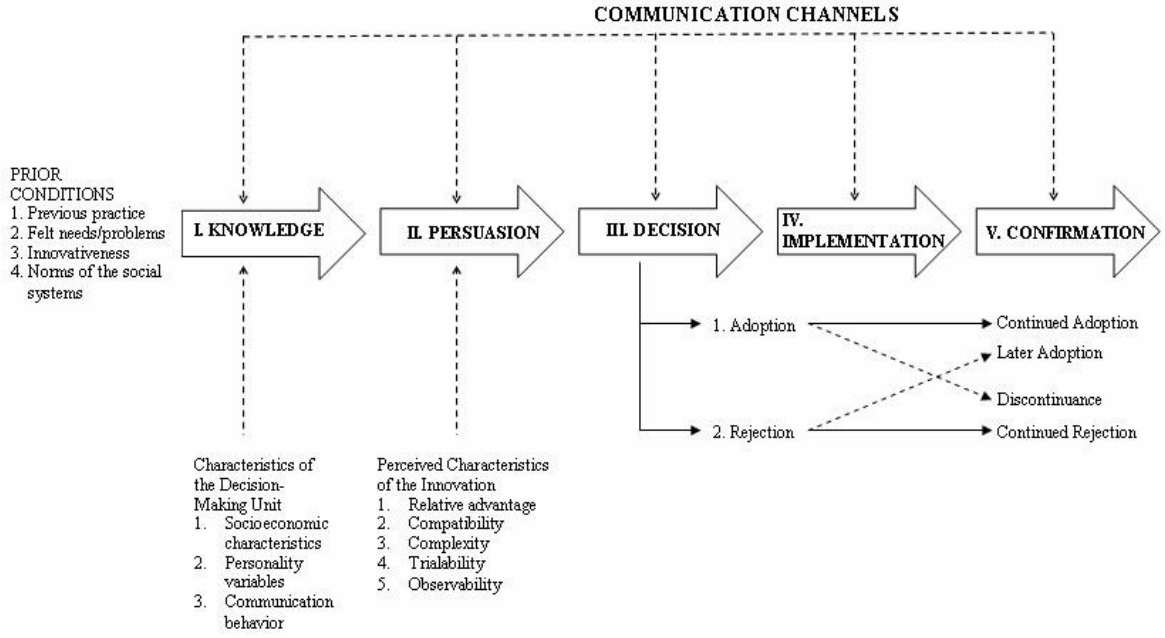

Figure 4. 2: Innovation Decision Process (Source: Rogers, 1995)

4.11.3 Perceived Attributes Theory

The perceived attribute of innovation theorises that prospective adopters judge an innovation based on five attributes see figure 4.3. These attributes are: Trial-ability, Observer-ability, Complexity, Relative Advantage, and Compatibility (Rogers, 1995).

The theory states that an innovation may experience a higher rate of diffusion when potential adopters assume that prior to implementation, innovation can be tested on a limited basis, produce measurable results, have an advantage over other innovations and are not too complex. He further noted that the degree of relative advantage can be calculated from an economic point of view, but social status, ease and comfort considerations are often also essential components. Not necessarily new learning has to be more valuable than what already exists.

Whether a person perceives the new knowledge as advantageous is what matters; the greater the perceived relative Advantage of the new information is that its acceptance rate will be higher. According to Rogers, compatibility is the degree to which new knowledge is seen to be consistent with already existing beliefs, past experiences and desires of potential adopters. He postulates that a concept that is not consistent with the standard and values of the social system will not be as easily accepted as compatible new knowledge.

Complexity, as Rogers explains it, is the degree to which the new information is seen as difficult to comprehend and use. Some members of a social system readily understand such innovations; others are more complex, and will be more gradually accepted. In general, new ideas that are simpler to understand will be adopted more rapidly than knowledge that requires the adopter to develop new skills and understandings.

According to Rogers, trial-ability is the degree to which new knowledge can be limitedly experimented. He further noted that new ideas that can be tried on the instalment plan will generally be adopted more quickly than knowledge that is not divisible. If the new idea could not be experimentally tested the adoption rate would be much slower. An idea that is trial-able represents less uncertainty for the individual who considers it for adoption, as can be learned through doing.

Observer-ability, as described by Rogers, is the degree to which the effects of new information are perceptible to others. He also noted that the more people perceive the implications of new knowledge, the more likely they are to put it into practice. This campaign promotes peer discussion of the latest concept as peers and neighbours of an adopter press him or her for new technology review content.

Rogers (1995) argued that new information that consumers see as having a greater relative advantage, usability, trial-ability and observer-ability, and less ambiguity, would be applied more rapidly than other new ideas. He further argued that these are not the only characteristics that influence adoption rates, but previous research suggests that when describing adoption rates, they are the most significant features of innovations.

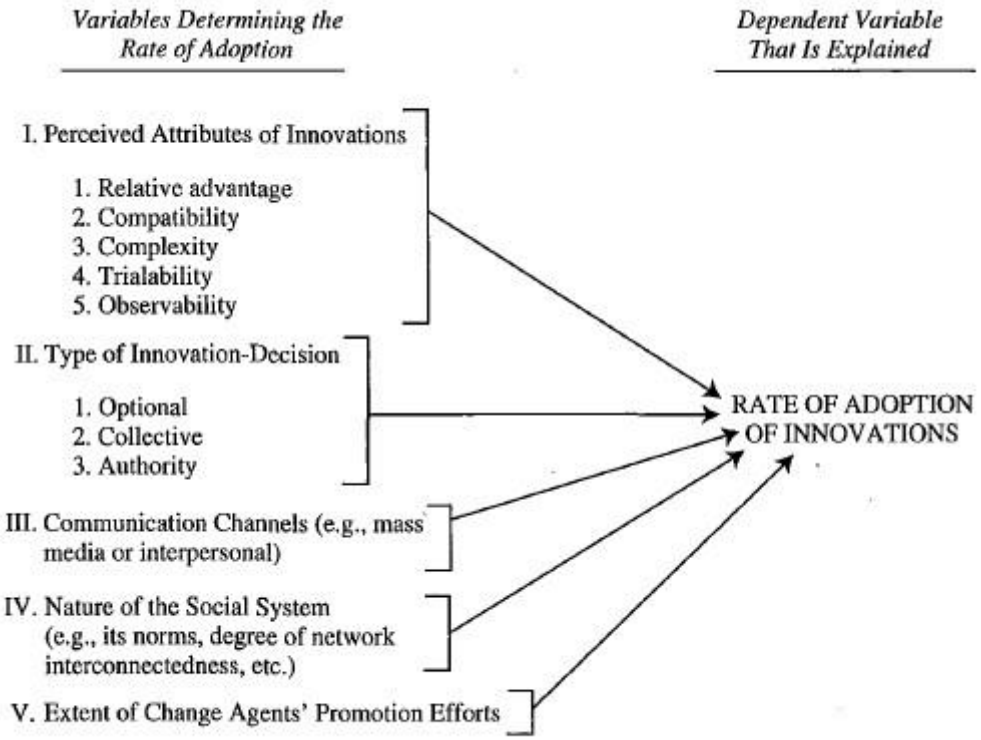

Figure 4. 3: Perceive Attributes of Innovation (Source: Rogers, 1995)

4.11.4 Individual innovativeness

The Individual Innovativeness Theory (Rogers, 1995) notes that individuals predisposed to innovation would embrace an invention faster than those less predisposed to innovation. Figure 4.4 demonstrates the bell-shaped Individual Innovativeness distribution and the percentage of the possible adapters theorized to fall into each group. The Innovators are on one side of delivery. Innovators are the risktakers and pioneers

in the diffusion process who adopt an innovation very early on. On the other extreme are the Laggards who resist, if ever, adopting an innovation into the diffusion process until rather late.

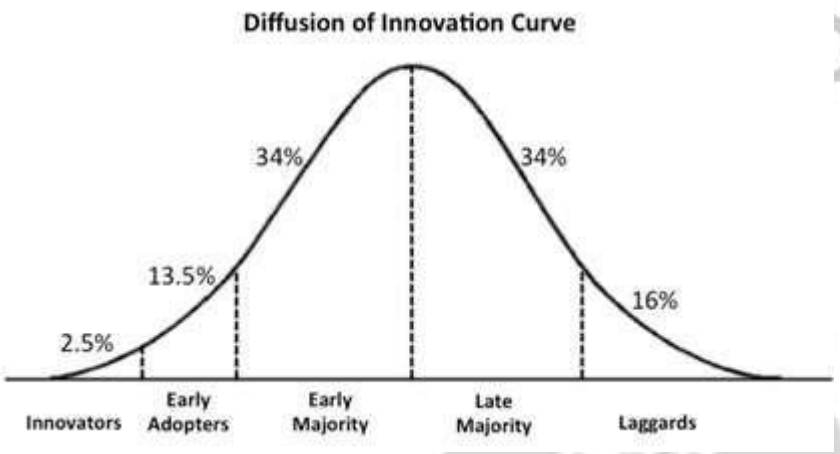

Figure 4. 4: Bell Individual Innovativeness and Percentage Within Category (Source: Rogers, 1995)

4.11.5 Rate of adoption

The third commonly applied diffusion theory discussed by Rogers (1995) is the rate of Adoption Theory. Rate of adoption theory states that over time innovations are diffused in a pattern resembling a s-shaped curve. Rate of adoption theorizes emphasises that an innovation goes through a time of slow, gradual growth before experiencing a phase of fairly drastic and rapid development. In Figure 4.5 an example of how a s-curve can typically represent the adoption level is shown. The theory also notes that the degree of innovation acceptance will stabilize gradually after a period of rapid growth, and eventually decline.

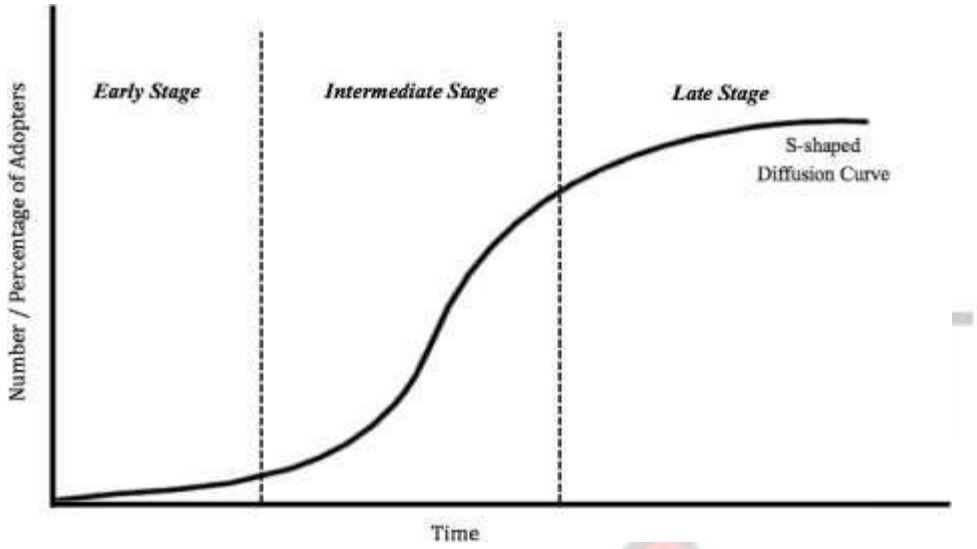

Figure 4. 5: Rate of Adoption of an Innovation over Time (Source: Rogers, 1995)

4.11.6 Perceived attributes of innovation

The newness of a product is often measured in terms of an individual's experience or decision to adopt (Rogers, 2003). The innovation characteristics that are most important to drive adoption are: the relative advantage: the assumption that innovation is better than the idea, application or process already used by the potential adopter is a relative advantage. If a potential adopter can readily see the benefits of using an innovation, there is a greater likelihood of adoption. The higher the degree the advantage the adopter perceives, the more likely they will to take it. Relative advantage: The degree to which an idea is considered to be in line with future adopters ' expectations. Adopters are searching for knowledge that can be implemented in their systems without much difficulty and without having to change the principles. Complexity: Complexity is the degree to which the future adopter views the innovation in terms of how complex the concept is to understand or how simple it is to use. If an innovation is easy to understand and use then the probability of adoption increases. Trial-ability: Trial-ability of a a new idea offers the opportunity to make use of an invention on a trial basis before committing to the full implementation. Observability: Observability is the observable consequence

of the new knowledge, in reality. When people can see an invention's findings quickly, there's an increased likelihood of acceptance (Rogers, 2003).

4.12 THE ROLE OF INDIVIDUALS IN THE DIFFUSION PROCESS

According to Frambach and Schillewaert (2002) the organisation's innovation decision is twofold; namely the decision of the company and the individual decision of the employees. Rogers (2003) further classifies these into voluntary, collective, authoritative and contingent decisions on innovation. The optional decision refers to individual acceptance or withdrawal decisions; all collective and authority decisions relate to decision-making at organisational level; and the contingent decision focuses primarily on decisions made by individual members following the previous collective or authority decisions (Taesung, 2015).

4.12.1 Individual innovation

Major components of innovation diffusion theory that influence the innovation - decision cycle of individuals include time-and social system, communication and innovativeness (Taesung, 2015). He further argued that Innovation Implementation of non-routines that requires change in thinking and doing is an innovation because it is perceived as new by potential adopters. Similarly, planned change in organisations might be perceived as something new and adopted/rejected by members depending on its perceived attributes and consequences. Innovative ideas may be generated by one individual or a group, from within or outside an organisation, and take several months or many years to develop. (Wolfe, 1994 as cited in Gambatese and Hallowell, 2011).

4.12.2 Communication

Communication within the organisation happens through different networks linked to each other. These networks and the views of those participating in them often and heavily influence individual adoption decisions. In many instances, the information needed for the changes flowing within and outside the organisation is caused by multiple channels connected to knowledge-focused cliques (Rogers, 2003).

4.12.3 Opinion leadership

Opinion leaders are the reason why diffusion can be a very successful process (Dearing, 2009). They affect other people's attitudes and behaviours because they are more receptive to information, have broad ties with different people within and outside the network, and are socially accessible to others (Rogers, 2003).

4.12.4 Time

Time is involved in diffusion in two way. The first is to quantify the time that passes from the time an invention information is introduced to an individual or group and the time that the innovation is accepted or rejected. The second time role is the time when an individual or group adopts an innovation in relation to introducing innovation into society. For example, a person may adopt an innovation in the early stages of adoption or may wait and become a late adopter after seeing others accept the innovation and use it effectively at Rogers (1995).

4.12.5 Critical mass.

Diffusion will most likely be effective if it reaches a point where there is self-support for future adoptions. The statement, called "critical mass," induces collective action among people by enhancing dynamics (Rogers, 2003). As it reaches this milestone, the

rate of acceptance shifts from a fairly linear course to an exponential upsurge; progress increases so that additional support for further reform is no longer needed (Centola, 2013).

4.12.6 Innovativeness

Individuals ' decision to adopt is closely linked to their own characteristics and to the social system they are in, both of which are factors in the process of organisational change spreading. Adopter categories: Adopter categories are arguably among the bestknown principles in diffusion theory, defined as the bell-shaped standard adopter frequency distribution as follows: 2.5 percent, venturous innovators; 13.5 percent, early adopters exerting opinion leadership; 34 percent, deliberate early majority; 34 percent, sceptical late majority; and 16 percent, laggards (Rogers, 1995). Unlike innovators and early adopters who make relatively independent decisions, subsequent adopters are impacted in their decision by social influence (Kossinets and Watta, 2009).

4.12.7 The bandwagon effect

This is a similar phenomenon in which, because of their own opinion, people begin to follow a shift within a social system rather than a large number of previous adopters showing positive attitudes to it. People are adopting innovation or falling into the bandwagon as a tactic to cope with a majority norm (Young, 2009).

4.12.8 Social systems

The fourth dimension of innovation diffusion lies in social systems. Social systems may consist of individuals, groups, or members of the organisation. The social system affects the diffusion of an idea, depending on the social system members ' composition, processes and responsibilities, types of innovation decisions, and the consequences of

adoption (Rogers, 2003). Innovative individuals known as opinion leaders or change agents can influence other people's attitudes and behaviours (Rogers, 2003).

4.12.9 Mass Media Channel

Often these are the quickest and most efficient means of educating an audience or potential adopters about the nature of a new idea. Radio, television, magazines, Internet sources and social media, saves as a medium for one or a few individuals to reach an audience. But Rogers argues that interpersonal channels are more effective in persuading an individual to adopt a new knowledge, particularly when two or more near-peers are connected by interpersonal channels (Rogers, 1995).

4.13 THE SIGNIFICANCE OF INNOVATION DIFFUSION IN THE CONSTRUCTION INDUSTRY

Innovation in construction has become the fourth competitive factor besides conventional time, cost and quality trade-off models. innovation within construction industry, like other sectors, gives companies the opportunity to succeed and prosper in a dynamic and complex business climate. There are however challenges in handling and transferring technological knowledge efficiently within the industry (Taylor and Levitt, 2005). These problems arise from the fragmented structure and project procedures as well as the traditional adversarial relationships of the construction industry (Hartmann and Caerteling 2010). The undue focus that consumers put on cost and time has also stunted industry innovation. Consequently, the need to actively control the innovation cycle has been recognised. It means that innovation managers need to be aware of the specific situations and conditions that affect innovation opportunities to maximize and improve those possibilities. This has led to research investigating the critical factors

contributing to successful innovation and dissemination. In light of this, various studies by Peansupap and Walker (2004); Hartmann and Caerteling (2010) have explored the contingencies in the construction industry surrounding innovation and diffusion.

4.14 DIFFUSION OF CONSTRUCTION INNOVATION

Worldwide the construction industry is seen as a risky industry, yet there are approaches that avoid injuries and ill-health. Preventing and improving the health and safety of the construction industries involves communication, dissemination, adoption, implementation of such strategies for health and safety. Creativity through architecture offers the future for significant corporate, industrial, and societal benefits (Slaughter 1998). Adapting strategies which have improved the safety performance of the construction business can be considered as innovation (Kale and Arditi 2010). Worldwide the construction industry is seen as not very creative. However, there is an increasing awareness that there is continuous innovation in the construction sector despising its project-based nature. Slaughter (1998) was of the opinion that invention occurs more in construction than those outside the construction industry recognize. The construction sector has been regarded as an industry prone to innovation and sluggish to adaptation (Koebel, 1999).

Egan (1998) noted that while the construction industry has no good reputation for innovation adaptation, the amount of work in this area is incredible. There is also extensive discussion in research on whether or not the industry is innovative. Yet work to date fails to understand how the industry can transfer health and safety to the communities in which these businesses operate.

Technology research is largely in line with either adoption-oriented or micro-oriented studies. Although research at the adopter level focuses on the behaviour of individuals

firms, research at macro level focuses on the ability of a network of companies to adopt an innovation (Attewell, 1992). Kale and Arditi (2010) is of the view that the diffusion of innovation models in academic research has not provided adequate attention. Mahajan et al (1990) as cited in Esmaeili et al. (2012) postulated that knowledge of modelling of diffusion has significantly increased in the last few decades. Models of innovation diffusion seek to analyse acceptance rates within a social structure in an attempt to explain the relationship between the adoption rate and the number of potential adopters over a period of time.

Imitation behaviour occurs when innovation mainly diffuses through interactions between members of a social system. The contact between these participants allows laggards to benefit from the earlier adopters' experiences and thus increases the overall adoption rate for positive innovation (Mansfield, 1961). Adopter research centres about an individual or firm's ability to adopt an innovation. This suggests that the actual literature is concerned with recognizing individuals and organisations' innovativeness by observing the adopter's decision-making processes and innovation. Rogers (1962, 1995) breaks down the decision process as knowledge, persuasion, decision, execution, and confirmation. He also classified the adopters themselves as innovators, early adopters, early majority, late majority or laggards, based on their adoptability.

The construction industry faces some diffusion challenges in terms of both introducing new ideas and the transfer of new knowledge. Relatively few studies have been conducted on diffusion of construction health and safety, whether the innovator or adopter, the literature on construction diffusion addresses the following:

1. Construction as a laggard industry relative to innovation.
2. Impediment to innovation in construction.
3. Competitive advantage and increased profit associated with innovation.

4. Migration of innovation from commercial to residential construction.
5. Organisational and social factors influencing innovation adoption by construction operatives.

4.15 CONCEPTUAL FRAMEWORK

4.15.1 Making a Connection between Knowledge Transfer and Diffusion There is the need for a connection between knowledge transfer and diffusion of innovation because a process between the supplier (construction company in this case) and the adopter (the community) from the onset to the end of a diffusion process must be well correlated to avoid failure of adopting a new idea by a decision making unit or an adopter.

Figure 4.6 below shows the inter-relation between knowledge transfer and diffusion, a combination of the theory of Nonaka and Takeuchi on knowledge creation and sharing and Everett Rogers's innovation decision theory. It also introduces transformation in the middle which means that after new knowledge has been transferred and diffused there must be a transformation in the adopting or receiving unit. As noted by Nonaka and Takeuchi (1995) and as shown in figure 4.6, there are several processes to a successful knowledge transfer and diffusion which must be satisfied in order to achieve a successful knowledge transfer and diffusion. These variables are explained as depicted in the conceptual framework developed below.

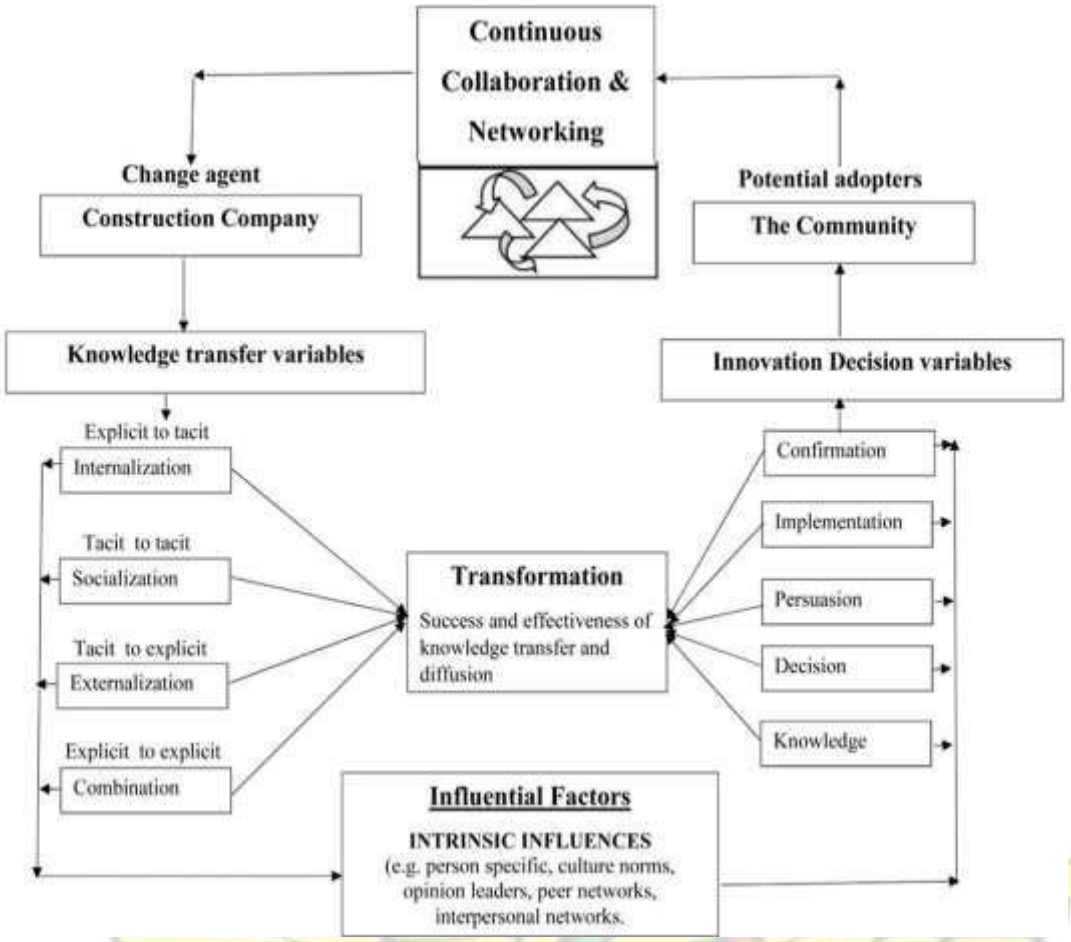

Figure 4. 6: Knowledge Transfer and Diffusion – a Conceptual Framework (Source: Williams et al., 2018).

4.15.2 Explanation of the Variables in the Framework

The framework proposed in this thesis has seven main constructs that are supposed to be the main players in transferring knowledge from construction companies to their host communities. These are discussed in the subsequent subsections.

4.15.3 The change agents

The change agent in this framework is the construction company because most construction projects happen in communities. Construction activities are amongst one of the industries that have a negative impact on the environment in which it occurs.

Therefore, it is prudent for the industry to compensate for its adverse impact on the people living in and around the project sites, hence the change makers.

4.15.4 Transformation

Transformation introduced in this framework is the successfulness and effectiveness of the knowledge codification, transfer and diffusion from the change agent (Construction Company) to the potential adopter (the host community). This means a good and successful knowledge transfer and diffusion must result in a change in attitude and knowledge on the part of the receiving unit. However, before this can be successful, there are some very vital drivers or actors that must be in place to enable its success. These are discussed below;

4.15.5 Influential factors

The intrinsic influences for a successful knowledge transfer are person-specific because all persons have different rate of absorption. Some persons are able to codify and understand new knowledge faster than others. Also, cultural norms in some communities facilitate the acceptance of new ideas whiles others do not. It also depends on opinion leaders like the chiefs and elders who are respected in most societies as people look up to them or consult them before making decisions. Other factors are peer networks, community networking and interpersonal networking. These factors are also very vital in influencing others to change their lifestyle.

4.15.6 Continuous collaboration and networking

Continuous collaboration and networking in any diffusion and knowledge transfer process is needed for reinforcement of the transferred knowledge. This is because for one to accept to imitate what another person does, there must be a mutual trust and understanding between the holder of such new knowledge and the receiver. There

should be continuous collaboration between the two sources throughout the transfer process from the onset to avoid discontinuation of the transferred knowledge because all persons are somehow risk averse.

4.15.7 Knowledge transfer variables

Knowledge transfer variables in this framework are Socialisation, Externalisation, combination and Internalisation of these variables are the systems in which knowledge is codified in the minds of persons. As the codification is going on formally or informally, one must get close to another to be able to know what the other person is doing. Health and safety knowledge have been codified in the construction industry tacitly or explicitly between the workers. For example, most of the skilled and nonskilled labour is recruited at where the project is taking place. These groups of persons are trained formally in HSE and they go home with this knowledge and consciously or unconsciously transfer the new knowledge to their families.

Socialisation is the process of sharing tacit knowledge through observation, imitation, practice, and participation in formal and informal communities and this agrees with Professor Albert Bandura's (1977) social learning theory which says that an individual learns from another by means of observation. In other words, one observes what another does and then does something similar, e.g. when knowledge is transferred through socializing with family members, friends and neighbours.

Externalisation usually begins with building a field or special interaction between the source and the receiver, in this case construction workers (change agents) and the community (adopters). The externalisation, according to Nonaka and Takeuchi, is seen in the process of concepts creation and is triggered by dialogue or collective reflection or when the community members share with others through interaction e.g. through

written documents like manuals, guidelines, rules, books, formal activities like meetings, team works, seminars, conferences, coaching, mentoring sessions and informal activities like visiting, leisure, coffee brakes.

Internalisation is the process of embodying explicit knowledge into tacit knowledge. Nonaka and Takeuchi (1995) argue that knowledge is created and improved when it flows between different levels of a social system and between individuals and groups, e.g. when the families, friends, and neighbours use the acquired knowledge in their context. Combination, as indicated by Nonaka and Takeuchi (1995), is the process of integrating concepts into a knowledge system to integrate multiple bodies of explicit knowledge. They further opine that it is important to consider that all the four phases of knowledge exchange must be satisfied to achieve a successful knowledge conversion within and across a social system.

4.15.8 Innovation decision variables.

The innovation decision in this framework is also made up of knowledge, decision, persuasion, implementation and a confirmation process. These variables are also very vital elements of the framework. In the first place, the host communities must first know of the existence of the HSE knowledge before taking decision to even ask of its merits and demerits or what it is. From this point onwards is when they may be persuaded to either try the new knowledge or not. At this point, it is an individual decision process by the person to implement or try the said new knowledge to see whether it would suit him or her. Following this, he or she would either confirm to use the new knowledge or reject it entirely.

Identifying and obtaining externally generated knowledge which is important to them can be helpful to a decision unit. The more the initiative, the quicker the knowledge base will be established by the decision-making unit or person. There are, however, limits to the ability of a unit of decision or an individual to achieve this speed. The adopter (receiving unit) needs to take the decision to accept or reject the new concept at the decision stage during information diffusion. This method is important because, by associating with the needs and current knowledge, it considers the possible benefits or disadvantages, and if it is more beneficial to established knowledge, it then becomes knowledge that can be used by the user to adopt.

The implementation or knowledge application stage is the most significant stage during a knowledge transfer process. Literature has shown that no other process in the knowledge transfer paradigm leads to improved performance. Improvement occurs only when knowledge transferred from the source to the receiver is successfully applied or used at where it is required. Confirmation or a successful adaptation and reinforcement depends on successful communication of the knowledge transferred and Adopters having sufficient absorptive power to acquire and implement the new concept. Transfer of information was considered a one-way mechanism where the receiver usually takes the bulk or all the benefits. Moreover, this study argues that the source, being the construction industry, still profits from the transferred information because it gives back to society and returns the prosperous and well-cooperated climate to accomplish its corporate target in return.

CHAPTER FIVE

RESEARCH METHODOLOGY, DESIGN AND APPROACH

5.1 INTRODUCTION

This chapter reviews a range of research approaches, design and methods as well as the collection tools, analytical techniques and research output to address the critical issues raised by the research questions, aim and objectives. The methodology of this study is as presented in a flow chart, as shown in figure 5.1 below. It shows how the data was processed and informed the proposed H&S knowledge transfer and diffusion framework for the Ghanaian construction industry. It further describes how the framework was designed, the methods adopted and how it was validated. In summary, it seeks to explain the entire approach adopted to address the research aim, objectives and questions.

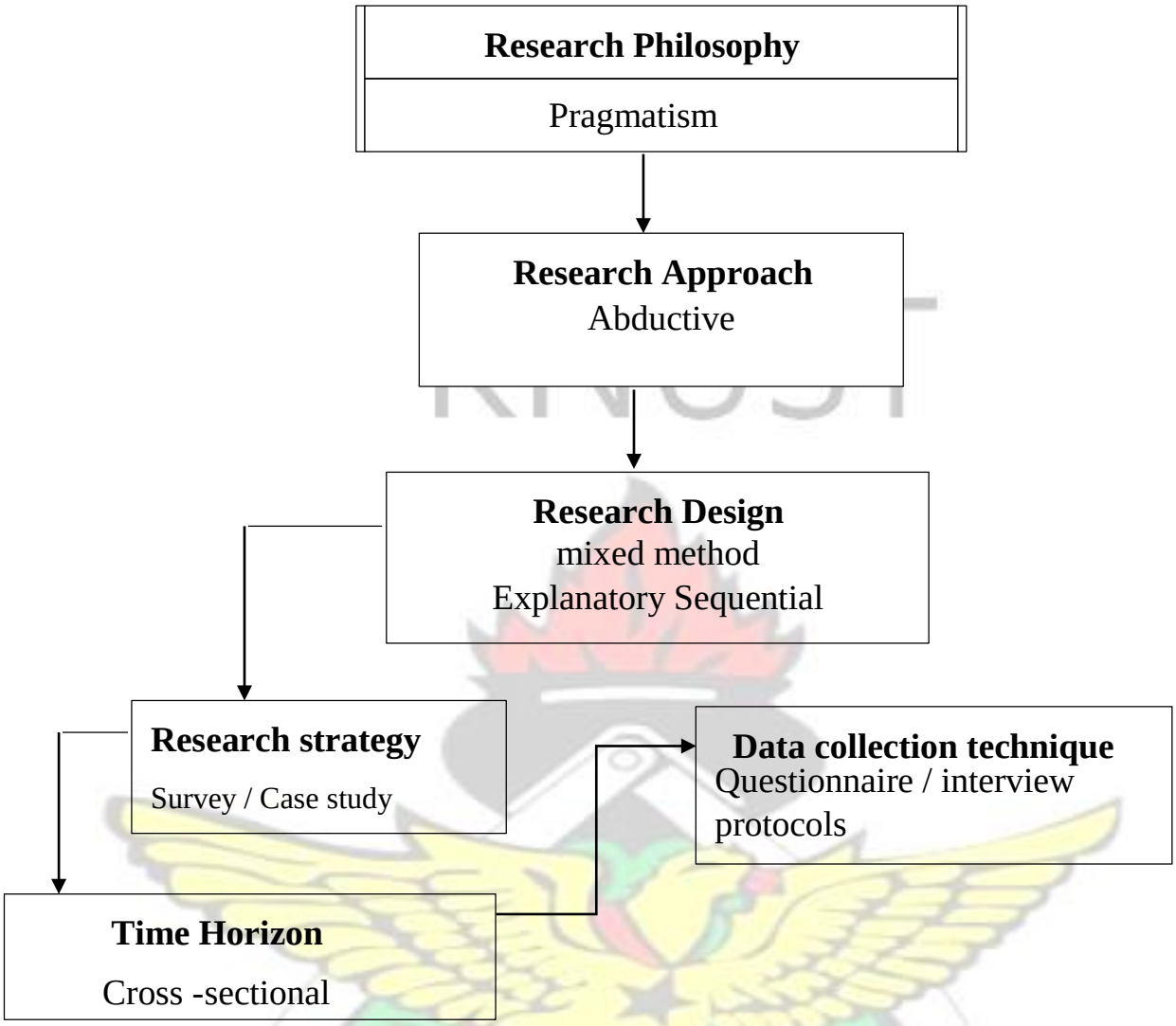

Figure 5. 1: Flowchart of the Research Methodology

5.1.1 Research Philosophy

The philosophical position adopted in any study is thus essential in the choice of an appropriate research methodology (Creswell et al., 2009). A research philosophy must link the research aim and objectives to help the researcher to find answers to the research questions. According to Creswell et al. (2009), several philosophical considerations underpin any research. The debate continues within the research community to present several views on this position. Bryman (2009) outlined three primary concerns as epistemological, ontological and axiological positions that underpin any research. There

is a need in all research projects to explain the choice of research methods and techniques that are engaged in the study. That interpretation relies on the theoretical perspective that the researcher brings to the study (Crotty, 2010; Guba and Lincoln, 1994) (also called research paradigms or worldviews). According to Pollack (2007), the word paradigm generally refers to a commonly shared set of assumptions, ideas and concepts in a society that is a way of seeing nature. Creswell et al. (2009) uses the term philosophical worldview as a paradigm and considers it to mean a whole set of beliefs that guide actions (Guba, 1990).

5.1.2 Ontology

Ontology is about the researcher's viewpoints on nature and what is known of the social world (Ritchie and Lewis, 2003). Throughout social research, the main ontological problems are whether or not social reality exists independently of human concepts and expectations. Whether there is a fundamental objective social reality or just different context-specific realities, and whether or not social behaviour is governed by regulations that can be viewed as unchallengeable or generalizable. Fitzgerald and Howcroft (1998) described ontology as consisting of two extreme positions: relativist and realist. They described the realist position as that the external world consists of preexisting hard and tangible structures. These they indicated exist independently of an individual's ability to acquire knowledge. The relativist position is described as holding the multiple existences of realities as subjective constructions of the mind. In that, the perception of reality is directed by socially transforming terms and varies according to language and culture.

Table 5. 1: Summary Ontological Considerations of Social Research

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

Source: Baiden (2006).

Ontological Consideration

Ontologically this study adopted a realist position that holds that there is a truth out there independent of the observer (i.e. the observed and the observer are separate) and that this external world is made up of pre - existing hard and measurable structures. This reality is however imperfectly apprehend-able because of flawed human intellectual mechanisms and the fundamentally intractable nature of phenomenon (Guba & Lincoln, 1994). This means that one cannot be sure that the ultimate truth has been uncovered; however, one cannot deny that reality is out there (Guba, 1990).

5.1.3 Epistemology

Epistemology deals with ways of knowing and learning about the social world, focusing on issues such as how to perceive truth and what the origin of knowledge is (Ritchie and Lewis, 2003). Simply put, it is about the issues of acceptability of knowledge within a discipline. According to these scholars, the discussion on this subject has been around three key issues. First is the Researcher's interaction with the Researched. Secondly, the ideas about reality and thirdly, the way that knowledge is gained. In all these

discussions, the underscored disparity as discussed by these authors concerns the definition of scientific research and what it entails.

Table 5. 2: Summary Ontological Considerations of Social Research

EPISTEMOLOGY	
Positivist	**Interpretivist**
Application of natural science methods to the study of social reality and beyond	Absence of universal truth and emphasis on realism of context
World conforms to the laws of causations and complex issues can be resolved by reduction	Understanding and interpretation comes from researcher's own forms of reference

Source: Baiden (2006).

Epistemological consideration

Epistemologically the researcher holds an epistemological position which emphasises the need for the researcher to gain knowledge of the field of the study objectively from a detached position and the repeatability of the inquiry. (So, it promotes the role of natural science methods in the social world (Guba and Lincoln 1994). While this is recognised as a difficult process in practice (Guba, 1990), objectivity becomes an ideal situation that can only be achieved relatively closely by ensuring a constituency with existing academic tradition and putting forward the inquiry to peer criticism and opinion Crotty, 2010).

5.1.4 Axiology

Axiology is a branch of philosophy that studies judgements about values (Saunders et al., 2012). Heron and Reason, (1997) argued that, in addition to considering the three defining characteristics of a research paradigm as suggested by Guba and Lincoln (1994) ontology, epistemology and methodology in an inquiry paradigm a researcher

must also consider a fourth factor which is axiology. axiology is engaged with assessment of the role of researcher's own value on all stages of the research process (Lee and Lings, 2008). Whatever the researcher's view, it is important for the researcher to demonstrate your axiological skill by being able to articulate your values as a basis for making judgements about what research you are conducting and how you go about doing it (Heron and Reason, 1997). Axiology primarily refers to the 'aims' of the research. This branch of the research philosophy attempts to clarify if you are trying to explain or predict the world, or are you only seeking to understand it. In simple terms, axiology focuses on what do you value in your research (Lee and Lings, 2008). This is important because your values affect how you conduct your research and what you value in your research findings (Saunders et al., 2012).

Axiological Consideration

With the research taken to a pragmatics axiological position it maintains that values play a large role in interpreting results, therefore this research adopts both objective and subjective point of view (Saunders., 2012). Although the researcher believes in the need for gaining knowledge of the field of health and safety knowledge transfer from Ghanaian construction companies to the Ghanaian communities from a detached position and the repeatability of the results (objectivist position). It is also the view of the researcher that perceptions and consequent actions of social actors create social phenomena, therefore social actors like the construction workers and members of the Ghanaian community who this study planned to study may place different interpretations on the situations they find themselves in. Some will perceive different situations in different ways because of their own views of the universe. Such interpretations are likely to influence their behaviour and the essence of their relationships with others in society (Subjectivist position). Therefore, in the event of

knowledge transfer analysis of the Ghanaian community members and the construction industry, it is the researcher's job to seek to see the subjective reality of the community members and the construction workers in order to be able to make sense of and appreciate their motivations, actions and expectations in a meaningful fashion. This investigation is also of the belief that knowledge is socially constructed by versions of major participants in knowledge transfer practice and therefore very necessary to gain a detailed understanding of social reality through the research of interpretations and roles of individuals.

5.1.5 Research philosophy

According to Saunders et al., (2007) the philosophy of science relates to knowledge formation and the nature of that knowledge. Referring to the research process onion by Saunders et al. (2012) there are several philosophies however Positivism and interpretivism are two extreme paradigms about the nature and sources of knowledge which are mutually exclusive (Fellows and Liu, 2008). As the debate of a choice between either positivism or interpretivism of research philosophy continues to range on, another position about worldviews of philosophy arises called Pragmatism (Creswell et al., 2009).

5.1.6 Positivism Vs Interpretivism

Positivism recognizes that a phenomenon obeys natural laws and can be subjected to natural logic; on the other hand, interpretivism believes that a phenomenon does not follow natural laws, but is perceived on the basis of people's beliefs and/or interpretations of the reality surrounding the phenomenon (Walliman, 2001). A positivist therefore believes that the facts can be tested, interpreted and even modelled, while an interpretivist believes that reality can only be interpreted (Sutrisna, 2009).

These paradigms are linked to two main ontological perspectives (i.e. conceptions of reality). The positivist paradigm is linked to the ontological position of single objective reality (i.e. objectivism) whilst the interpretivist paradigm is linked to the ontological position of multiple realities (i.e. constructivism) (Sutrisna, 2009). A positivist investigator has an idea or theory, according to Aliyu et al. (2014), that the universe or world conforms to eternal and unchanging laws and rules of causation and events, that there is an intricacy and ambiguity that can be resolved by reductionism and with the intention of stressing impartiality, measurement, objectivity and repeatability.

5.1.7 Pragmatism

Pragmatists understand that there are many different ways to interpret the world and undertake research, that there is no single point of view that can ever offer the whole picture and multiple realities (Saunders et al., 2012). At the same time, experienced scholars sometimes need to modify their philosophical assumptions over time and move to a new stance on the continuum (Collins and Hussey, 2014). According to Collins and Hussey (2014) the modified philosophical assumptions are adapted by pragmatic researchers, who usually happen to be experienced researchers. Research question is the most important determinant of research philosophy according to the pragmatist. Pragmatists contended that the nature of the research question can instigate combine positivist and interpretative positions within the scope of a single research (Wilson, 2010). The theoretical perspective adopted in this study is that of pragmatism. The researcher agrees with Patterson and Williams, (1998) and believes in an external world that is independent of the mind as well as that in the mind. The researcher also believe that researchers need to stop asking questions about truth and the laws of nature

(Cherry Holmes, 1992). The researcher further believe that truth is what works at the time (Cherry Holmes, 1992).

5.2 RESEARCH PHILOSOPHICAL POSITION OF THIS STUDY

The acceptance of positivist ideas among some qualitative researchers suggest within the qualitative tradition that qualitative and quantitative methods should not generally be seen as conflicting approaches to study but complementary (Ritchie and Lewis, 2003). From the positivist/objectivist perspective, reality can be independently observed as it is single and therefore experienced the same way by everyone. From the interpretivist/constructivist perspective, reality can only be interpreted as it is multiple and therefore experienced differently by everyone. Therefore, this work finds itself at the crossroads of using both quantitative and qualitative methods resulting in an overall process of mix research method.

5.3 RESEARCH STRATEGY

Researchers often follow, apart from their philosophical position adopt also research approach and techniques (i.e. study methods) for data collection and analysis. The following section demonstrates three common research approaches: qualitative and quantitative methods, the main distinction about these methods and what they represent in the debates. Weaknesses in both resulted in also describing a mixed-method strategy.

5.4 QUALITATIVE RESEARCH METHOD.

Ritchie and Lewis (2003), described the term qualitative research; as a term used as an overreaching category that covers a wide range of approaches and methods used in different research disciplines. Qualitative analysis offers a means for individuals or groups to investigate and appreciate the nature of a phenomenon (Creswell et al., 2009). This has not escaped criticism from researchers, given the importance of qualitative work in offering in-depth interpretation of phenomena. According to Bryman (2004), critics of qualitative studies argue that: the findings are too ill-defined and subjective, sometimes relying on unsystematic interpretations of what is important and meaningful.

It is hard to reproduce since this relies on unstructured data, and because there are hardly any formal protocols to follow, the accuracy depends on the creativity of the researcher It has generalisation issues, since the scope of qualitative research is often restricted. Lacks clarity due to the difficulties sometimes resulting from assessing what the qualitative researcher actually did and how the results of the analysis were reached. Despite these concerns, reliability in qualitative research can be accomplished by enforcing suggested reliability procedures such as rigorous transcript checks to ensure that they do not contain errors, and by ensuring that the interpretation of codes is not drifting (Gibbs, 2007).

Validity can also be achieved by following procedures, such as creating themes based on the incorporation of various data sources or participant viewpoints, allowing participants to annotate the results and also using peer debriefing (Creswell et al., 2009). According to Bryman (2004), there is a fairly broad agreement that qualitative research is a naturalistic, interpretative method, concerned with understanding the meanings people attach to phenomena (actions, assumptions, attitudes, values and likes) within their social worlds.

The qualitative research approach can be applied if there is no existing awareness of the subject matter and the most suitable form of measuring is not certain. Likewise, a qualitative approach will be sufficient to the highest degree if the definitions to be addressed are examined on a nominal scale, without clear demarcation and participation, examining behaviours and attitudes. Ritchie and Lewis (2003) summarized three central views of qualitative research: First, it is important to conduct qualitative research in a systematic manner, with a clear methodological structure in order to direct its design and implementation. Second, there is a' truth' to be defined, although complex and multi-faceted, in terms of the social norms, values and behaviours that work. Also, that this fact's fluidity is recognised but viewed as sufficiently stable to direct the development of contemporary social policy and theory. Third, these small-scale qualitative experiments may be used to draw wider inferences about the 'social world' if they are sufficiently adhered to the standards of qualitative research. Creswell et al. (2009) set out five strategies for the qualitative data collection. Those five strategies are probably the most widely used, and are discussed below.

5.4.1. Ethnography

Ethnography is a scheme in which the inquirer examines an intact cultural group for a long period of time in a natural setting by mainly collecting observational data (Creswell, 2007). This is known to be an in-depth approach, as the long engagement of the inquirer offers the opportunity to focus not only on what people claim they do, but on what they actually do. In response to observed realities in field setting, ethnography is versatile and usually develops contextually (LeCompte and Schensul, 1999).

5.4.2. Grounded Theory

Grounded theory is a scheme in which the investigator extracts from the prospects of the study participants a theory of a method, event, actions or interaction (Creswell et al., 2009). This process requires multiple levels of data collection, and refinement and interrelationship of knowledge categories (Strauss and Corbin, 1998).

5.4.3. Case Study

Case study is a technique that requires a systematic, in-depth study of a phenomenon (e.g., a system, an occurrence, an action, or a mechanism, usually using a variety of information sources and procedures (Stake 1995 and Yin 2003). Cases are limited in time and behaviour and researchers collect detailed information over a long period of time (Stake, 1995). Yin (2003) provides a useful perspective on the design and implementation of case study approaches.

5.4.4. Phenomenological Research

Phenomenological research is a strategy which involves the study of the ways a person's world view is formed in part by the person who lives it (Fischer, 2006). This scheme is so concerned with the content of human experiences as presented over a phenomenon by the participants (Creswell et al., 2009). In this method, the researcher set aside his or her perspectives to consider those of the participants in the study (Fischer, 2006).

5.4.5. Narrative Research

Narrative research is a sort of qualitative analysis in which the researcher looks into the lives of individuals and asks one or more individuals to comment about their experiences (Creswell et al., 2009). The details are then recited in a narrative chronology by the researcher. The narrative essentially blends views from the life of the participant in a corroborative manner with those from the life of the researcher (Clandinin and

Connelly, 2000). Biographies and autobiographies are examples of narratives.

5.5 QUANTITATIVE RESEARCH METHOD

Quantitative research is a research technique focussing on calculating and quantifying data collection and analysis (Bryman, 2004). Hence, addressing research questions about what, how much and how many is beneficial (Fellows and Liu, 2008). The quantitative analysis method is logically and literarily deductive, and is generally rooted in the positivist/objectivist philosophical framework (Sutrisna 2009).

Scholars have also criticized quantitative research, and Bryman (2004) defines these as: inability of quantitative scholars to differentiate between human beings and social institutions from the natural world; artificial measurement method and a sense of precision and accuracy that does not proceed from the real or reported source; dependence on instruments and procedures. Notwithstanding these criticisms, when properly implemented in relation to the nature of an investigation and the questions to be answered, quantitative analysis has proven a valuable method of inquiry. There are two notable techniques of quantitative nature: survey and experiment. These are briefly discussed in the next section.

5.5.1 Survey

This methodology offers a quantitative or scientific analysis of a population's trends, attitudes or opinions (Creswell et al., 2009). This involves cross-sectional and longitudinal research using questionnaires or standardized interviews collecting data intended to generalize from a study to a population (Babbie, 1990). All data regarding relevant variables were collected simultaneously or within a relatively short time frame in a cross-sectional sample. It thus provides a snapshot of the variables included in the

investigation at a given point in time. On the other hand, the data are obtained in longitudinal surveys over long periods of time. Measurements shall be taken on each variable over two or more distinct time periods. That allows variable measurements to change over time (Creswell et al., 2009).

5.5.2 Experiment

This approach attempts to assess which result affects a specific treatment (Creswell et al., 2009). This effect is measured by giving a specific treatment to one group and withdrawing it from another group, and then assessing how both groups performed on an outcome (Creswell et al., 2009). Researchers may also classify a sample in an experiment and generalize it to a population; however, the primary purpose of the experiment is to assess the impact of a procedure or intervention on an outcome while controlling all other factors (i.e., determinants or cause-independent variables) that could affect the outcome (i.e. the effect-dependent variable) (Creswell et al., 2009). In both physical and social sciences, experiments are performed. The approach is based in the physical sciences on a laboratory basis. The work is however field-based in the social sciences. Many scholars have explained the principal distinction between quantitative and qualitative research, including (Baiden (2006), Bryman (2004), Ritchie and Lewis 2003). Table 5.3 shows these differences under their goals, orientation, data gathering, results and philosophical considerations.

Table 5. 3: Summary of the Differences between Qualitative and Quantitative Research

	Quantitative Research	**Qualitative Research**

Objectives	Gather factual data and study relationships between facts and relationships in accordance with theory	Study issues in depth and seek to gain insight and understand people's perception
Orientation to the theory of research	Deductive and therefore associated with verification of theory and hypothesis testing	Inductive and geared towards role generation of theory from specific instances
Common data collection techniques	Hard data, structured, large sample size, analysed using statistical methods	Soft data, descriptive, less structured, analysed using non-statistical packages.
Out comes	Conclusive findings used to recommend a final course of action.	Exploratory and or investigate and findings are conclusive.
Epistemological orientation	positivism	interpretivism
Ontological orientation	objectivism	Constructionism

Source: Bryman (2003) and Baiden (2006)

5.6 MIXED METHOD DESIGN

Mixed method concept is an amalgam of qualitative and quantitative methods in a single study (Tashakkori and Teddlie, 1998). Therefore, the use of both qualitative and quantitative data accumulation and analysis is needed in a single study (Creswell et al., 2009). Mixed-method analysis is usually required in research programmes, where both qualitative and quantitative data are likely to be obtained due to the nature of the study topic being examined, the evaluation of which would provide a more comprehensive and deeper discernment of a phenomenon (Creswell et al., 2009).

Many demands have recently been made for the use of mixed process designs in research studies (Landsverk et al., 2012; Palinkas et al., 2010). Recognizing that the complexities of implementing evidence-based and other novel methods, treatment strategies, and services are sufficiently complex that a single systematic approach is often insufficient (Palinkas et al., 2010). Qualitative methods are used to explore and understand the causes of success or failure to carry out evidence-based experiments or to establish techniques for promoting implementation, while quantitative methods are used to try to confirm hypotheses based on an established conceptual model and to obtain a broad understanding of predictors for successful implementation.

Fellows and Liu (2003) identified five ways of triangulation mixed process listed below:

1. Data triangulation: time, place, and involving persons
2. Triangulation of investigators: consisting of the use of many, not single observers.
3. Theory triangulation: which uses more than one abstract scheme to explain the phenomenon.
4. Methodological triangulation: involves the application of more than one method, and may consist of techniques within or beyond methods; and
5. Diverse triangulation: In one investigation the researcher incorporates diverse participants, theoretical viewpoints, data sources, and methodologies. According to Creswell (2009), there are three main mixed method strategies employed in social research. These are:

5.6.1 Convergent parallel mixed methods

This is a form of mixed methods of design in which the researcher converges or fuses quantitative and qualitative data to provide a detailed analysis of the study problem. In this process, the investigator typically gathers both types of data at about the same time

and then integrates the information into the review of the overall results, clarifies or further examines the discrepancies or incongruous findings in this system.

5.6.2 Exploratory sequential mixed methods

This is the reverse sequence from the explanation design. In the sequential exploratory approach, the researcher first starts with a process of qualitative research and explores participant views. The data and the details used to develop into a second quantitative phase of the analysed. The qualitative phase may be used to create an instrument that best fits the sample under analysis, to determine suitable instruments to be used in the quantitative follow-up process, or to define variables to be used for a quantitative follow-up test. A particular challenge to this design lies in deciding on the correct qualitative results to be used and the collection of samples for both study phases.

5.6.3 Explanatory sequential mixed methods

There, the researcher first performs quantitative research, analyses the findings and then builds on the results with qualitative research to describe them in greater detail. It is known to be linear, because the qualitative process follows the initial quantitative phase. Such style of design is common in fields with a clear quantitative focus (thus the project starts with quantitative research), but it poses difficulties in defining the quantitative outcomes to be further examined and the unequal sample sizes for each step of the study.

5.7 RESEARCH METHOD EMPLOYED

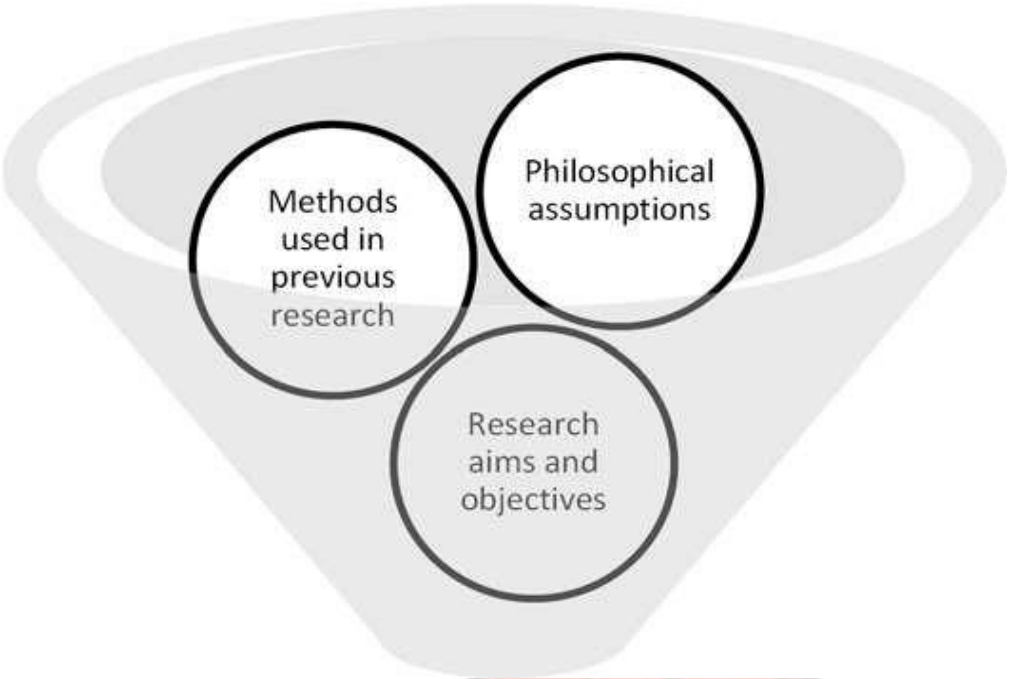

Figure 5. 2: choosing a research method (Adopted from Creswell, 2009; Rogers, 2003)

Figure 5.2 depicts the process of choosing a research method. According to Creswell (2011), the selection of a research method is based on three main considerations: (A) the nature of the research question or the problems to be solved, (B) the personal experience of the researcher and (C) the field audiences. There are many research strategies available, and although one method may not be better than the other, some strategies are best suited to specific issues and attract particular philosophical perspectives in an elective way. Gopalakrishnan and Damanpour (1994), Subramanian and Nilakanta (1996), argued that when it comes to diffusion research, two primary research approaches must be present, Variance and process research. According to Rogers (2003), whereas variance research involves data gathering and analysis that consists of determining the covariances (correlation) among a set of variables (quantitative), process research seeks to determine the sequence of a group of events over time (qualitative).

The research strategy chosen for this study was guided by the researcher's philosophical assumptions, a previous field of studies and the research questions the study seeks to answer. A mixed-method approach whose data neutralizes the weakness of both qualitative and quantitative methods is ideal. Emphasising the research questions, the selected philosophical perspective and the arguments made by Rogers (2003); Gopalakrishnan and Damanpour (1994) and Subramanian and Nilakanta (1996). The study thus employed two research methods: survey and case study research methods.

5.8 RESEARCH STRATEGY

5.8.1 Relationship between research method and research strategy.

Yin (2014) hypothesized the selection of a research strategy, as shown in table 5.4. according to the author, the choice depends on the following three conditions: (A) the type of research question posed, (B) the extent to which an investigator controls actual behavioural events, and (C) the extent to which contemporary rather than historical issues are focused.

Table 5. 4: Relevant situation for different research strategies F

Methods contemporary	**Form of Research**		**Required Control of**	**Focused on**
Experiment	**Question**		**Behavioural Event**	**Events**
	How, why?		Yes	Yes
	Who, what, where, how?			
Survey	How Many, how much?		No	Yes
Archival	Who, what, where, how		No	Yes
Analysis	many, how much?			
History	How, why?		No	No

Case study	How, why?		No	Yes

Source: Yin, (2014)

Built on Yin's (2014) conditions as depicted on table 5.4, the research questions above are what and how. Therefore, exploration, interview, archival, historical and case study will possibly be the research technique. Proceeding by Yin's (2014 main condition, which suggests that the experimental scheme is inappropriate for this topic because this work did not involve designing the environment in which the transfer and diffusion of health and safety knowledge takes place, or testing the group of people in different types of knowledge transfer and diffusion settings. The survey was selected as a more appropriate choice provided that the issue of inquiry is contemporary and the lack of relevant accumulated documents or archives on the transfer of H&S knowledge transfer by Ghanaian construction firms. It has also chosen a' how' and' why' question because it favours the use of case studies. Case study was selected because of the researcher's lack of control over circumstances, and the fact that the observed phenomenon was a contemporary one.

5.8.2 Research Design

A research design helps the researcher plan and explain how data can be collected and analysed. This research design is divided into two parts which involve both qualitative and quantitative methods of study. In Phase 1, quantitative data was collected on variables that would influence the transfer of health and safety knowledge from construction companies to their operating communities, and variables that would assist their diffusion process, using structured questionnaires as the main tool. The resulting results helped to develop a framework that would move health and safety awareness of construction companies to the societies in which they operate as corporate social responsibility to the construction companies.

5.9 PHASE 1: SURVEY DESIGN

5.9.1 Questionnaire Design

As already stated, the instrument used in the first part of this survey was a standardized questionnaire specifically designed for the study. The 10-page questionnaire was made up of an introduction explaining the purpose and structure of the questionnaire, and three sections. Section A solicited for background information on respondents; a cover letter was also included as part of the questionnaire to explain its purpose. Section B dealt with corporate social responsibility challenges facing the Ghanaian construction industry, while identifying some of the corporate social responsibility programs construction companies are engaged in. Section C dwelled on health and safety, knowledge transfer and diffusion.

5.9.2 Phase 2 case study.

The case study was also divided into two parts: one Ghanaian community and one construction company were selected in the first part to help understand how new knowledge can be transferred to the community from an external source and also how the new knowledge can be diffused in the Ghanaian society.

The second part involves organisation a focus group discussion with eight D1K1 construction companies that are registered with the association of building and civil engineering contractors of Ghana who also took part in the survey and were willing to be part of the focus group discussion to validate the designed framework.

5.10 SAMPLING PROCEDURE AND TECHNIQUES.

Sampling technique advises on the selection of the portion of an aggregate involved in data collection. Study population is the universe of units the sample is selected from (Bryman, 2004). Bryman, (2004) has proposed that sample selection may be probability or non-probability. The main difference between the two, according to this author is that while non-probability is not selected by an instrument, probability is selected using an instrument. Certain important issues noted by study methodologists include sampling frame, descriptive sampling, sampling and non-sampling errors, and response rates. According to Saunders (2009), whatever the study question(s) and priorities you need to use sampling.

5.10.1 Sampling Frame

Typically for this study, the theoretical population is construction companies registered with Ministries of Works and Housing (MW&H) and Ministry of Roads and Highways (MRH). The study population is all contractors registered with Association of Building and Civil Engineering Contractors of Ghana (ABCECG) and Association of Road Contractors (ASROC). Companies that formed the sampling units were chosen because the two organisations are the officially recognised associations of construction contractors in the country and therefore represent the construction sector in Ghana. The techniques of probability sampling were then used to pick companies within the sample frame. Each unit in the sample had equal chance of being included in the survey. This technique was employed to also keep the difference between the sample and the population: i.e. sampling error, as low as possible.

A list of an uneven distribution of construction companies registered with ASROC and ABCECG across the country in good standing as at December 2017 were realised from the association's secretariat. In the list received from the Association of Building and Civil Engineering Contractors of Ghana, some of the members on the list could not be

contacted through the addresses provided. In the same list, other contractors were found to be part of the association but not on the list provided and through recommendation from other contractors in the association they were contacted and subsequently included in the list.

Regarding the list received from the association of road contractors there were no contacts attached to the list. With the assistance of the association's secretariat, some contact and email addresses were received. Further contacts were also received from some of the contractors who were included in the list. Also, with this association there were some contractors with the association whose names were not on the list provided and were also added to the list through recommendations by some of the contractors. There were five hundred and twenty-seven (527) members of the association of road contractors, and six hundred and fifty-three (653) members of Association of Building and Civil Engineering Contractors of Ghana. The two associations were employed as the stratification strata to enable a proportional representation of companies, and became the population for this study.

5.10.2 Determination of sample size for the study.

In order to determine a suitable sample size for the study, the following formula from Yamane (1967) was adopted. The formula was adopted due to its ability to work well with random sampling technique (Israel, 1992). And its ability to reduce errors associated with sampling as low as possible. The formula is as follows:

$$n = \frac{N}{1+N(e)^2}$$

Where:

n = the sample size N

= the population size e = the

level of precision (0.5)

As with most researches, a confidence level of 95% and p = 0.5 degree of variability are assumed for the equation (Israel, 1992).

Based on the equation, the sample size was determined as follows:

$$n = \frac{1180}{1+1180(.05)^2}$$

n = 298.73

The sample size required for the survey questionnaire is therefore 298 contractors. This sample was raised by 20 per cent in an effort to improve the number of responses and eventually came to 357 contractors. This is because the construction industry is infamous for responding poorly to survey questionnaires. It was for this reason that the sample size had to be changed to compensate for non-responses.

5.10.3 Sample Size Allocation

The calculated minimum sample size of three hundred and fifty-seven (357) was the total for the stratified sample of contractors of the Association of Building and Civil Engineering Contractors of Ghana (ABCECG) and Association of Road Contractors (ASROC) hence, the number of elements from each stratum had to be allocated to the sample. Two methods can be employed in the allocation: Proportionate and Disproportionate methods (Hair et al., 2010). In the proportionate allocation method, the sample size of each stratum is calculated such that its proportion to the total sample

size, is the same as the proportion of the size of the stratum to the population. The disproportionate allocation method allocates the sample size per stratum without regard to the proportion of the stratum size to the population but rather based on a judgement of the relative importance of the various strata or the variability of the data in each stratum (Hair et al., 2010). For the purpose of this study proportionate sample size allocation was used. This is because the variances for each stratum can be calculated.

Table 5. 5: Sample Size Allocation to Strata

STRATA	***TARGET POPULATION***	***PROPORTION OF POPULATION***	***PROPORTION OF SAMPLE SIZE***
Association of Building and Civil Engineering Contractors of Ghana	653	0.580	207.06 (55.41%)
Association of Road Contractors	527	0.420	149.94 (44.59%)
Total	**1180**	**1**	**357**

5.10.4 Sampling Technique.

Having assigned the sample sizes to the two strata, the need is to draw the sample sizes from the different target populations. According to Bernard (2002), probability or random sampling is used to ensure that findings are generalised by minimising the potential for bias in selection and control of known and unknown confounders potential influence. Therefore, stratified random sampling technique was used to remove biases

in the selection of researchers when selecting the companies within the different strata. Stratified random sample was selected because when the population is heterogeneous or there is a large variability in population values, simple random sampling is not suitable for selecting population units, as it is possible that all units from the same group will be selected and the sample will not be representative of the population (Abha, 2011).

5.10.5 Calculating the sample fraction.

1. Target population of Association of Building and Civil Engineering Contractors of Ghana = 653
2. Sample size of Association of Building and Civil Engineering Contractors of Ghana = 207
3. Target population of Association of Road Contractors = 527
4. Sample size of Association of Road Contractors = 150

Sample fraction = target population / sample size

1. Sample fraction for ABCECG = $\frac{653}{207}$ = 3
2. Sample fraction for ASROC = $\frac{527}{150}$ = 3.53 approximately 4

5.10.6 Strata 1. Association of Building and Civil Engineering Contractors of Ghana.

Based on the calculated sample fraction for the Association of Building and Civil Engineering Contractors of Ghana, numbers were written on pieces of paper from 1 to 3, the numbers were shuffled and number 2 was selected out of the three numbers which became the first number. Therefore, number two contractor on the associations list was selected as number one and from there every subsequent third number from the list was selected until 207 contractors were selected for the survey.

5.10.7 Strata 2. Association of Road Contractors.

Based on the calculated sample fraction for the Association of Road Contractors, numbers were also written on pieces of paper from 1 to 4, the numbers were shuffled and out of the numbers, number 3 was selected which also became the first number on the list of the association. Therefore, number 3 was selected on the list as the first name and from there every subsequent fourth number was selected until 150 contractors were selected for the strata. It is worth knowing that the selection did not end on the first random selection therefore another round of selection continued until the saturation point.

5.11 DATA COLLECTION

5.11.1 The pilot study

In preparation for the major study, a pilot study can be described as a small scale or a test run (Pilot et al., 2001). Teijlingen et al, (2001) also identified pilot study as a mini version of a full-scale study or feasibility study, also called pre-testing of a specific research tool such as a questionnaire.

The pilot study of the questionnaire was done in June 2018 with two Health and Safety practitioners and three 4th year PhD students in Kwame Nkrumah University of Science and Technology who provided their feedback, suggested changes to some of the terminology, and further explanations to some of the terms that they did not easily understand.

To ensure further robustness of the questionnaire, three separate meetings were held with my supervisors prior to the piloting of the questionnaire. They subjected the questionnaire to both content and facial validity and suggested amendments to some of

the variables and requested the addition of explanations to some of the terminology used. They also made sure the questionnaires were easily readable and easy to understand by respondents.

5.11.2 The Actual Data Collection

The actual data collection was carried out using three methods. Hardcopies were initially distributed with the help of three field assistants. This was complemented by distributing some of the questionnaires via email and WhatsApp platforms to others who were not easily accessible and to save time and cost. In the case of the email and WhatsApp distribution, respondents were first sent introductory emails and WhatsApp messages informing them of the proposed study and also enquiring from them their preferred means of distribution (e.g. email or WhatsApp). Based on their choice, subsequent emails and WhatsApp messages were sent with the questionnaires for them to access. The questionnaire was in an automated Pdf format to enable them to answer, save and send back. Reminders were sent on a daily basis via emails and WhatsApp a week after the last questionnaires were sent. Follow ups were also made on the hardcopies by phone calls and visitations to their various locations.

In all, two hundred and seven (207) questionnaires were distributed to building contractors and one hundred and fifty (150) were also distributed to road contractors.

5.11.3 Questionnaire Response Rate

In all, three hundred and fifty-seven (357) questionnaires were distributed, out of which two hundred and fifty (250) were returned. As indicated earlier, face to face hand delivery, email, and WhatsApp/web-based data collection methods were used for the distribution of the questionnaire.

Table 5. 6 : Questionnaire Response Rate

Respondent	*Questionnaires Distribution*	*Questionnaires Retuned*	*Response Rate*
Building Contractors	207	155	43.4 %
Road Contractors	150	95	26.6%
Total	**357**	**250**	**70%**

The survey was voluntary response and hence the contractors could choose not to respond to the questionnaires. The average response rate obtained was 70%, which is significant in the Ghanaian construction industry.

5.11.4 Quantitative Data Analysis

The quantitative data was analysed using five deferent tools. These are; Cross tabulation, Chi-square test of independence, Cumulative or Gutman scale, Principal component Analysis and One sample T-test. The tools were selected in relation to the data collection instruments adopted to answer the specific objectives set for the study. Notwithstanding there are similar tools that can perform the same task to an extent such as structural equation modelling but structural equation modelling is largely confirmatory rather than exploratory technique hence the choice of exploratory factor analysis. furthermore, other methods could not be used due to lack of access. Moreover, the current tools best suited the data collection instrument and resulted in achieving the objective set for this study.

5.12 PHASE TWO CASE STUDY

5.12.1 Rationale for chosen case study.

Much of the case study approach is used for various functions, such as providing descriptions, checking hypothesis or generating theory (Siggelkow, 2007). The case study approach is used in this study to provide an in-depth understanding of the transfer of health and safety, acceptance and its diffusion from the Ghanaian construction industry to the Ghanaian communities. Yin (2011) opined that when there is lack of previous research in an area, a case study approach is appropriate for exploring a contemporary phenomenon, gaining a holistic view of complex instances through observation, and searching for patterns. It has been argued that the strength of case study lies in its approach to develop empirically collected and context-dependent knowledge with a multiple wealth of details (Guba and Lincoln, 1994).

The case study was conceived as a second step of this research, and seeks to explain how health and safety knowledge can be passed from the construction industry to the Ghanaian population and its mechanism of diffusion.

Phase 2 attempts to answer the following research question:

How can the safety culture of the construction industry be transferred to the local communities in which they operate?

Four objectives were established to answer the above question:

The first is to establish important enablers to a successful knowledge transfer process.

The second is to identify critical barriers to a successful knowledge transfer.

The third is to establish important drivers to a successful diffusion process.

The fourth is to identify critical barriers to a successful diffusion process.

For this section, the case study research strategy was chosen because it is an empirical investigation that investigates a contemporary phenomenon in its real-life context, particularly when the

boundaries between the phenomenon and context are not clearly established (Yin, 2009). The overall theoretical stand followed in the study (pragmatism), as stated earlier, allows for a mixed method.

Likewise, both qualitative and quantitative approaches have been engaged in research on diffusion by (Gopalakrishnan and Damanpour 1994, Subramanian and Nilankanta, 1996). Furthermore, case study was utilized in addition to the survey method so that the two methods compensate for each other's failings and limitations. The case study offered the opportunity to draw from, as much as possible, experience gained in the transfer and adoption of new ideas within the context of the study. Instead of asking people what they have generally performed under certain circumstances as was the case in the survey, the case study sought to focus on issues and places with regard to knowledge transfer and diffusion from the Ghanaian construction industry to the Ghanaian community and to benefit from the specific experiences of the respondents. This approach complements the survey research method employed by providing more in-depth understanding in addition to the broad understanding of surface patterns provided by the study.

5.12.2 Components of a Case Study Design

According to Yin (2003), a case study design consists of five components, namely:

1. The case study questions
2. The case study protocol
3. The unit of analysis
4. The rationale ties the proposal to the results, and
5. The requirements for interpreting the findings.

5.12.3 The Case Study Questions

The research question that this case study aims to address as noted earlier in this chapter is: "How can the safety culture of construction companies be transmitted to the local communities in which they operate?" The aim is to establish important enablers for a successful knowledge transfer process, identify critical barriers to a successful knowledge transfer process, identify important drivers for a successful diffusion process and identify critical barriers to a successful diffusion process. The result of the case study will help develop a framework for the transfer and distribution of the construction industry's external knowledge to the community. Those skills can then be used to inform how construction companies can effectively translate and disseminate health and safety information into Ghanaian communities as their corporate social responsibility.

5.12.4 The Unit of Analysis

The unit of analysis defines what and where the “case” is. In this study, the focus was on individual members in the Ghanaian communities and a Construction Company operating in the Ghanaian community, undertaking a construction project in the selected community. The target community was selected because it is influential base on the following; Having persons with health and safety knowledge and willing to participate in the study. Its leadership structure with opinion leaders willing to assist in the study and having a D1K1 construction company undertaking a life construction project with a health and safety department and also willing to partake in the study.

The company was also selected because it works in the selected community, registered with the Ministries of Works and Housing with the financial resources and enough health and safety knowledge, practices and expertise capable of transferring such knowledge from the company to the community of its operation. The study followed a holistic multiple case study design and comprised the two (2) cases mentioned above.

The choice of this design was based on the fact that the evidence from multiple cases is considered more convincing and robust of its logic of replication.

Representatives from the community with some knowledge in the subject matter were identified for interviewing using advice and direction from the chiefs and opinion leaders from the community.

5.12.5 The Study Proposition

Health and safety knowledge in the construction industry has improved, and the construction industry has the capacity to transfer their health and safety knowledge to the community in which it finds itself.

5.13. DATA COLLECTION AND ANALYSIS

The data was collected from November 2018 to January 2019, using 9 semi-structured for the adoption unit, in this case the Ghanaian community, and 7 for the transfer unit, in this case the Ghanaian construction industry. The interviews lasted approximately 30 to 40 minutes respectively. The diversity in interviewees gave a holistic view in order to understand how health and safety culture of the construction industry would be transferred to the Ghanaian communities in which they operate, both from transfer unit and adopting unit perspectives. The interviews were conducted in different locations; those of the transfer unit were done on a construction site where there was a live project going on and the ones of the adopting unit were done in the houses and offices. All interviews were electronically recorded and notes taken as well with the consent of the participants. Before the interviews were conducted, letters were sent to the opinion leaders in the community and a K1 D1 construction company undertaking a construction project in that community. Agreements were reached as to when to come to the

community and how to locate the representatives of the community. One community leader was assigned to the researcher to coordinate his work with the community representatives and the construction company.

5.13.1 Instrumentation

Interview guides were developed and delivered as a checklist to direct questioning during the semi-structured interviews to ascertain whether all relevant matters were handled. However, the interviews were flexible enough to allow the interviewer to go after other relevant lines of questioning when the need arose during the interview. The topics addressed in the interview guides were based along the innovation decision variables identified by Rogers, (1995). In the conceptual framework, each of the interview guides was slightly different to cater for the different categories of respondents to be interviewed.

5.13.2 The sample

It is essential to determine the sample size when doing any research studies (Saunders et al., 2016). However, taking a sample size for a qualitative work is less important than quantitative research, because qualitative research is more about quality than quantity (Kumar, 2011). Francis et al., (2010) are of the opinion that the sample size is often justified in interview research studies by interviewing participants until data saturation is achieved. That means interviews are conducted until no new thoughts emerge, indicating that data saturation is attained. In view of this, the sample was not intended to be statistically representative, as is the case with the quantitative survey, but rather the adequacy of the sample was judged on the basis of its ability to help in understanding the process of knowledge transfer in the Ghanaian construction industry and the community.

The sample size was defined for this purpose in order to get enough people to saturate the researched issues and provide adequate data for the survey. Other issues considered were where the respondents were and their willingness to participate. The study's limitation has been to get enough people with health and safety background in the community to better appreciate the questions and provide adequate answers. The interviews were conducted in English; therefore, no translation was done at all. Semistructured interviews were conducted facet-to-face. In all, three community members and two construction workers making five in all were interviewed. Everything audio captured was transcribed as it sounded without any deletion or editing. The researcher listened to the audio recordings over and over to get a general understanding of their content in order to ensure and improve the transcription consistency. In addition, the following steps have been taken to improve the transcription: the information has been transcribed verbatim from the audio recorded in word documents; each transcript has been re-checked to improve the quality and accuracy of the information.

5.13.3 Data Analysis Procedure

The method of data analysis includes researching, analysing, tabulating, categorizing or otherwise recombining both qualitative and quantitative information to answer the study's initial proposition (Yin, 2014). It is widely accepted that one of the most important parts of any research process is data analysis because it helps to analyse the data collected and to reach a satisfactory conclusion. A general strategy for data analysis should be designed to reduce potential analytical difficulties according to Yin (2014).

Some others also contend that no specific data analysis was implemented to support case studies, despite the existence of various methods of data analysis (Petty et al., 2012; Yin, 2014). It is significant, therefore, that the researcher follows analytical procedures consistent with the study's

philosophical choice (Easterby-Smith, et al., 2008). Hence this study adopts the process of thematic analysis. Thematic analyses were used to analyse the data obtained from the open questions.

5.13.4 Thematic Analysis

When it comes to qualitative data analysis, Denscombe (2010) indicates that there are many methods of evaluating qualitative data based on interpretations such as content analysis, established theory, treatment analysis, conversation analysis, and story analysis are dissimilar in that respect. According to Yin, (2014) another form of qualitative data analysis is thematic analysis. In this research, thematic analysis technique was implemented for the purpose of analysing the interviews according to the semi-structured interview guide. Thematic analysis is a tool by which researchers will recognize, analyse and report themes within a dataset (Braun and Clarke, 2006). According to Braun and Clarke (2006), some of the advantages of the thematic approach are:

1. It is highly flexible.
2. Training and practising are fast.
3. It does not necessitate much qualitative research experience.
4. The results will be made publicly available to the informed general public.
5. It is a useful way of working within the research paradigm of the participants, with participants as collaborators.
6. It can usefully summarise the key features of a large body of data and/or offer a detailed description of the datasets.
7. It can highlight similarities and differences across the data sets.
8. It can bring out unintended observations.

9. It can be useful in producing qualitative analyses appropriate to inform policy development.

The authors have provided a six-step guide for the thematic analysis as shown in the table 5.7 below;

Table 5. 7: Step- By -Step Thematic Analysis Process

PHASES	DESCRIPTION OF THE PROCESS
Get yourself familiar with your data	Read and re-read the transcribed data.
Begin with initial coding	Coding of interesting data characteristics in a systematic manner across all data sets, collecting data specific to each tag.
Searching for possible subthemes	Collecting codes into potential sub-themes, collecting all relevant data for each potential topic.
Reviewing subthemes	Check whether the sub-themes work in relation to the extracts coded (level 1) and the entire data sets (level 2).
Defining and naming themes	Continuous research to refine each theme's details, and the overall tale the analysis tells, creating clear definitions and names for each theme.
Completing the report	The final chance to evaluate. Selection of vivid, convincing examples of extracts; final review of selected extracts; linked back to the question and literature of the study; creating a comprehensive research report.

Source: Braun and Clarke, (2006)

In this study also, Braun and Clarke (2006) steps were followed carefully step-by-step as shown in the following:

Step one: as previously stated, all data was transcribed from the audio version to the textual version using the Microsoft office word. As soon as the data was transcribed, it was collected into one folder because the design was creating a poll of data where all

thoughts, perspectives and associations along the studied phenomenon were collected together in the same space. The researcher started slowly taking the transcript to get acquainted with it.

Step two: once the researcher had become conversant with the textual scripts, he set off to use initial coding to place important keywords mentioned by the participants. Being new to the thematic analysis required from the researcher been attention so he would able to position the text under the pre-determined themes. The codes were generated from the data with the assistance of Nvivo software to enhance the work of the researcher.

Step three: once all the data had been coded into the Nvivo program, the researcher, with the aid of the software, began to find the links between similar codes under the predetermined themes. Search also for word quarry to find common words that the respondents use. This behaviour was motivated by the program itself and the instructions, and not the researcher. In other words, the software extracted the connections between the codes and the research's role was to issue the commands.

Four Sept: once all the codes under the sub-themes were gathered, the creations of the major themes began. These themes were pre-determined from theory.

Step five: the researcher had to revisit them once the initial subjects were put in order to clarify their significance. The behaviour does not mean the researcher has made any changes to the themes; it means the themes have been clarified in the light of the codes and the themes.

Step Six: Report writing was the final step in the thematic analysis. In this step the researcher had to bring together all the quotations, themes and common words used to

make sense of the data in a written textual format. The researcher was very keen that the data evidences spoke for themselves. In other words, as suggested by the codes from the data text scripts, the themes and common words were represented.

5.14 RESEARCH VALIDATION

This section discusses the criteria used to assess the study's consistency and to ensure accurate ideas, inferences and conclusions. While study quality is an ambiguous principle because it has been established by methodological guidelines, there are specific issues that are recognised in the literature as being relevant to study quality such as validity, reliability and trustworthiness. It is nevertheless to be observed that at that place are varied interdependent areas of validity, and a trade-off is of necessity (Seale, 1999). The validity issues were addressed as much as possible throughout the research, but it is understood that the validity concept is an ideal state that cannot be completely achieved (Lynch and Brinberg, 1986). It has been argued in qualitative methods that quality and reliability are affected by the viewpoint of the study, which may be biased. Lincoln and Guba (1985) therefore proposed alternative principles for assessing qualitative research, namely trustworthiness and validity, instead of the traditional parameters used in relation to quantitative investigation. In qualitative enquiry, according to Yin, (2009), certain steps should be attempted to state the quality of the research. Those criteria are: construct validity; internal validity; external validity; and reliability.

5.14.1 Construct Validity

Construct validity is built on the correctness of the instruments for collecting data (Miles and Huberman, 1994). The data collection methods were chosen for this subject area after a re-evaluation of existing literature (such as published works, academic

articles, and conference reports). Two different data sets were employed, including indepth face-to-face semi-structured interviews, to ensure that the most appropriate, rich and precise information was gathered for the survey. This study's supervisors served as arbitrators of the research method, questionnaires and interview guide. There were several encounters with them before the final set of data collection instruments was approved as necessary for this study. Furthermore, the study used a questionnaire, and semi-structured interviews in a mixed method to improve the research's construct validity.

5.14.2 Internal Validity

This criterion is based on the data, techniques that have been employed to analyse and the collected data. Additionally, the related literature was comprehensively reviewed to make sure that the researcher was aware of the most current updates discussed and recorded in the literature (in terms of selecting the appropriate data techniques and following the analysis process carefully). Also, by achieving the research objectives, the internal validity has been addressed.

5.14.3 External Validity

External validity can be defined as to what extent the research findings can be generalised. In qualitative research the generalisation is less applicable; it can be only generalised on a theoretical proposition and to a whole population, unlike quantitative research (Yin, 2014). In this study, in order to ensure external validity, good sampling procedures were employed as much as possible in the survey: defining a good sample frame, random selection of sample and the like. Also, the population was selected in such a way that all members in the sample frame had an equal chance of being selected.

5.14.4 Reliability

Reliability means the procedure used to perform a test can be repeated with the same results. This can be expanded in positivism although it cannot be implemented in interpretative stance since the latter type of work is performed in a non-controlling context (Easterby-Smith et al., 2008). While it cannot be calculated, a number of estimators can be used to measure this. The reliability of the survey was improved in this study via the Cronbach's alpha which was used as a reliability estimator because it is the most widely used in analysis. It was used to measure the reliability of the Ghanaian construction industry's corporate social responsibility performance, health and safety improvements in the Ghanaian construction industry, knowledge transfer enablers and barriers.

5.14.5 Conclusion Validity

Conclusion Validity deals with the degree to which conclusions drawn about the relationships (not necessarily causal) in the data are reasonable (Trochim, 2005). Its purpose is to avert the occurrence of Type 1 (identifying a relationship where there is none) and Type 2 (failing to identify a relationship that really exists) errors and the wrong estimation of the magnitude of a relationship and its associated degree of confidence (Whittemore et al., 2001). In order to improve conclusion validity, efforts were made to improve reliability thereby increasing the sample size. In addition, appropriate sampling procedures and statistical test were employed.

CHAPTER SIX

SURVEY DATA, ANALYSIS AND DISCUSSION

6.1 INTRODUCTION

This chapter discusses how the field data collected was treated, analysed and discussed.

The retrieved data from the field was assigned serial numbers and entered into Microsoft Excel spreadsheet. The data was imported from an Excel spreadsheet into Statistical Packages for Social Science (SPSS) version 23 for setting up and screening before estimations. Data was cleaned and edited using frequencies tables and the questionnaire. The edited data was used to make all estimation aided by SPSS version 23.

6.2 RESPONDENTS BACKGROUND INFORMATION

Table 6.1 shows the frequency and percentage distribution of respondents' characteristics relating to their category, work position, level of education, years of expertise and years of the company's existence. BSc is the dominant educational level of surveyed respondents. Many of the respondents surveyed are project engineers. Most of the respondents worked in the construction industry for eleven to fifteen years, and many of the businesses were between five and ten years in existence. This means that all of the respondents have sufficient construction industry experience to ensure data reliability and accuracy.

Table 6. 1: Background Information

	Frequency	Percent
Respondents' category		
Road	95	38
Building	155	62
Total	250	100
Job Position		

Director	22	9.2
Managing Director	14	5.8
Safety Officer	38	15.8
Project Engineer	73	30.4
Project Manager	53	22.1
Others	40	16.7
Total	240	100.0

Educational Level		
PhD	3	1.2
MSC	64	26.0
BSC	91	37.0
B-TECH	30	12.2
HND	42	17.1
Others	16	6.5
Total	24[1]	100.0
Years of Experience		
Less than 6 years	54	21.6
6-10 years	79	31.6
11-15 years	87	34.8
16-20 years	30	12
Total	250	100
Years of existence of company 5-10 years	63	25.6
11-15 years	62	25.2
16-20 years	57	23.2
More than 20 years	56	22.8
Others	8	3.3

[1] **.3 UNDERSTANDING THE HEALTH AND SAFETY SITUATION IN THE GHANAIAN CONSTRUCTION INDUSTRY.**

To understand the health and safety situation in the Ghanaian construction industry, respondents were asked YES and NO questions to know whether their businesses have

Total	246	100.0

a health and safety policy, health and safety code of conduct, or whether their organisations practice health and safety.

Tables 6.2 and 6.3 present the results of cross-tabulation to determine the difference between the responses of road and building contractors pertaining to their health and safety performance and the independent chi-square test to the relationship between road and building contractors, and their focus on health and safety in Ghana. From the crosstabulation table 6.2, 79 out of 94 road contractors representing 84.0% put emphasis on health and safety, while 15 road contractors representing 16% do not. From the same Table 6.2, 88 out of 146 building contractors representing 60.3% also place emphasis on health and safety while 58 representing 39.7% do not place emphasis on health and safety. In all, 69.6% of Ghanaian contractors place emphases on health and safety, while 30.4 do not place emphasis on health and safety.

The independent chi-square test was conducted to assess whether there is any correlation between health and safety results and the category of construction companies operating in the Ghanaian construction industry i.e. (Road and Building). The p-value was set at 0.05 which means that if $p \geq 0.05$ there is no association between the category of construction contractor groups and health and safety performance but when $p \leq 0.05$ would mean that there is an association with the type of construction contractor's category and their health and safety performance (p-value = 0.000*).

From the chi-square results, it was observed that the category of construction companies was statistically significantly linked to their focus on health and safety performance in the construction industry in Ghana. In other words, respondents believe that health and

safety performance in the Ghanaian construction industry is related to whether the company is a road or building contractor. The result further is an indication that road contractors place more emphasis on health and safety than building contractors in the Ghanaian construction industry. In other words, road contractors take safety more seriously than building contractors.

Table 6. 2: Respondents' category * Emphasis place on Health and safety in the Ghanaian construction industry Cross tabulation

			Emphasis place on Health and safety in the Ghanaian construction industry		Total
			YES	NO	
Respondent's category	Road	Count	79	15	94
		% within Respondent's category	84.0%	16.0%	100.0%
	Building	Count	88	58	146
		% within Respondent's category	60.3%	39.7%	100.0%
Total		Count	167	73	240
		% within Respondents' category	69.6%	30.4%	100.0%

Table 6. 3: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	15.264[a]	1	.000		
Continuity Correction[b]	14.161	1	.000		
Likelihood Ratio	16.174	1	.000		
Fisher's Exact Test				.000	.000

Linear-by-Linear Association	15.200	1	.000		
N of Valid Cases	240				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 28.59.
b. Computed only for a 2x2 Table

The results from this study are indications that somehow Ghanaian construction firms are interested in health and safety. The results are backed by Esmaeili et al. (2012), who argued that health and safety had significantly improved in the construction industry. Furthermore, the improvement of health and safety in the construction industry has been attributed to the increased implementation of good safety policies and strategies adopted by construction companies. As some researchers have noted, changes in the construction industry's health and safety performance are the results of increased adoption of highly effective injury prevention techniques (Jaselskies et al., 1996; Findley et al., 2004; Hallowell and Gambatese, 2009).

It is also interesting to observe that Ghanaian construction companies are becoming aware of the need to emphasize health and safety. According to Abdelhamid and Everett, (2000) improving construction safety remains a problem in virtually every country around the world, as the construction industry stands out as the main contributor to severe and fatal accidents amongst all other industries.

Evidently, as dynamic as the Ghanaian construction industry is, it comes with different dangers and risks than previously existed in the country's construction industry. Bhattacharjee et al. (2011) argued that the volatile and dynamic nature of the construction activities had made health a concern wherever construction work takes place. The construction industry in Ghana employs both skilled and unskilled labour coming from different parts of the country with different cultural backgrounds and awareness levels of health and safety, coupled with different religious beliefs.

Consequently, it is vital for construction companies operating in the Ghanaian construction industry to increase their efforts in health and safety performance. Mostly the building contractors who work on high-rise buildings as well as steel buildings that have different activities and specialities to undertake such works. Therefore, placing emphasis on health and safety in the Ghanaian construction industry is required as the first step by the industry players who are directly involved in the project execution to save the lives of their workers, visitors and all stakeholders associated with the project. In addition to the societal cost of workplace injuries, the economic impact on business performance can be substantial (Bhattacharjee et al., 2011).

But in all, it is worthy to note that Ghanaian contractors are beginning to emphasize health and safety, mostly Ghanaian road contractors since the performance of building contractors are not that encouraging. It is also worth mentioning that emphasizing health and safety does not mean the industry is faring well in health and safety in totality. But just an aspect because total safety is when health and safety become each and everyone's business from management to the last person involved. It becomes their way of doing things.

6.4 PERSONS RESPONSIBLE FOR IMPLEMENTING AND COMMUNICATING HEALTH AND SAFETY

The respondents who indicated that their companies emphasized health and safety were asked further to indicate those responsible for implementing and communicating health and safety in their various respective organisations. From the study survey, as shown in Table 6.4, 109 respondents representing 65.3% indicated that health and safety officers are those in charge of implementing and communicating health and safety in their respective organisations. Thirty-seven respondents representing 22.2% also indicated

that project managers are responsible for communicating health and safety in their companies while 35 respondents representing 20% indicated that foremen are responsible for implementing and communicating health and safety in their

organisations.

Table 6. 4: Persons Responsible for Implementing and Communicating Health and Safety

	Frequency	Percent
Health and safety officers	109	65.3
Project engineers	37	22.2
Foremen	35	21.0
Administrators	8	4.8
HR officer	6	3.6

Identifying persons responsible for health and safety communication in the Ghanaian construction industry is relevant because, Alsamadani et al. (2013) argued that if safety hazards are not communicated effectively, risk behaviours and the probability of injury increases. Albert and Hallowell (2017), acknowledged that earlier research has shown that inadequate health and safety communication is a widespread issue in the construction industry.

It is worth noting however, that other professional such as project engineers and foremen are given the additional responsibility of communicating health and safety in the

Ghanaian construction industry. It should also be noted again that health and safety problems are not left in the hands of only the few health and safety officers in the Ghanaian construction industry. All other practitioners are also involved in improving the safety situation in the construction industry in the country.

This finding is supported by Othman (2017), who argued that project management staff such as site managers, project managers, engineers and supervisors have essential roles in the art of safety management. Sunindijo and Zou (2012) also argued that engagement in health and safety is essential for site management teams as they are responsible for implementing related safety tasks and leading other project stakeholders with different backgrounds and expectations to maintain safety.

Health and safety communication are an essential aspect of safety management because it helps in inculcating safety behaviour in the workers and everybody else involved. Effective communication of health and safety in the Ghanaian construction industry is very important because this would allow information flow between the management, site managers and the workers as well so that every member on the site is aware of all safety measures and strategies put in place so that they can work together in implementing the planned strategies to improve the safety atmosphere on site.

According to Chang et al. (2016), a large body of research is discussing the importance of efficient safety communication in high-risk work environments such as the construction sector. Yet sadly, previous research has shown that poor communication about safety is a widespread issue in the construction industry (Albert et al., 2017). Alsamadani et al. (2013) also discussed the advantages of safety coordination among the workers themselves and its impact on improving safety at the site.

The understanding of ways to effectively communicate health and safety is also essential for project managers in the Ghanaian construction industry because inadequate communication of these initiatives in the workplace would hinder all the policies and plans put in place to minimize on-site accidents. Bhavana et al. (2018) supported this assertion by arguing that learning how to communicate on-site health and safety effectively will empower construction managers, safety professionals and construction supervisors with actionable information that can be leveraged strategically to foster better safety efficiency. The authors also argued that such site-leadership programs could dramatically improve the flow of workplace safety information and security management. Subramani and Lordsmillar, (2014) are of the view that safety program in the construction industry is a package which comprises a safety policy, safety department to enforce the policy and specially trained personnel to man it.

Kines et al. (2010) noted the value of safety interactions between workers and their supervisors. This is seen as a means of creating the conditions for achieving a safe working environment. Therefore, it is worthy to note that in the construction industry in Ghana, almost all those involved in the actual day-to-day construction supervision get involved in communicating safety, since they are continually interacting with the workers. Therefore, they would be able to receive feedback from the workers who can help in revising health and safety plans put in place to improve safety on-site continually. In all, Neal and Griffin (2000) summarized the debate on health and safety communication. They suggested that successful safety communication facilitates the exchange of relevant safety information, which translates into desirable safety behaviours such as identification of special risks and hazards, compliance with safety protocols, use of personal protection, engagement in safety and voluntary initiatives. Regrettably, most construction workplaces continue to fail to achieve desirable rates of communication among employees (Albert et al., 2017).

6.5 HEALTH AND SAFETY CULTURE MATURITY IN THE GHANAIAN CONSTRUCTION INDUSTRY.

Respondents were asked to describe the state of health and safety culture in the Ghanaian construction industry. Cumulative scale (Guttman scale) was the instrument used in the data collection. The respondents were asked to indicate only one out of ten health and safety culture situations presented to them. Ten health and safety situations identified from the literature were categorized into five stages; from pathological to generative and each step is made up of two conditions based on the health and safety cultural maturity ladder posited (Hudson, 2007). Thus, indicating any of the statements as a health and safety situation in the Ghanaian construction industry means that the respondent first agrees with the preceding statement.

From the responses, "People don't care about H&S issues in the Ghanaian construction industry" was indicated by 38.6 per cent of the respondents under pathological in the evolution of safety culture posited by (Hudson, 2007). "The Ghanaian construction industry is only driven by regulatory compliance, making sure one does not get caught" was also indicated by 17.4 per cent of the respondents as a state of safety culture in the Ghanaian construction industry also under pathological.

"People take safety seriously only when there is an accident on site" was indicated by 26.6 per cent of the respondents as the safety situation in the Ghanaian construction industry. At the same time "Workers don't do what they are told to do by management on-site" was also indicated by 13.6 per cent of the respondents as the safety cultural situation in the Ghanaian construction industry all under reactive.

"Companies only focus on systems and data collection without verifying the effectiveness of the results of the data collected" was seen by 1.6% of the respondents

as the health and safety cultural situation in the Ghanaian construction industry. “Health and safety is managed based on what has happened in the past to prevent future occurrences” was also indicated by 1.1% of the respondents all under calculative.

When it came to generative, none of the respondents indicated any of the two statements presented under it. What this means is that none of the respondents believes the Ghanaian construction industry is at the generative stage.

Table 6. 5: Health and Safety Culture maturity in the Ghanaian Construction industry

	Frequency	Percent	Cumulative percentages
People don’t really care about safety issues in the Ghanaian construction industry.	71	38.6	Pathological 56%
The Ghanaian construction industry is only driven by regulatory compliance, making sure one doesn’t get caught.	32	17.4	
People take safety seriously only when there is an accident on site.	49	26.6	Reactive 40.2%
Workers don’t do what they are told to do by management on site.	25	13.6	
Companies only focus on systems and data collection without verifying the effectiveness of the results of the data collected.	3	1.6	Calculative 12.6%
Health and safety is managed based on what has happened in the past to prevent future occurrences	2	1.1	
In the Ghanaian construction industry, the workforce gets involved in safety practices and prevent wrongdoing.	1	0.5	Proactive 1%
In the Ghanaian construction industry, every person tries to be as informed as possible to prepare them for unexpected.	1	0.5	
In the Ghanaian construction industry, the workforce gets involve in safety practices and prevent wrongdoing.			Generative had no score
In the Ghanaian construction industry, the workforce tires to be as informed as possible to prepare them for unexpected.			
Total	184	100	

The findings of the study mean that cumulatively 56% of Ghanaian contractors believed that although in the Ghanaian construction industry safety policies, code of conducts is in place. Management and supervisors are still not effectively emphasizing the need for

safety measures to be integrated into the accomplishment of different project activities. Further, these respondents believed that management flouted safety mechanisms, miscommunication arises to cause fabricated reports or non-disclosure of all safety problems due to the fear of attracting fines for non-compliance. 40.2%, of Ghanaian contractors, also believe that if safety issues become severe, the management becomes only reactionary by responding and addressing only significant areas of failure. So the analysis and sense of the likely safety issues are ignored by management.

12.6% of the contractors also believe that further investments in the reactive safety management systems cause management to develop a calculative safety management system in which only the essential safety management systems are put in place. 1% of the respondents also were of the view that for Ghanaian construction companies to improve their safety management systems and realised the associated business values. Management must become more interested in how to effectively reduce incidents or accidents and adopts proactive safety management systems by continually sensing and integrating safety management issues in the process of project conceptualization and designs.

The results show that the health and safety culture of the Ghanaian construction industry is at the first level, the pathological stage. Even though Ghanaian contractors have health and safety policies and codes of conduct in place, safety is not seen as a key business risk. Consequently, management and most frontline staff do not emphasise the importance of integration of safety measures in the various activities on the site. They do not see safety as being important, and part of the construction works.

This research finding is supported by Alkilani et al. (2013), who conducted a study in Jordan and concluded that the management and evaluation of health and safety in Jordan is still in its infancy stage. This finding further reinforced by EU-OSHA, (2012) that

most construction industry firms have a reactive approach to safety management, taking action only after accidents or injuries occur. The state of the Ghanaian construction industry on the safety culture ladder is also not surprising because a majority of contractors in the Ghanaian construction industry are small and medium scale contractors, with low start-up capital coupled with competition in the industry. Makes it difficult for them to invest in health and safety management or recruit personnel with health and safety know-how in their organisation.

These organisations are focused primarily on meeting project completion time, and health and safety problems are either not on their agenda at all or relegated to the background before an incident occurs. The status of the Ghanaian construction industry with respect to its health and safety maturity is also due to the reality that the idea of safety culture in the construction industry is relatively recent (Rafiq et al., 2007; Kartikawati and Djunaidi, 2018). The state of the industry on the safety ladder is also as a result of Ghana being a developing country; health and safety issues are still underdeveloped and not much attention is being given to health and safety issues in the country and the construction industry at large. According to Annan et al. (2015), Ghana as a nation does not have any comprehensive national policy on health and safety. According to Annan et al. (2015), there is no comprehensive national health and safety policy in Ghana as a country. Although a draft bill for national health and safety is in the plan, it is yet to be implemented. Quartey and Puplampu, (2012) argued that health and safety issues for workers in the country seem very worrying, hence the state of the Ghanaian construction industry on the safety maturity ladder. Kheni et al. (2008) argued that the leading health and safety challenges faced by Ghanaian small-scale and medium-sized construction companies are lack of skilled human resources and insufficient government support for regulatory standards. According to Rafiq et al. (2007), the majority of small construction companies that

dominate the industry worldwide tend to have slim management structures, with no formal safety management systems. Therefore, the state of the Ghanaian construction industry can be attributed to the nature of the sector, which has a large proportion to be small and medium enterprises. To improve the current state of safety culture, the Ghanaian construction industry needs to develop a safety culture that is deeply integrated with the organisational culture (Cesarini et al., 2013). The authors proposed a three-step process of improving the state of health and safety in an organisation: 1. Identify and strengthen the areas of weakness 2. Monitor, 3. Evaluate and encourage continuous learning and safety improvement.

6.6 CORPORATE SOCIAL RESPONSIBILITY IN THE GHANAIAN CONSTRUCTION INDUSTRY.

Tables 6.6 and 6.7 show chi-square test of independents and cross-tabulation results to investigate the relationship between road and building contractors and their success in the Ghanaian construction industry in terms of corporate social responsibility. From the cross-tabulation Table, 42 out of 93 road contractors representing 45.2 per cent said their companies were engaged in corporate social responsibility. In contrast, 51 out of 93 said they were not involved in any corporate social responsibility operation. From same Tables 6.6 and 6.7, 49 out of 148 building contractors, representing 33.1 per cent, said their companies were engaged in corporate social responsibility. In contrast, 99 out of 148, representing 66.9 per cent, said their businesses were not involved in any corporate social responsibility activities.

Table 6. 6: Respondents' category * Corporate social Responsibility Cross tabulation

	Corporate social Responsibility	Total

			YES	NO	
Respondents' category	Road	Count	42	51	93
		% within Respondents' category	45.2%	54.8%	100.0%
	Building	Count	49	99	148
		% within Respondents' category	33.1%	66.9%	100.0%
Total		Count	91	150	241
		% within Respondents' category	37.8%	62.2%	100.0%

Table 6. 7: Chi-Square Tests

In all, 91 contractors in the Ghanaian construction industry are active in corporate social responsibility, representing 37.8 per cent. In comparison, 150 contractors in the Ghanaian construction industry, representing 62.2 per cent, are not engaged in corporate social responsibility. To know whether corporate social responsibility practices have a connection with the contractor's group sampled, i.e. road and building contractors, independent chi-square test was employed. The p-value was set at 0.05 which implies that if $P \geq 0.05$ there is no connection between the category of contractors and corporate social responsibility

performance, but when $p \leq 0.05$ it means there is an association between contractor category and corporate social responsibility performance in the Ghanaian construction industry. From the chi-square results, it was observed that the construction group

category was found not to be statistically significantly linked to their contribution to corporate social responsibility (p-value= 0.081*).

This means that there is ample statistical evidence to conclude that there is no significant

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.530[a]	1	.060		
Continuity Correction[b]	3.036	1	.081		
Likelihood Ratio	3.509	1	.061		
Fisher's Exact Test				.076	.041
Linear-by-Linear Association	3.516	1	.061		
N of Valid Cases	241				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 35.12.

c. Computed only for a 2x2 table

relationship between the contractor group category in the Ghanaian construction industry and that of their corporate social responsibility involvement. In other words, there is no doubt to conclude that the success of corporate social responsibility in the construction industry in Ghana has no relation to the type of contractor groupings.

Findings from this study support the notion that it is only the major construction companies with financial resources in the Ghanaian construction sector that can conduct CSR activities, and most of them are primarily expatriate firms. A large proportion of contractors in the construction industry in Ghana are also small-scale enterprises and therefore, do not have the structures to engage in CSR. Hence a large percentage of the respondents' responses were in the negative. This confusion may be attributed to the

non-reporting of CSR activities in the construction sector in Ghana and the lack of studies in this area. As noted, corporate social responsibility regulation is scarce in the Ghanaian construction industry, and few academic studies have advanced this field (Lichtenstein et al., 2013).

it is heart-warming to find in a developing nation like Ghana that approximately 38 per cent of contractors in the construction industry are engaged in corporate social responsibility in one way or the other. Tilt (2016) noted that research on corporate social responsibility activities has traditionally focused on businesses in more developed economies, such as the US, UK, and Australia.

Wang et al. (2018) noted further that corporate social responsibility has not yet reached an optimum level even in the Chinese construction industry, which means that CSR activities are still generally low in the construction industry. The reason provided by Oppong (2014) that it is a prior financial success that determines the potential magnitude of CSR initiatives in the Ghanaian context can be seen as another factor that may have resulted in the low corporate social responsibility in the Ghanaian construction industry. There are also numerous issues as to why the commitment to corporate social responsibility is so weak in the country. Some of these are stated to be low per capital income, weak currency, capital flight, low productivity and low savings, rendering it almost impossible for indigenous firms, most of which are small in comparison with foreign-owned firms, to participate in CSR (Amponsah-Tawiah and Dartey-Baah, 2011).

6.7 CORPORATE SOCIAL RESPONSIBILITY ACTIVITIES IN THE GHANAIAN CONSTRUCTION INDUSTRY

Respondents who said their companies are engaged in corporate social responsibility were asked to indicate the frequency at which they employ CSR activities presented to

them. One-sample t-test was used to analyse the responses. These corporate social responsibility activities were ranked based on the Likert scale of 1 to 5 where 5 = always, 4 = occasionally, 3 = rarely, 2 = very rarely and 1 = never with a statistical mean set at 2.5. A high mean relevance rating would mean that the corporate social responsibility activity under consideration is the leading corporate social responsibility being undertaken in the Ghanaian construction industry always. From Table 6.7, it was observed that (4 out of the 20 variables) are statistically significant for the results sampled for the study. The results reveal that "sanitation" (mean = 3.46), "health education and screening" (mean = 2.96), "renovation of schools" (mean = 2.96) and "support of orphanages" (mean 2.83) are the corporate social responsibility activities Ghanaian construction companies are engaged in with sanitation been the most significantly employed. It is also clear that all the mean difference of the (4) fell within the 95% confidence interval constructed for each activity item. Thus, all four activities are corporate social responsibility activities in the Ghanaian construction industry.

Table 6. 8: Corporate Social Responsibility Engagement in the Ghanaian Construction Industry

	Mean	Std. Dev.	Test Value = 2.5				Rank
			t	df	pvalue	Mean Dif.	
Sanitation	**3.46**	**1.210**	**6.498**	**90**	**0.000**	**0.96**	**1**

Renovation of schools	**2.96**	**1.306**	**2.755**	**90**	**0.004**	**0.46**	**2**
Health Education/Screening	**2.96**	**1.365**	**2.647**	**90**	**0.005**	**0.46**	**3**
Support to orphanages	**2.83**	**1.368**	**1.842**	**90**	**0.034**	**0.33**	**4**
Safety Drills	2.78	1.474	1.009	90	0.158	0.28	5
Building of community clinic	2.70	1.336	0.983	90	0.164	0.20	6
Medical support to the poor and needy	2.70	1.402	1.172	90	0.122	0.2	7
Building school blocks	2.70	1.495	0.674	90	0.251	0.20	8
supply of furniture to schools	2.66	1.478	0.620	90	0.268	0.16	9
Fire prevention Education	2.63	1.185	0.592	90	0.278	0.13	10
Sponsorship of sporting activities	2.62	1.266	0.235	90	0.407	0.12	11
Provision of water	2.60	1.421	0.507	90	0.307	0.10	12
Environmental protection education	2.59	1.289	0.235	90	0.407	0.09	13
Renovation of Hospitals	2.59	1.316	0.468	90	0.321	0.09	14
Provision of skills training	2.57	1.537	-0.066	90	0.526	0.07	15
Support for the works of NGOs	2.42	1.221	-0.841	90	0.799	-0.08	16
Provision of Scholarship scheme	2.42	1.307	-0.934	90	0.824	-0.08	17
Provision of counselling	2.32	1.437	-1.499	90	0.931	-0.18	18
Building of Recreational centres	2.26	1.255	-1.970	90	0.974	-0.24	19
Preservation of monuments	2.08	1.196	-3.937	90	0.999	-0.42	20

The findings of this study are supported by Griffith (2011) who also looked at three main aspects in which corporate social responsibility is performed in the construction industry and suggested that the environment is perhaps the most vital link between the requirements for corporate social responsibility, management systems and the organisational performance of contractors. The findings of this study have brought out

the kind of corporate social responsibility activities in the Ghanaian construction industry.

Lichtenstein et al. (2013) further support the finding, arguing that while businesses in Ghana could be committed to CSR, they are doing so with financial caution. The authors also observed that if a company anticipates benefits more significant than the costs, it will invest more in CSR. The findings further provide the construction industry with a benchmark to determine if the type of CSR activities they participate in is capable of providing the industry with the appropriate corporate identity they deserve. It may also be that the kind of corporate social responsibility activities undertaken by Ghanaian contractors is the reason why the industry is considered not to engage in CSR. As such activities do not have the necessary impact on community members wherever they occur to be able to provide the industry with the kind of mileage it deserves (Chang et al., 2017).

Again, corporate social responsibility practices have been treated on a wholesale basis across all industries and, as a result, the construction industry does not produce the type of construction-industry-specific CSR activities. Thus, failing to have the necessary exposure that would alter the corporate image of firms indulging in such business actions. Besides, the construction industry is unique and different from other sectors. So it is necessary for the construction industry in Ghana to better understand the kind of corporate social responsibility activities construction companies carry out in the industry, to be able to determine whether these activities can provide them with the sort of mileage they deserve. And also offer a long-term societal benefit to the Ghanaian community, which would, in effect, boost the corporate image of the industry.

Adaptation of corporate social responsibility policies by construction companies from other sectors also has limitations on the industry because of its one-time and temporary nature. The construction industry should, therefore define CSR activities that are focused on the industry and also provide the communities with what they are demanding. To improve their welfare and also enable the construction companies to get the necessary atmosphere to fulfil their corporate goals and complete their projects on time.

In the CSR literature, researchers suggested that today's corporate social responsibility is no longer conceived as a pure moral duty but as a strategic vision for increasing productivity and achieving shared values with the societies in which these companies do business (Porter and Kramer, 2011; Battaglia et al., 2014; Loosemore and Teck Heng Lim, 2017). From the results, one can see that the Ghanaian construction industry is genuinely engaged in corporate social responsibility, though not most contractors do so. This is contrary to the statement in the Ghanaian corporate social responsibility literature that corporate social responsibility programs are noted in the country to be carried out by telecommunications companies, financial institutions, and mining and oil and gas firms (Ofori, 2008). It may be due to the non-reporting of CSR in the Ghanaian construction industry, as well as the inability of the Ghanaian construction industry to participate in activities with long-term social effects and the lack of field studies as indicated by (Lichtenstein et al., 2013).

6.8 CORPORATE SOCIAL RESPONSIBILITY CHALLENGES IN THE GHANAIAN CONSTRUCTION INDUSTRY

Respondents were asked to indicate corporate social responsibility challenges confronting the Ghanaian construction industry. One sample t-test was used to analyse the responses. The corporate social responsibility challenges were ranked based on a Likert scale of 1 to 5 where 5 = strongly agree, 4 = agree, 3 = somehow agree, 2 = don't agree and 1 = strongly don't agree. A high mean rating would mean that the problem of corporate social responsibility under consideration was a challenge in the construction industry in Ghana.

From Table 6.8, it was observed that 6 out of the 9 challenges presented have a mean score more than the 3.5 statistical mean set for the study. The results indicate that there are six challenges presented in the Ghanaian construction industry. Namely,

1. Ghanaian contractors associate CSR with avoidable expenses.
2. They lack a legal framework to guide CSR implementation.
3. CSR is not incorporated into the mission and vision statements of Ghanaian contractors.
4. Ghanaian contractors do not have enough financial resources to carry out CSR.
5. There is too much corruption in the Ghanaian construction industry for the contractors to be able to carry out CSR. And finally,
6. Ghanaian contractors do not have adequate training in CSR implementation. It is also clear that all the mean difference of the (6) fell within the 95% confidence interval constructed for each challenge item. Thus, all six challenges are corporate social responsibility challenges in the Ghanaian construction industry.

Table 6. 9: One-Sample T-Test for Construction Industry CSR Challenges

	Mean	Std. Dev.	Test Value = 3.5				95% CI Dif.		Rank
			t	df	pvalue	Mean Dif.	Lower	Upper	
We associate CSR with avoidable expenses	**4.093**	**.993**	**8.986**	**229**	**0.000**	**0.59**	**0.46**	**0.72**	**1**

We lack legal framework to guide CSR implementation in the industry	**4.026**	**1.120**	**7.112**	**229**	**0.000**	**0.53**	**0.38**	**0.67**	**2**
CSR is not incorporated into our company's vision and mission statement	**3.871**	**1.230**	**4.510**	**229**	**0.000**	**0.37**	**0.21**	**0.53**	**3**
We do not have sufficient financial resources for CSR implementation	**3.829**	**1.210**	**4.105**	**229**	**0.000**	**0.33**	**0.17**	**0.49**	**4**
There is too much corruption in the industry to be able to take up CSR implementation	**3.825**	**1.134**	**4.343**	**229**	**0.000**	**0.33**	**0.18**	**0.47**	**5**
We do not have adequate training for CSR implementation	**3.773**	**1.151**	**3.587**	**229**	**0.000**	**0.27**	**0.12**	**0.42**	**6**
We do not have relevant knowledge about CSR implementation	3.563	1.222	-2.435	229	0.992	0.06	-0.10	0.22	7
There are no significant benefits for CSR implementation	3.528	1.369	-2.590	229	0.995	0.03	-0.15	0.21	8
We don't have any attachment to the community in order to carry out CSR.	3.417	1.200	-3.805	229	0.999	-0.08	-0.24	0.07	9

The finding of this study is in agreement with Bardes and Tela (2015) that challenges faced by construction companies within today's complex and competitive market environment are products of economic and non-economic related forces. It is clear from the findings that challenges facing Ghanaian construction companies in carrying out their corporate social responsibility activities are multifaceted, thus not limited to financial constraint alone. Financial challenges were not even their first CSR challenge. Loosemore and Phua (2011) surveyed the Australian construction industry and found their challenges to be confusion in what corporate social responsibility means, lack of leadership and management support and lack of corporate social responsibility data, established cultures and ways of working, scepticism about return on investment; supply chain management and sceptical clients.

Comparing the challenges in the Austrian construction industry found by these authors and the findings of this study reinforces the argument that adaptation of CSR activities of developed nations in developing nations like Ghana has limitations in their implementation because the conditions present in the two areas are not the same. It was first of all essential to understanding the challenges in the Ghanaian context to be able to provide tailored solutions that can serve Ghanaian industrial specific needs and also countries with the same attributes. It is also as a result of the ambiguous nature of corporate social responsibility coupled with pressure on companies to absorb it that organisations have had to translate the concept to suit their demands (Duman et al., 2016). Every construction company, therefore, looks at what they can do without actually identifying what would impact the community and also improve their corporate image in the Ghanaian society.

Loosemore and Phua (2011) argue that there were some problems with the growing literature on CSR in construction. Initially, it naively advertised CSR as a generic solution for all companies without really understanding the specific business sense in which it was implemented. Secondly, not every firm automatically suits a highly formalized CSR strategy. Thirdly, the increasing number of papers uncritically philosophizing about the need for construction firms to implement some sort of CSR initiative was not backed by adequate evidence of how firms can strategically undertake and operationalize CSR to achieve sustainable competitive advantage and improved performance. It was wise to have described CSR challenges in the Ghanaian construction industry by believing these writers to be able to narrow down to countryspecific challenges rather than choosing the challenges found in the developed nations. The finding is further supported by Tilt (2016), who argued that studies of

corporate social responsibility have neglected to take into account country-contextual variables but rely on theories originating from the developed world.

Knowing the problems in a business sense is very important to find ways to overcome them and progress in those fields. It is also important to note that the challenges vary from country to country, and from industry to industry. Therefore, relying on challenges found to be militating against CSR in other countries or industries and implementing them in the Ghanaian construction industry may not yield any meaningful result as the circumstances are different.

6.9 EXPLORATORY FACTOR ANALYSIS (EFA) ON KNOWLEDGE TRANSFER AND DIFFUSION ENABLERS AND BARRIERS

The following are the exploratory factor analysis on knowledge transfer media, enablers of knowledge transfer, barriers to knowledge transfer, enablers of a successful diffusion process and barriers to a successful diffusion process accordingly.

6.10 EXPLORATORY FACTOR ANALYSIS FOR KNOWLEDGE TRANSFER MEDIA

Exploratory factor analysis (EFA) of knowledge transfer media results presented in Table 6.10 to Table 6.13 showed the KMO and Bartlett's Test, the commonalities extracted, total Variance Explained, and Rotated Component Matrix for the EFA conducted on the knowledge transfer media. Twelve (12) variables measured knowledge transfer media and were subjected to exploratory factor analysis (EFA). The methods of extraction and rotation utilized were the principal component (PC) and varimax with Kaiser Normalization, respectively.

Table 6. 10: KMO and Bartlett's Test of Sphericity and Cronbach's Alpha for Knowledge Transfer Media

	KMO	Bartlett's Test of Sphericity	Reliability

		Approx. ChiSquare	df	Sig.	N	Cronbach's Alpha
Road	0.680	190.735	66	0.000	12	0.698
Building	0.867	572.551	66	0.000	12	0.858
Combined	0.863	648.880	66	0.000	12	0.815

To ensure factorability of the correlation matrix before undertaking the EFA, the KMO measure of sampling adequacy and Bartlett's test of sphericity were conducted for knowledge transfer media. From Table 6.10, the KMOs recorded were 0.698, 0.867 and 0.863 for road contractors, building contractors and combined sample respectively which were more significant than the minimum cut-off of 0.7 to establish sampling adequacy (Hair et al. 2010) except the sample for road contractors but more significant the KMO value acceptability minimum according to Kaiser, (1970). Thus, the range of KMO measure of sampling adequacy is fixed at a minimum of 0.50 and a maximum of 0.80. Similarly, the result of Bartlett's test of sphericity also revealed a significance level of 0.000 ($p<0.05$). The implication of this result is that there exists a possible correlation among the variables, thus suggesting a realistic group forming factors from the variables and a justification to proceed with FA (Field, 2009).

Further, the Cronbach's alpha was computed, and a value of 0.815 (combined) was recorded suggesting adequacy of internal consistency and reliability in the measures and the scale (Hair et al., 2014; Field, 2009). According to Field (2009), a Cronbach's alpha above 0.70 is acceptable for scale reliability and internal consistency of the instrument.

Table 6. 11: Communalities for Knowledge Transfer Media

	Initial	Extraction		
		Road	Building	**Combined**
The use of opinion leaders in the community.	1	0.726	0.900	0.912
The use of leaflets with safety inscriptions.	1	0.532	0.817	0.526
The use of town hall meetings.	1	0.833	0.699	0.866
The use of mass media (e.g. radio, television, public announcing system etc.)	1	0.693	0.516	0.602

The use of local food vendors on construction site.	1	0.622	0.706	0.736
Organisation of safety meetings in the community (e.g. between construction workers and the community members)	1	0.591	0.631	0.504
Safety demonstrations in the community.	1	0.648	0.691	0.700
Celebration of safety weeks in the community.	1	0.785	0.667	0.628
Use of signage with health and safety inscriptions	1	0.679	0.796	0.700
Provision of orientations for visitors, subcontractors and suppliers from the community.	1	0.662	0.633	0.641
Through peer groups in the community (e.g. inter community groupings)	1	0.649	0.650	0.595
The use of social media (e.g. Facebook, WhatsApp, twitter Instagram etc)	1	0.534	0.835	0.597
Average	***1***	***0.663***	***0.712***	***0.667***
Extraction Method: Principal Component Analysis.				

The average commonality of the variables after extraction was 0.667 (combined), indicating that the extracted communalities support the use of factor analysis on the variables. Field, (2009) advises that the reliability of the results and explanations in factor analysis attained with an average commonality of the variables after extraction should be above 0.60. Similarly, communality values of a hypothetically significant variable must yield an extraction value (eigenvalues) greater than 0.50 at the initial iteration (Field, 2009; Hair et al., 2014). All the twelve (12) variables had an extracted eigenvalue greater than the 0.50. Hence all variables were retained and subsequently used for further analysis (Field, 2009; Hair et al., 2010).

After conducting all the required assessment, the EFA was then conducted using twelve variables. In Table 6.12, the total variance explained by the variables indicates that five components be extracted from the data to improve the cumulative percentage of variance. Similarly, the Rotated Component Matrix in Table 6.13 confirms five unique component factors as each variable

dominantly belonged to a single factor (component). It could be suggested, therefore that the components that emerged are knowledge transfer media.

Table 6. 12: Total Variance Explained for Knowledge Transfer Media

Category	Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
		Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Road	1	2.954	24.617	24.617	2.039	16.994	16.994
	2	1.654	13.784	38.400	1.712	14.270	31.264
	3	1.325	11.043	49.443	1.600	13.332	44.596
	4	1.072	8.932	58.375	1.534	12.782	57.378
	5	0.946	7.887	66.262	1.066	8.884	66.262
Building	1	4.865	40.543	40.543	2.482	20.687	20.687
	2	1.096	9.130	49.673	1.943	16.189	36.876
	3	1.013	8.444	58.117	1.491	12.425	49.300
	4	0.841	7.008	65.125	1.490	12.416	61.716
	5	0.724	6.034	71.160	1.133	9.443	71.160
Combined	1	4.096	34.137	34.137	2.057	17.138	17.138
	2	1.088	9.069	43.207	1.823	15.190	32.328
	3	1.036	8.631	51.838	1.799	14.994	47.323
	4	0.947	7.889	59.727	1.221	10.173	57.496
	5	0.840	7.003	66.731	1.108	9.235	66.731

Results from Table 6.12 presented the total variance explained by each of the five extracted components in each sample. The principal component factor one accounted for 34.137 per cent (combined) up to the fifth component factor cumulatively accounting for about 66.731 per cent. From this, it could be seen that the five component factors extracted cumulatively accounted for 66.731 per cent of the total variance, which is above the recommended minimum of 50% (Field, 2009).

Table 6. 13: Rotated Component Matrix for Knowledge Transfer Media (combined)

Knowledge Transfer Media	Component				
	1	2	3	4	5

Safety demonstrations in the community.	0.800				
Celebration of safety weeks in the community.	0.770				
Organisation of safety meetings in the community (e.g. between construction workers and the community members)	0.562				
Through peer groups in the community (e.g. inter community groupings)	0.537				
The use of local food vendors on construction site.		0.810			
The use of social media (e.g. Facebook, WhatsApp, twitter Instagram etc)		0.696			
The use of leaflets with safety inscriptions.		0.561			
Use of signage with health and safety inscriptions			0.790		
Provision of orientations for visitors, subcontractors and suppliers from the community.			0.732		
The use of mass media (e.g. radio, television, public announcing system etc.)			0.552		
The use of town hall meetings.				0.898	
The use of opinion leaders in the community.					0.944
Extraction Method: Principal Component Analysis.					
Rotation Method: Varimax with Kaiser Normalization.					

The rotated component matrix was used over the ordinary un-rotated matrix due to the ability of the rotated component matrix to yield and achieve simple, robust structure which enables easy identification and interpretation of results (Field, 2009). Considering the possible interrelations among the variables contained in each component and the factor loadings, more suitable names that summarize the knowledge transfer media explained by the components were derived. Thus, Component factor one was named awareness creation, factor two named community engagement, three named community orientation, component four Community Integration and five opinion leaders' engagement.

The art of transferring knowledge in the construction industry has been noted as complex. These difficulties have been noted to stem from the fragmented structure, project processes and adversarial relationships which are typical of the construction industry (Hartman et al., 2006) owing to these difficulties the construction industry has

been seen to lag in transferring knowledge both within and without the industry. It is therefore important for the construction industry to find better and more effective media of sharing knowledge both internally and externally. The findings of these studies have identified five ways in which knowledge can be transferred and diffused in the construction industry and the Ghanaian community as well. These are:

6.10.1 Awareness creation

The first component factor of the result describes awareness creation loaded by four variables which together had a total variance explained the component by 34.137 per cent. The variables were safety demonstration in the community (0.800), celebration of safety weeks in the community (0.770), organisation of safety meetings in the community (e.g. Between construction workers and the community members) with a factor loading of 0.562. The fourth variable was the creation of peer groupings in the community (intercommunity groupings) which was different from the safety awareness campaign discussed (extreme variable).

Awareness creation as a knowledge transfer medium remains very significant, especially in the Ghanaian construction industry and the community as well, which is made up of both literate and illiterate, skilled and unskilled employees. It is worth mentioning that one must be mindful of the existence of innovation before he or she can conceive of seeking knowledge about it and making a decision to examine such an introduction leading to its acceptance or rejection. Be it technological innovation, improvement in a system or work, or administrative. Awareness creation is vital, even after a planned transfer of knowledge has been completed. Ashley (2009) as cited in Taesung (2015), argued that it does not lead to the conclusion that one must wait for the diffusion of new knowledge or product to reach the last person, but rather one can accelerate the rate of

acceptance within a social system through more intense and effective communication and awareness-raising. Rogers called it Knowledge stage and said it consisted of the innovation-decision process which commences when the individual or other decision-making unit is exposed to the innovation or new knowledge exists (Rogers and Shoemaker, 1971; Rogers,1995).

6.10.2 Community Engagement

The second component had no pattern of a description of the loaded variables. Together explained the component (total variance explained) was 9.069 per cent. These variables were the use of local food vendors on a construction site (0.810), the use of social media (e.g. Facebook, WhatsApp. Twitter, Instagram) (0.696) and the use of leaflets with safety inscriptions (0.561).

Community engagement is seen as one of the most critical stages in the knowledge transfer process; it involves the inclusion, thus bringing on board, leaders of the community or their representatives in the knowledge transfer process as a medium of transfer at the initial stage. Knowledge transfer thrives on networking; therefore, engaging the community, who are the targeted unit for the transfer of knowledge or introduction of innovation, would better facilitate its early acceptance and implementation. They would feel part of the transfer process and therefore eliminate any suspicions in the adopting unit. In most or all construction sites in Ghana are local food vendors who sell to the workers on site. These vendors become part of the project stakeholders and create excellent relationships with the workers. Therefore, building mutual trust between the workers and the local food vendors, making it easier to communicate and learn from each other. The food vendors live in the community with friends, neighbours and family members and so can quickly introduce them to any new knowledge acquired from the construction project site.

Social media is catching up with the Ghanaian citizenry due to the proliferation of mobile phones in the country, therefore using social media as a medium of knowledge transfer can reach out to the masses as fast as possible in the communities. It is also important to emphasize that although social media is regarded as a speedy and efficient way to reach out to the people, it can also bring uncertainty as to the authenticity of such knowledge and also bring trust issues. Leaflets are also an excellent medium of transferring or communicating information from one source to the other, which would lead to changes in attitudes and behavioural change.

6.10.3 Community Orientation

The third component was identified as community orientation. It consisted of three variables which are the use of signage with health and safety inscriptions (0.790), provision of orientations for visitors, sub-contractors and suppliers from the community (0.732) and the use of mass media (e.g. radio, television, public announcing systems etc. (0.552).

Community orientation is another important medium of knowledge transfer, which brings together the knower and the learner in introducing the new knowledge. It is a medium that creates the atmosphere of engagement between the two parties, in this case, the source and the receiver, and also enables further clarifications that may arise out of doubt. Subcontractors are part of most projects from the supply of materials, specialist works, to minor works associated with construction works. Most of these suppliers are from the community in which the project is taking place. Suppliers have been part of the construction project and are expected to be integrated into the project team. So they should be given all the relevant knowledge required for the project execution. When the

new knowledge impacts them, they would in-turn transfer such new knowledge to their various community members, friends and families in a conscious effort and not by accident.

6.10.4 Community Integration

The fourth component was the single item loaded; thus, the use of town hall meetings (0.898). This variable alone accounted for 7.889 per cent of the total variance. Community integration in the knowledge transfer process amongst the Ghanaian community is very important due to the nature of the Ghanaian community setting. The act of integrating a new member in a community can improve learning and for that matter, transfer of knowledge across each other. Ghanaian communities are known to live in communism, which therefore makes it easier to mobilize the community members for town hall meetings. Townhall meetings have been employed in so many instances as a means of disseminating information in the Ghanaian community; it provides the opportunity for the holder of the new knowledge to either meet the community leaders or a section of the community members to relate information to them. Construction companies in an attempt to transfer external knowledge from the industry to the community in which they find themselves can do so by organisation town hall meetings to speak to the community members as a medium of transferring such knowledge. Doing so would bring the two sources together and promote mutual trust since it would offer both parties the opportunity to know and understand each other's concern arising from the introduction of the new knowledge.

6.10.5 Opinion Leaders' Engagement

The use of opinion leaders in the community was also loaded on the fifth component with a factor loading of 0.944 and accounted for 7.003 per cent of the total variance.

One very important medium of transferring knowledge in a community is the use of opinion leaders. Opinion leaders are very influential in any community due to the respect they command in the community. They affect others' attitudes and behaviours because they have more exposure to information, maintain extensive links with various people in and outside of the system, and are socially accessible by others (Rogers, 2003). They are very influential and influence the community members to either accept or reject any new knowledge that is being introduced in the community. They're noted to be respected in the community, and so their judgement is also trusted. Opinion leaders are the reason why knowledge transfer can be very successful in a community (Dearing, 2009). Therefore, in other, for Construction companies to be able to transfer knowledge from the industry to that of the community, they should make every effort to engage the opinion leaders to be able to achieve the desired result. It's practically impossible for whatever new knowledge or innovation to succeed in the Ghanaian community without the involvement of the opinion leader. Rogers (1995) noted that Information they obtain spreads to others with relative ease and speed, which in turn dramatically expedites the change diffusion among them.

6.11 ENABLERS OF KNOWLEDGE TRANSFER FROM CONSTRUCTION COMPANIES TO THE COMMUNITY

Exploratory factor analysis (EFA) of the enablers of knowledge transfer from construction companies to the community results was presented in Table 6.14 to Table 6.17. The KMO and Bartlett's Test, the commonalities extracted, total Variance Explained, and Rotated Component Matrix for the EFA conducted on the enablers of knowledge transfer from construction companies to the community. There were twenty (20) variables used to measure the

enablers of knowledge transfer from construction companies to the community and were all subjected to exploratory factor analysis

(EFA). The methods of extraction and rotation utilized were the principal component (PC) and varimax with Kaiser Normalization, respectively.

Table 6. 14: KMO and Bartlett's Test of Sphericity for Enablers of Knowledge Transfer from Construction Companies to The Community

	KMO	Bartlett's Test of Sphericity			Reliability	
		Approx. ChiSquare	df	Sig.	N	Cronbach's Alpha
Road	0.668	621.149	190	0.000	20	0.815
Building	0.884	1468.736	190	0.000	20	0.922
Combined	0.860	1804.819	190	0.000	20	0.893

The study conducted a KMO measure of sampling adequacy and Bartlett's test of sphericity to ensure factorability of the correlation matrix before undertaking the EFA. The result of the KMO measure of sampling adequacy and Bartlett's test of sphericity was presented in Table 6.14. The KMOs recorded were 0.668, 0.884 and 0.860 for road contractors, building contractors and combined samples respectively, which were more significant than the minimum cut off of 0.7 to establish sampling adequacy (Hair et al. 2010) except sample for road contractors. Still, greater the KMO value acceptability minimum, according to (Kaiser, 1970), thus, the range of KMO measure of sampling adequacy is fixed at a minimum of 0.50 and a maximum of 0.80. Similarly, the result of Bartlett's test of sphericity also revealed a significance level of 0.000 ($p<0.05$). This result implies that there exists a possible correlation among the variables, thus suggesting a realistic group creating factors from the variables and explanation to proceed with FA (Field, 2009).

The reliability test, Cronbach's Alpha, was computed and the value of 0.893 was recorded (combined), suggesting adequacy of internal consistency and reliability in the

measures and the scale (Hair et al., 2014; Field, 2009). According to Field (2009), a Cronbach's alpha above 0.70 is acceptable for scale reliability and internal consistency of the instrument. The Cronbach's Alpha identified was significantly higher, 0.893 > 0.70 showing the high internal consistency and reliability of the instrument.

Table 6. 15: Communalities for Enablers of Knowledge Transfer from Construction Companies to The Community

	Initial	Extraction		
		Road	Building	**Combined**
Employment of local labour (e.g. masons, labourers, carpenters, steel benders etc)	1	0.549	0.840	0.752
Playing word search games to share health and safety knowledge.	1	0.541	0.712	0.626
Inter personal networking between workers of the company and the community members	1	0.695	0.682	0.676
Close inter-connectivity nature of Ghanaian community settings (inter community)	1	0.690	0.730	0.696
Community members Ability to innovate and use new knowledge.	1	0.715	0.684	0.666
The ability to communicate properly.	1	0.680	0.702	0.618
Individual willingness to participate.	1	0.574	0.637	0.653
Through working colleagues in the community.	1	0.739	0.742	0.744
Decentralization of Organisational policy relating to knowledge transfer	1	0.734	0.678	0.739
Willingness of employees to share knowledge with others.	1	0.640	0.709	0.569
Ability to Speak common language between construction workers and community members	1	0.641	0.705	0.631
Capacity to learn and use new knowledge by the community members.	1	0.768	0.758	0.720
Individual capability and competence in using the new knowledge.	1	0.660	0.765	0.640
Inter community networking between Ghanaian communities (intra community)	1	0.660	0.702	0.642
Willingness to adopt to change by the community members.	1	0.493	0.654	0.573
Increase collaboration of both parties (community and construction company)	1	0.672	0.670	0.544
The ease of integrating new members into Ghanaian communities.	1	0.713	0.783	0.722
The collective and open nature of Ghanaian communities.	1	0.687	0.665	0.682
Using local suppliers and sub-contractors on the project as change agents	1	0.753	0.728	0.729
Building mutual trust between the community and the construction company.	1	0.635	0.779	0.740
Average	***1***	***0.662***	***0.716***	***0.668***
Extraction Method: Principal Component Analysis.				

The overall average commonality of the variables after extraction was 0.668 (combined), indicating that the extracted commonality supports the use of factor analysis on the variables. Field, (2009) suggested that the reliability of the results and interpretations in factor analysis that is achieved with an average commonality of the variables after extraction should be above 0.60. Likewise, commonality values of a hypothetically significant variable must yield an extract value (eigenvalues) greater than 0.50 at the initial iteration (Field, 2009; Hair et al. 2014). All the twenty (20) variables had an extracted eigenvalue greater than the 0.50. Hence all variables were retained and subsequently used for further analysis (Field, 2009; Hair et al., 2014).

After conducting all the essential checks and initial tests, the EFA was then performed using the twenty variables. From Table 6.16, the total variance explained by the variables showed that six components were extracted with significant variation. Similarly, the Rotated Component Matrix in Table 6.17 confirms six unique component factors as each variable dominantly belonged to a single factor (component). It could be suggested, therefore, that the components that emerged are enablers of knowledge transfer from construction companies to the community.

Table 6. 16: Total Variance Explained for Enablers of Knowledge Transfer from Construction Companies to The Community

Category	Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
		Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Road	1	4.779	23.894	23.894	3.017	15.087	15.087
	2	2.272	11.360	35.254	2.639	13.194	28.281
	3	1.969	9.845	45.099	2.073	10.363	38.644
	4	1.709	8.545	53.644	1.879	9.397	48.041
	5	1.393	6.965	60.609	1.842	9.211	57.252
	6	1.116	5.579	66.188	1.787	8.936	66.188
Building	1	8.367	41.837	41.837	3.314	16.572	16.572
	2	1.493	7.463	49.300	2.929	14.647	31.219
	3	1.356	6.778	56.078	2.651	13.255	44.474
	4	1.176	5.880	61.958	2.207	11.037	55.511

	5	0.976	4.880	66.838	1.834	9.168	64.680
	6	0.958	4.789	71.627	1.389	6.947	71.627
Combined	1	6.809	34.047	34.047	3.087	15.433	15.433
	2	1.756	8.782	42.828	2.881	14.404	29.837
	3	1.471	7.354	50.183	2.687	13.433	43.270
	4	1.270	6.352	56.535	1.822	9.108	52.378
	5	1.078	5.391	61.926	1.671	8.357	60.735
	6	0.977	4.884	66.809	1.215	6.074	66.809

Results from Table 6.15 presented the total variance explained by each of the six extracted components in each sample. The principal component one accounted for 34.047percent (combined) up to the sixth component factor cumulatively accounting for about 66.809 per cent. From this, it could be seen that what the six components extracted cumulatively accounted for is above the recommended minimum of 50% (Field, 2009).

Table 6. 17: Rotated Component Matrix for Enablers of Knowledge Transfer from Construction Companies to The Community (Combined)

Individual ability to use knowledge, collaboration, networking, communicate, trust and local content inclusion	**Component**					
	1	**2**	**3**	**4**	**5**	**6**
Individual capability and competence in using the new knowledge.	0.735					
The ease of integrating new members into Ghanaian communities.	0.718					
Inter community networking between Ghanaian communities (intra community)	0.654					
The collective and open nature of Ghanaian communities.	0.639					
Willingness to adopt to change by the community members.	0.605					
Capacity to learn and use new knowledge by the community members.		0.771				
Ability to Speak common language between construction workers and community members		0.726				

Individual willingness to participate.		0.640				
Increase collaboration of both parties (community and construction company)		0.610				
Willingness of employees to share knowledge with others.		0.508				
Inter personal networking between workers of the company and the community members			0.768			
Close inter-connectivity nature of Ghanaian community settings (inter community)			0.700			
Community members Ability to innovate and use new knowledge.			0.680			
Playing word search games to share health and safety knowledge.			0.600			
The ability to communicate properly.			0.481			
Decentralization of Organisational policy relating to knowledge transfer				0.811		
Through working colleagues in the community.				0.768		
Building mutual trust between the community and the construction company.					0.756	
Using local suppliers and sub-contractors on the project as change agents					0.549	
Employment of local labour (e.g. masons, labourers, carpenters, steel benders etc)						0.850
Extraction Method: Principal Component Analysis.						
Rotation Method: Varimax with Kaiser Normalization.						

The rotated component matrix was used over the ordinary un-rotated matrix due to the ability of the rotated component matrix to yield and achieve simple, robust structure which makes it easy to identify and interpret the results (Field, 2009). Considering the possible interrelations among the variables contained in each component and the factor loadings, a more suitable name that summarises the enablers of successful knowledge transfer from construction companies to the community explained by the components were derived. The identified components were individual ability to use knowledge, collaboration, networking, communication, trust and local content inclusion.

6.11.1 Individual ability to use knowledge

The first component named as individual ability to use the knowledge comprised five variables and with total variance explained to be 34.047 per cent. The cluster of

variables in this component was the individual capability to use the new knowledge with a factor loading of 0.735, giving the ease of integrating new members into Ghanaian communities with factor loading 0.718. The other variables were inter-community networking between Ghanaian communities (intracommunity) with a factor loading of 0.654, the collective and open nature of Ghanaian community members with a factor loading of 0.639 and lastly, willingness to adapt to change by the community members with a factor loading of 0.605.

When it comes to knowledge transfer, the individual's ability to acquire and apply new knowledge determines the success of the transfer process. It is, therefore, an important enabler of knowledge transfer. Knowledge transfer, whether inter- intra organisation or external transfer, involves individuals and their ability to use and transfer within themselves. Knowledge is a set of skills, experiences, information and capabilities individuals apply to solve problems (Baker et al., 1996). This definition means that for a construction company to be able to transfer knowledge, it would take individuals in the company first to be able to use such knowledge before helping to transfer the same to the community. It is practically impossible for knowledge to be shared without the individuals been capable of assimilating such knowledge, be it the source or the receiver. Dubois and Gadde (2002) supported this position by positing that knowledge means a knower who can offer it to its immediate environment, e.g. Teams, networks and other surroundings. Nonaka and Takeuchi (1995) also emphasized the role of individuals in knowledge transfer by arguing that knowledge transfer is about actions, beliefs and commitment as it is dependent on the perspective or intention of individuals.

6.11.2 Collaboration

The second component consisted of four variables, with a total variance explained in the factor was 8.782 per cent named as collaboration. The capacity to learn and use new knowledge by the community members was the first variable under this component with a factor loading of 0.771. The second variables under collaboration were the ability to speak a common language between construction workers and community members with a factor loading of 0.726. The other indicators were individual willingness to participate, increase collaboration of both parties (community and construction company) and willingness of employees to share knowledge with others with their respective factor loadings 0.640, 0.610 and 0.508.

Collaboration is one of the most significant natural processes in the knowledge transfer process. Individuals in any transfer process must be willing to get actively involved in the conveyance procedure and an important enabler of knowledge transfer. There cannot be any transfer of knowledge without collaboration between the actors in the transfer system. According to Rogers (1995), it is a special type of communication why two persons agree to walk together or part ways. Two people must agree to collaborate to be able to work together. This implies that the community members of the construction company must be willing to collaborate before they can transfer any knowledge to the community or the community accepting the new knowledge. Therefore, the construction companies in an attempt to transfer knowledge from the industry to any community in which they find themselves must first seek the collaboration of the community members for them to be successful.

6.11.3 Networking

The third component of the factor analysis of the enablers of knowledge transfer from construction companies to the community was named networking. Networking between

the company and the community was clustered, containing several variables that predict the theme. The variables together explained the total variance by 7.354 per cent having five indicators. The indicators consisting of this network cluster were interpersonal networking between workers of the company and the community members with a factor loading of 0.768. The second variable was the close inter-connectivity nature of Ghanaian community settings (inter-community). The third variable was community members' ability to innovate and use new knowledge and fourth, playing word search games to share health and safety knowledge with a respective factor loading of 0.700, 0.680 and 0.600. Variable five had shared loadings with collaboration and networking highly loaded on networking. The said variable is the ability to communicate properly.

Networking is seen as the means of transferring knowledge in many forms, from peer groups, professional associations, organisation clubs, social clubs and religious groupings are all seen to provide an enabling environment for the transfer of knowledge. These groups meet to discuss, share and learn from each other, something that is new or innovative. Due to networking, people see themselves as having a common attribute or being homogenous and therefore act the same without any discrimination, thus facilitating the ability to learn from one another. Continuous collaboration and networking in any diffusion and knowledge transfer process are needed for reinforcement of the transferred knowledge (Williams et al., 2018). The construction companies need to network with the community members by socialising with them in the form of creation of clubs and also facilitating the integration of the workers of the company and the community members. These would enable both the construction companies and the community members to ascertain each other as one common unit with a common purpose leading to trust and confidence in the adopting unit.

Courtney et al. (1998) note that organisational learning can take place through networking, cognitive systems and memories. This notion signifies a significant reliance on individuals and groups as enabling actors to transfer knowledge.

6.11.4 Communication

Decentralization of organisational policy relating to knowledge transfer and through working colleagues in the community were the variables loaded on component four themed as communication. The factor loadings were respectively 0.811 and 0.768 and together explained the component by 6.352 per cent (total variance explained).

Communication is the transfer of knowledge is very vital and sometimes seen as one of the important enablers in a transfer process. One can have all the right strategies and plans in place, but if not communicated well would lead to the rejection of such a new idea or innovation. According to Edward and Cordey-Hayes (2000), communication theory describes the element that is involved in such transfer. According to Shannon and Weaver (1949), communication is a linear process, starting with an information source and finishing with a destination. According to the authors, the information source selects a message, which then reaches the destination. They further argue that the transmitter and receiver may or may not be integral parts respectively of the source and destination. The construction companies need to plan the route of communicating the intended knowledge to be transferred well and to be accepted by the community. It is established in knowledge transfer and diffusion literature that communicating an innovation to a targeted audience would either lead to its acceptance or total rejection. According to Koebel (1999), diffusion involves communicating a new idea to the targeted adopters. It is a special type of contact, according to Rogers (1995), in that the communications are concerned with new ideas.

Rogers (1995) describes communication as a process in which participants generate and share information to achieve a mutual understanding with each other. This implies that two or more individuals exchange information with one another to move towards one another or part (Rogers, 1995; Toole, 1998; Sexton, 2004). It also founds that through the construction process, affiliation and networks will be created to make the project members have the chance to communicate with each other and learn advanced knowledge from other participants (Jian SUN and Xu REN, 2014).

6.11.5 Trust

Trust was the name assigned to component five with two variables explaining the component by 5.391 per cent. The variables were building mutual trust between the community and the construction company with factor loadings of 0.756 and using local suppliers and sub-contractors on the project as change agents with a factor loading of 0.549.

The transfer of knowledge and its subsequent adoption cannot take place without trust. Trust is seen in the knowledge transfer literature as the main enabler between two persons. For one to accept to follow another or learn from another, he or she must believe or have trust in the person first and then whatever he or she is introducing can also be trusted. Some scholars had defined the role of trust in the transfer of knowledge. Hajidimitrious et al. (2012) and Chen et al. (2014) described trust as a critical factor in the transfer of knowledge. Yew Wong (2005) suggested that mutual trust between project participants fosters the development of an open environment for knowledge sharing. According to Chen et al., (2014), the level of trust directly affects the collaborative culture and the cooperation between the parties and noted further that Trust is the prerequisite for effective knowledge transfer.

As suggested by these authors, knowledge transfer can't take place in any shape or form without the existence of trust. It is therefore important for any construction company trying to influence any community with its health and safety knowledge to first win the trust of such a community through the actions of the company. Building trust between the community and the construction industry would not only assist in transferring knowledge but also increase the cooperation between the two entities, thereby providing the atmosphere for the companies to have a peaceful atmosphere to carry-out their operation in harmony.

6.11.6 Local content inclusion

The last variable was named local content inclusion, thus employment of local labour (e.g. masons, labourers, carpenters, steel benders, etc.). This variable alone had a total variance explained to be 4.884 per cent.

Local content inclusion in construction projects has been on the ascendancy in recent years. These have been seen as a deliberate attempt for construction companies to affect the livelihood of the community members in giving them employment during the construction process. It is also important to think beyond the provision of income to those who can be gainfully employed and also see the use of these local employees as a means of reaching out to the entire community members by transferring new knowledge or innovation that is relevant to the community from the construction industry through them. They are critical in this sense because they come from these communities and better understand their ways of doing things. Also, every person employed from the community may have a family or a neighbour. Therefore if such a person is trained in health and safety and instructed to also go and replicate same in his or her neighbourhood. It would lead to a fast adoption and diffusion of such knowledge in that

community better as the community members and relations would have the opportunity of seeing the application, or demonstration of such new knowledge and better appreciate its adoption in the process. These also reinforce the concept of social learning theory posited by Bandura (1977) which says that people learn from others through observation, imitation and modelling of their behaviour and try to imitate same.

6.12 BARRIERS TO KNOWLEDGE TRANSFER FROM THE CONSTRUCTION INDUSTRY TO THE COMMUNITY

This section presented an exploratory factor analysis (EFA) of barriers to knowledge transfer from the construction industry to the community. The results were accordingly presented in Table 6.18 to Table 6.21, measuring the KMO and Bartlett's Test, the commonalities extracted, total Variance Explained, and Rotated Component Matrix for the EFA conducted on the barriers to knowledge transfer from the construction industry to the community. There were eleven (11) variables used to measure the barriers to knowledge transfer from the construction industry to the community and were all subjected to exploratory factor analysis (EFA). The method of extraction and rotation utilised was the principal component (PC) and varimax with Kaiser Normalization, respectively.

Table 6. 18: KMO and Bartlett's Test of Sphericity for Barriers to Knowledge Transfer from the Construction Industry to the Community

	KMO	**Bartlett's Test of Sphericity**			Reliability	
		Approx. ChiSquare	**df**	**Sig.**	N	Cronbach's Alpha
Road	0.604	213.099	45	0.000	10	0.692
Building	0.862	555.377	45	0.000	10	0.857
Combined	0.805	667.581	45	0.000	10	0.808

The study conducted a KMO measure of sampling adequacy and Bartlett's test of sphericity to ensure factorability of the correlation matrix before undertaking the EFA.

The result for KMO measure of sampling adequacy and Bartlett's test of sphericity was presented in Table 6.18. The KMOs recorded were 0.604, 0.862 and 0.805 for road contractors, building contractors and combined sample respectively which were more significant than the minimum cut-off of 0.7 to establish sampling adequacy (Hair et al., 2010). Except for sample for road contractors but more significant than the KMO value acceptability minimum according to (Kaiser, 1970), thus, range of KMO measure of sampling adequacy is fixed at a minimum of 0.50 and a maximum of 0.80. Similarly, the result of Bartlett's test of sphericity also revealed a significance level of 0.000 ($p<0.05$). This result implies that there exists a possible correlation among the variables, thus suggesting a realistic group creating factors from the variables and explanation to proceed with FA (Field, 2009).

The reliability test, Cronbach's Alpha, was computed, and the value of 0.808 was recorded (combined), suggesting adequacy of internal consistency and reliability in the measures and the scale (Hair et al., 2014; Field, 2009). According to Field (2009), a Cronbach's alpha above 0.70 is acceptable for scale reliability and internal consistency of the instrument. The Cronbach's Alpha identified was high, 0.808> 0.70, showing high internal consistency and reliability of the instrument.

Table 6. 19: Communalities for Barriers to Knowledge Transfer from the Construction Industry to the Community

	Initial	**Extraction**		
		Road	**Building**	**Combined**
Time constraint in the transfer process.	1	0.806	0.644	0.690
Gated elite's community settings in some parts of the country.	1	0.790	0.914	0.908
Inability to communicate properly.	1	0.618	0.609	0.583
Lack of trust between parties (community and construction company).	1	0.765	0.726	0.735
Budget limitation on the part of the construction company.	1	0.544	0.773	0.676

Lack of management support.	1	0.681	0.762	0.469
External influence (e.g. political and social).	1	0.724	0.817	0.784
Rules and regulation attached to construction projects (e.g. project duration, payment, terms et.c.)	1	0.756	0.656	0.678
Lack of motivation of staff to share knowledge.	1	0.534	0.739	0.693
Employees' unwillingness to share knowledge.	1	0.615	0.772	0.738
Average	**1**	**0.683**	**0.741**	**0.695**
Extraction Method: Principal Component Analysis.				

The overall average commonality of the variables after extraction was 0.695 (combined), indicating that the extracted communalities support the use of factor analysis on the variables. Field, (2009) suggested that the reliability of the results and interpretations in factor analysis achieved with an average commonality of the variables after extraction should be above 0.60. Likewise, commonality values of a hypothetically significant variable must yield an extraction value (eigenvalues) greater than 0.50 at the initial iteration (Field, 2009; Hair et al. 2014). All the eleven (11) variables had extracted eigenvalues greater than the 0.50. Hence all variables were retained and subsequently used for further analysis (Field, 2009; Hair et al., 2014).

After conducting all the essential checks and initial tests, the EFA was then conducted using the twenty extracted variables. In Table 6.20, the total variance explained by the variables showed four components extracted with significant variances. Similarly, the Rotated Component Matrix in Table 6.21 confirms four unique component factors as each variable dominantly belonged to a single factor (component). It could be suggested, therefore that the components that emerged are barriers to Knowledge Transfer from the Construction Industry to the Community.

Table 6. 20: Total Variance Explained for Barriers to Knowledge Transfer from the Construction Industry to the Community

Category	Component	Initial Eigenvalues	Rotation Sums of Squared Loadings

		Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Road	1	2.903	29.033	29.033	2.357	23.574	23.574
	2	1.605	16.053	45.086	2.034	20.342	43.916
	3	1.175	11.748	56.834	1.243	12.429	56.346
	4	1.150	11.504	68.338	1.199	11.993	68.338
Building	1	4.595	45.949	45.949	2.590	25.897	25.897
	2	1.086	10.862	56.811	2.081	20.807	46.704
	3	0.985	9.849	66.660	1.546	15.463	62.167
	4	0.746	7.463	74.123	1.196	11.956	74.123
Combined	1	3.872	38.720	38.720	2.380	23.803	23.803
	2	1.143	11.434	50.153	1.740	17.403	41.206
	3	0.999	9.988	60.142	1.684	16.837	58.043
	4	0.940	9.397	69.538	1.150	11.495	69.538

The results in Table 6.21 showed the total variance explained by each of the four extracted components in each sample. The principal component one accounted for 38.720 per cent (combined), the second component 11.434 per cent, third component 9.988 per cent, fourth component 9.397 per cent and cumulatively accounting for about 69.538 per cent. From this, it could be seen that what the four components extracted cumulatively accounted for is above the recommended minimum of 50% (Field, 2009).

Table 6. 21: Rotated Component Matrix for Barriers to Knowledge Transfer from the Construction Industry to the Community (Combined)

Lack of trust, contractual restriction, time constraint, type of neighbourhood	Component			
	1	2	3	4
Employees' unwillingness to share knowledge.	0.804			
Lack of trust between parties (community and construction company).	0.786			
Lack of motivation of staff to share knowledge.	0.712			
Inability to communicate properly.	0.611			
External influence (e.g. political and social).		0.878		

Rules and regulation attached to construction projects (e.g. project duration, payment, terms et.c.)		0.647		
Lack of management support.		0.498		
Time constraint in the transfer process.			0.776	
Budget limitation on the part of the construction company.			0.721	
Gated elite's community settings in some parts of the country.				0.935
Extraction Method: Principal Component Analysis.				
Rotation Method: Varimax with Kaiser Normalization.				

The rotated component matrix was used over the ordinary un-rotated matrix due to the ability of the rotated component matrix to yield and achieve simple, strong structure which makes it easy to identify and interpret the results (Field, 2009). Considering the possible interrelations among the variables contained in each component and the factor loadings, a more suitable name that summarises the barriers to Knowledge Transfer from the Construction Industry to the Community explained by the components was derived. The identified components were lack of trust, contractual restriction, time constraint and type of neighbourhood.

6.12.1 Lack of trust

The first component of the varimax with Kaiser Normalisation rotation was loaded on by four variables with a total variance of 38.720 per cent. The variables were employees' unwillingness to share knowledge with a factor loading of 0.804, lack of trust between parties (community and construction company) with a factor loading of 0.786, lack of motivation of staff to share knowledge loading of 0.712 and inability to communicate properly loading of 0.611. These variables together explain the lack of trust between the community and the construction company. Lack of trust as a barrier to knowledge transfer from the construction industry to the community is one of the major hurdles one must cross to be able to transfer knowledge from one end to the other successful. What this means is that employees would not be willing to share knowledge among themselves if they lack confidence in each other. The community

members would not be ready to relate with the construction company in any fashion when they lack trust in them and hence in the building industry. Workers would not be motivated to take part in any transfer process when they lack trust in their leaders. Therefore, lack of trust should be seen as the number one barrier to knowledge transfer where ever it
exists.

6.12.2 Contractual restriction

The second component is themed as contractual restriction of the company by rules and regulations and external influence as well as lack of management support. The variables were three, loaded on contractual restriction (component 2), external influence (e.g. Political and social influence) with a factor loading of 0.878, and rules and regulations attached to construction projects (e.g. project duration, payment, terms, etc.) with a factor loading of 0.647 and the last variable a lack of management support with a factor loading of 0.498. Construction companies work with contracts and with conditions which in turn restrict them to concentrate on working within their contractual obligations in order to avert default. Contractual restrictions should be seen as a major barrier to the construction companies in transferring knowledge from the industry to the community because contractors would have to strictly work within the remits of their contract which would limit them from extending into other extra activities. That is not immediately related to discharging their work on time and within cost. Construction companies are invariably known to have paid attention to just execution and completion of their projects within time, cost and quality as the contract may call for. Therefore, construction companies would always shy away from any other activities that would prevent them from realising these objectives which therefore constitute a major barrier

in the construction industry in transferring external knowledge from the industry to the community in which they find themselves.

6.12.3 Time constraint

There were two variables loaded on component three, which constitute a time constraint explaining the total variance of 9.988 per cent. These variables were time constraints in the transfer process and budget limitation on the part of the construction company with factor loadings of 0.776 per cent and 0.721 per cent, respectively. Time on the side of any construction company is a precious commodity that is hard to come by; it is so much of the essence that it is the number one priority of every contracting contractor. Time constraints, therefore as a barrier to construction companies in transferring external knowledge happen because construction activities are time-bound, one-off in most events and temporal. A contractor starts a project in a community and initiates the procedure of transferring valuable knowledge that is substantive to that community and halfway through the transfer process, completes the project and has to leave that community. This then ends the transfer process, unlike other industries that are permanently sited in one community for decades and can repeatedly continue with the transfer process. Therefore, the time constraint is seen as a huge barrier in transferring knowledge as established by this study.

6.12.4 Type of Neighbourhood

The last component of this rotated component was themed type of neighbourhood, explaining 9.397 per cent of the total variance. The only indicator loaded on this component was gated elite's community settings in some parts of the country with a factor loading of 0.935 and accounting for 9.397 per cent of the total variance. Knowledge transfer is noted to act on collaboration among the actors, and therefore the

type of neighbourhood is very important in this regard. There are some types of neighbourhoods that do not assist the transport of knowledge due to their setting, such as gated elite's community. Gated elite's communities are noted on living in exclusion, thereby eliminating the culture of communalism. These residential areas do not facilitate the human action of learning or enabling easy access to each other to learn from others and also limits interpersonal interaction and efficient communication with others living in the same locality. It also acts as a barrier to knowledge transfer because the organisation of these residential areas does not allow one to experience what other neighbours do and so any new knowledge is restricted to the confines of the holder. defeating the process of learning from one another and therefore hinders effective knowledge transfer in such a locality.

6.13 ENABLERS OF A SUCCESSFUL DIFFUSION PROCESS IN THE GHANAIAN COMMUNITY

This section presented the Exploratory Factor Analysis (EFA) of enablers of a successful diffusion process for construction companies to the community. Results were presented in Table 6.22 to Table 6.25, showing the KMO and Bartlett's Test, the commonalities extracted, total Variance Explained, and Rotated Component Matrix for the EFA conducted on the enablers of a successful diffusion process from construction companies to the community. There were twenty-one (21) variables used to measure the enablers of a successful diffusion process from construction companies to the community and were all subjected to exploratory factor analysis (EFA). The methods of extraction and rotation utilised were the principal component (PC) and varimax with Kaiser Normalization, respectively.

Table 6. 22: KMO and Bartlett's Test of Sphericity for Enablers of a successful diffusion process in the Ghanaian community

	KMO	Bartlett's Test of Sphericity			Reliability	
		Approx. ChiSquare	**df**	**Sig.**	N	Cronbach's Alpha
Road	0.763	776.125	210	0.000	21	0.863
Building	0.841	1398.57	210	0.000	21	0.913
Combined	0.857	1843.75	210	0.000	21	0.896

The study conducted a KMO measure of sampling adequacy and Bartlett's test of sphericity to ensure factorability of the correlation matrix before undertaking the EFA. The result for KMO measure of sampling adequacy and Bartlett's test of sphericity was presented in Table 6.22. The KMOs recorded were 0.763, 0.841 and 0.857 for road contractors, building contractors and combined sample respectively which were greater than the minimum cut-off of 0.7 to establish sampling adequacy (Hair Jr et al. 2010). Similarly, the result of Bartlett's test of sphericity also revealed a significance level of 0.000 ($p<0.05$). This result implies that there exists a possible correlation among the variables, thus suggesting a realistic group creating factors from the variables and explanation to proceed with FA (Field, 2009).

The reliability test, Cronbach's Alpha, was computed, and the value of 0.896 was recorded (combined), suggesting adequacy of internal consistency and reliability in the measures and the scale (Hair et al., 2014; Field, 2009). According to Field (2009), a Cronbach's Alpha above 0.70 is acceptable for scale reliability and internal consistency of the instrument. The Cronbach's Alpha identified was significantly high, 0.896> 0.70 showing high internal consistency and reliability of the instrument.

Table 6. 23: Communalities for Enablers of a successful diffusion process in the Ghanaian community

	Initial	Extraction		
		Road	Building	**Combined**
Community leadership support for the new knowledge.	1	0.593	0.765	0.612

Inter personal networking between community members.	1	0.643	0.803	0.667
Ghanaian culture of neighbourliness & reliability.	1	0.695	0.643	0.767
Community members Willingness to participate in the diffusion process.	1	0.655	0.582	0.599
Mutual trust between community leadership and community members	1	0.716	0.612	0.518
The extended family system and close family ties of Ghanaian communities.	1	0.714	0.637	0.695
The ability to communicate properly to the community members.	1	0.634	0.641	0.642
The culture of Peaceful coexistence in the Ghanaian communities.	1	0.631	0.703	0.609
Rewarding safe working employees in the community.	1	0.639	0.747	0.726
Willingness to learn from others by the community members.	1	0.661	0.718	0.709
External influence (e.g. political, social, government policy etc.).	1	0.824	0.575	0.591
Involving opinion leaders from the community in the project.	1	0.617	0.671	0.552
The ease of individual integration into Ghanaian communities.	1	0.651	0.739	0.681
Respect for community leadership.	1	0.723	0.677	0.703
Ease of access to Ghanaian community leaders (e.g. chiefs and elders).	1	0.728	0.676	0.674
Working in teams to answer sets of HSE questions in the community.	1	0.535	0.678	0.502
Respect for religious leadership in the Ghanaian communities.	1	0.749	0.837	0.77
Organisation of safety clubs in the communities.	1	0.733	0.545	0.536
Creating inter-personal support system in the communities.	1	0.718	0.727	0.634
Maintaining continued collaboration between construction company and the community members.	1	0.695	0.618	0.648
Inter- cultural networking between communities.	1	0.491	0.661	0.545
Average Communalities	***1***	***0.669***	***0.679***	***0.637***
Extraction Method: Principal Component Analysis				

The overall average commonality of the variables after extraction was 0.637 (combined), indicating that the extracted communalities support the use of factor analysis on the variables. Field, (2009) suggested that the reliability of the results and interpretations in factor analysis achieved with an average commonality of the variables

after extraction should be above 0.60. Likewise, communality values of a hypothetically significant variable must yield an extraction value (eigenvalues) greater than 0.50 at the initial iteration (Field, 2009; Hair et al. 2014). All the twenty-one (21) variables had extracted eigenvalues greater than the 0.50. Hence all variables were retained and subsequently used for further analysis (Field, 2009; Hair et al., 2014).

After conducting all the essential checks and initial tests, the EFA was then performed using the twenty-one extracted variables. The fixed number of factors to extract was set to six (6) to ensure sufficient total variance explained and factorability of the structure. From Table 6.24, the total variance explained by the variables showed that six components were extracted with significant variance. Similarly, the Rotated Component Matrix in Table 6.25 confirms six unique component factors as each variable dominantly belonged to a single factor (component). It could be suggested, therefore, that the components that emerged are enablers of a successful diffusion process from construction companies to the community.

Table 6. 24: Total Variance Explained for Enablers of a successful diffusion process from construction companies to the community

Category	Component	Initial Eigenvalues			Rotation of Squared Sums Loadings		
		Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Road	1	6.081	28.959	28.959	2.664	12.686	12.686
	2	2.040	9.714	38.673	2.620	12.476	25.161

	3	1.988	9.469	48.142	2.610	12.429	37.590
	4	1.471	7.007	55.149	2.437	11.605	49.195
	5	1.274	6.064	61.213	2.181	10.385	59.581
	6	1.191	5.671	66.884	1.534	7.303	66.884
Building	1	7.967	37.936	37.936	3.380	16.095	16.095
	2	1.597	7.603	45.539	3.310	15.764	31.859
	3	1.451	6.910	52.449	2.795	13.309	45.167
	4	1.260	5.999	58.448	1.681	8.004	53.171
	5	1.044	4.971	63.419	1.677	7.986	61.157
	6	0.938	4.467	67.886	1.413	6.729	67.886
Combined	1	7.121	33.908	33.908	2.751	13.099	13.099
	2	1.542	7.341	41.249	2.667	12.701	25.799
	3	1.467	6.984	48.233	2.299	10.948	36.748
	4	1.189	5.660	53.894	2.073	9.873	46.621
	5	1.084	5.163	59.057	2.064	9.830	56.451
	6	0.977	4.651	63.708	1.524	7.257	63.708

Results from Table 6.27 presented the total variance explained by each of the six extracted components in each sample. The principal component one accounted for 33.908 per cent (combined) up to the sixth component factor, cumulatively accounting for about 63.708 per cent. From this, it could be seen that what the six components extracted cumulatively accounted for is above the recommended minimum of 50% (Field, 2009).

Table 6. 25: Rotated Component Matrix for Enablers of a successful diffusion in the Ghanaian community

Community and religious leadership, community cultural norms, leadership and rewards, individual willingness, Inter personal networking, external influence	**Component**					
	1	**2**	**3**	**4**	**5**	**6**
Respect for religious leadership in the Ghanaian communities.	0.791					

Respect for community leadership.	0.672					
Ease of access to Ghanaian community leaders (e.g. chiefs and elders).	0.657					
Working in teams to answer sets of HSE questions in the community.	0.527					
Ghanaian culture of neighbourliness & reliability.		0.815				
The culture of Peaceful coexistence in the Ghanaian communities.		0.612				
Organisation of safety clubs in the communities.		0.542				
Creating inter-personal support system in the communities.		0.542				
The extended family system and close family ties of Ghanaian communities.		0.520				
Rewarding safe working employees in the community.			0.807			
Maintaining continued collaboration between construction company and the community members.			0.646			
Involving opinion leaders from the community in the project.			0.643			
Willingness to learn from others by the community members.				0.743		
Inter- cultural networking between communities.				0.623		
The ease of individual integration into Ghanaian communities.				0.521		
Inter personal networking between community members.					0.696	
Community members Willingness to participate in the diffusion process.					0.587	
Community leadership support for the new knowledge.					0.576	
Mutual trust between community leadership and community members					0.563	
The ability to communicate properly to the community members.					0.556	
External influence (e.g. political, social, government policy etc.).						0.709
Extraction Method: Principal Component Analysis.						
Rotation Method: Varimax with Kaiser Normalization.						

The rotated component matrix was used over the ordinary un-rotated matrix due to the ability of the rotated component matrix to yield and achieve simple, robust structure which makes it easy to identify and interpret the results (Field, 2009). Considering the possible interrelations among the variables contained in each component and the factor loadings, more suitable names that summarised the enablers of successful knowledge

transfer from construction companies to the community explained by the components were derived. The identified components were community and religious leadership, community cultural norms, leadership and rewards, individual willingness, interpersonal networking and external influence.

6.13.1 Traditional and Religious Leadership

There were four variables uniquely loaded on component one named community and religious leadership, explaining a total variance of 33.908 per cent. The variables loaded on community and religious leadership were respect for religious leadership in the Ghanaian communities with the loading of 0.791, respect for community leadership with the loading of 0.672. The other variables were ease of access to Ghanaian community leaders (e.g. Chiefs and elders) and working in teams to answer the sets of HSE questions in the community with respective factor loadings of 0.657 and 0.527.

Community and religious leaders play very significant and important roles in the Ghanaian community or in any community where they participate in the community's propagation and acceptance of new ideas or innovation. Based on their authority, established society leaders hold a significant role in social change and the adoption of technologies (Roger, 1962). Referring to the versatility and degree of freedom exercised and affected by their authority, they may choose to support or oppose those changes depending on their appropriateness to their context.

They are viewed as people with expert judgement and role models, and so others would like to copy and follow any decisions they get on any new knowledge. Their judgement is trusted and therefore, can influence others to either adopt or reject any new knowledge being introduced to that community. Community leaders are people of high status who

are more likely to be mimicked because they are familiar role models (Haunschild and Miner, 1997; Strang and Soule, 1998). Therefore, community and religious leaders must be seen as the main enablers of diffusion in our part of the world because apart from their leadership role. They also command many followers and have close ties with the members of the community, whether poor or powerful.

Weber's concept of the traditional leadership as quoted in Nypan (1970) suggests a diffuseness of authority that can be strengthened by guiding change, giving formal leaders the potential to influence social change processes in general (Nypan 1970). Traditional and religious leaders play an important role in championing the welfare of community members by promoting their advancement and as such are seen as drivers of any innovation that happens within the community as they serve as intermediaries with development authorities and members of the community.

It is important to mention that no diffusion can occur in any community without the involvement of the institutional leaders in those communities, whether traditional or spiritual. According to Nypan (1970), through informal communication networks, opinion leaders exercise their power in which they have a central position. To be successful, therefore, construction companies trying to influence their project host communities with their awareness of health and safety through diffusion must do so first through both the community and religious leaders. The success or failure to disseminate new knowledge and growth, in general, depends heavily on formal leaders ' attitudes and their position in the local community (Nypan, 1970).

6.13.2 Community Cultural Norms

Community cultural norms is the theme for component two with five variable accounting for 7.341 per cent of the total variance. The variables and their factor loadings were Ghanaian culture of neighbourliness and reliability of 0.815, the culture of peaceful coexistence in the Ghanaian communities 0.612 and organisation of safety clubs in the community 0.542. Creating an interpersonal support system in the communities and the extended family system and close family ties of Ghanaian communities have factor loadings of 0.542 and 0.520, respectively.

Cultural norms of any community are held in high esteem because they serve as their hopes and aspirations. One cannot introduce a new way of doing things in a social system without knowing whether it is compatible with their cultural values. Any new knowledge that is to be diffused in a targeted community would be rejected outright or resisted and protested against in some cases when it contradicts their existing cultural norms.

It is one of the main determinants of a diffusion process's progress, and should therefore be taken seriously when designing a diffusion system. One of the key challenges facing companies in an increasingly global business environment is how to balance the demand from the standardization of global policies, with due consideration of the unique norms of different cultural contexts (Bartlett and Ghoshal, 1998; Enderle, 1996).

Every community has its ways of doing things, and it is, therefore, necessary for construction companies to regard this as a major enabler to the diffusion of health and safety knowledge in the targeted Ghanaian community. Different cultural contexts lead to different ways in which the environment is viewed, and cultural differences influence individual ethical thinking (MacDonald, 2000). Application of awareness of health and safety into the Ghanaian culture would be welcomed if it were tailored to match their

current cultural norms and values. Most readily adopts technologies are those consistent with the principles, expectations and perceived needs of the intended adopter (Rogers, 1995).

6.13.3 Continuous Collaboration and Rewards

The third component was themed continuous collaboration and rewards loaded on by three variables and accounting for 6.984 per cent of the total variance extracted. Rewarding safe working employees in the community, maintaining continued collaboration between construction companies and the community members, involving opinion leaders from the community in the project were the variables loaded, measuring leadership and reward sub-construct of enablers of a successful diffusion process for construction companies to the community, leadership and rewards.

Continuous collaboration between the community members and the construction companies in diffusion programs is of a greater essence; it is important because without the collaboration from each other new knowledge cannot be shared or passed around between the two players. One cannot receive from another without his collaboration. Diffusion is a process and not an act, therefore would always involve more than one actor over a period of time. It is important that diffusion may also be accelerated within a social system through rewarding of the early adopters in the community or safe working employees in the community, in this case, the construction company. This can be the tipping point of the diffusion process because others would see the beneficiary and also aspire to receive the same and lead to the spread of such new knowledge.

Continuous collaboration and rewards are again viewed as an important enabler since it possesses the power to encourage, aid and increase the diffusion of health and safety knowledge in the Ghanaian society. Continuous collaboration, rewarding and

involvement of opinion leaders in any community is the facilitation of teaching, learning and the ability to learn from one another. The presence of the following actors does not only serve as a platform for diffusion to take place but as the main process by which diffusion thrives. One cannot learn without collaboration, and one would be encouraged to learn when incentivised. Therefore, health and safety knowledge can only be diffused in the Ghanaian communities when the members are willing to keep continually collaborating with the construction companies to improve in the new knowledge and then saturation would eventually take place in the whole social system.

6.13.4 Individual willingness

There were three variables loaded on component four named individual willingness. This component accounts for 5.660 per cent of the total variance. Willingness to learn from others by the community members, inter-cultural networking between communities and the ease of individual integration into Ghanaian communities have factor loadings of 0.743, 0.623 and 0.521, respectively.

Within a social system, the introduction of new ideas relies on the willingness of new participants to be integrated into the target group. It is essential within the transfer process as the community members ' willingness to welcome a new member into their mist would increase the share and spread of new knowledge. Also, the degree to which many community members are willing to adopt new knowlsgw can contribute to further dissemination of that knowledge. Besides, the extent to which people can access the latest knowledge also depends on the extent to which they are close to local media networks and the degree of control they can exert on others.

Adoption of a new idea involves two essential elements, namely; the personal adoption of the new idea and its collective manifestation (Baron et al., 2006). On the receiver's part willingness to learn from the holder is the only way diffusion can take place. One cannot learn to behave like that without willingness. Diffusion is viewed as a process of accepting or rejecting such objects over time by introducing units such as individuals or groups linked to specific communication channels, a social system or culture (Nypan, 1970).

Diffusion would not occur if the people were not willing to participate; if the information holder did not have the communication culture, diffusion would not occur. Similarly, if the information holder is willing to share, and the adopter is not willing to learn, there can be no diffusion. In many cases, good innovations face obstacles to their establishment, and in some others, they simply fail since individuals play important roles in delivery and acceptance it (Aikaterini and Ali, 2011). The explanation of why some successful ideas fail does not depend solely on the innovation itself. Still, the ability of the workers to implement and incorporate with others in the diffusion process also dictates their success or failure in implementing it. Human willingness should therefore, be considered as a very significant diffusion enabler for efficient diffusion because it determines whether or not a planned diffusion program would succeed. The relative advantage of a new idea alone, in accordance with some scholars, does not guarantee widespread adoption but the roles of individuals play (Fitzgerald et al., 2002).

6.13.5 Inter-Personal Networking

The following variables were highly correlated with component five themed interpersonal networking: interpersonal networking between community members,

community members' willingness to participate in the diffusion process, community leadership support for the new knowledge, mutual trust between community leadership and community members and the ability to communicate properly to the community members

Diffusion of a new idea begins with the ability to network. It provides the actors in the social system the platform to come together and facilitate learning among themselves. The ability of individuals in a social system to the network means new knowledge that is introduced in that network can get to every member in that network. Also, it is easier to diffuse a new idea in a social network because the members of the social network see each other as having the same attributes and so are comfortable of learning or seeking reinforcement from each other because of their perceived social status.

While the promise of improvement is what drives adaptation, these theories ignore the social networks of the mechanism through which the public embraces and accepts innovation (Lounsbury and Glynn, 2001). Interpersonal networking, without doubt, provides the means of introducing others to new knowledge that is found by others in the network. For health and safety knowledge to diffuse in the Ghanaian community, it would take social networks to drive such activity. Personal networking in a diffusion process has the means to direct and determine the time and duration of the program, the stronger the network, the faster the diffusion process. Individuals have some information about the new innovation that is being considered, and this information is dynamic; this information and their limited expectations or criteria for acceptance of such innovation affect the tendency of the future adopter to embrace the innovation (Yucel and Daalen, 2011). Rogers also defined the role of individuals in facilitating the

diffusion process and noted that individual tendencies to mimic each other are present in a social system (Rogers, 1995).

According to this author, individuals tend to be related to others who are physically close to them and fairly homophile in social characteristics such as socioeconomic, educational, technical, and cultural backgrounds. Therefore, it is important to realise the role of personal networks in facilitating the process of disseminating new knowledge within a social system; it provides people with the enabling atmosphere to communicate the newly found knowledge that is useful to all. These networks would, therefore allow construction companies to be able to securely disseminate information about health and safety within the Ghanaian community. Also, network theorists have postulated that networks form the distribution of new knowledge (Coleman et al., 1966) and that social networks can influence actors through both positional and coherent mechanisms (Marsden and Friedkin, 1993).

6.13.6 External Influence

External influence enabler of a successful diffusion process was a single variable to one component (component six) accounting for 4.651 per cent of the total variance explained. In the Ghanaian communities, most interventions and development programs are spearheaded by the Government, NGOs, and the local government agencies in these communities. Therefore, these external bodies have so much influence on happenings in the community. External influence can so much set the extent at which new knowledge or the planned diffusion program can start. It is therefore important to see these external influences as enablers of a diffusion process. They have the means to drive a diffusion process and implement it to the letter. It is therefore important for the construction industry to collaborate with these external influences to help in the transfer

of health and safety knowledge in the community as partners in the planned program which in turn would give both the construction companies and such external bodies the goodwill in the said community. According to Nypan (1970), in rural communities in developing countries, social change and diffusion of innovations often occur as a result of request, suggestions and demands from various outside change agents.

6.14 BARRIERS TO A SUCCESSFUL DIFFUSION IN THE GHANAIAN COMMUNITY

This section presented the Exploratory Factor Analysis (EFA) of barriers to a successful diffusion from the construction industry to the community. Results were presented in Table 6.26 to Table 6.29, showing the KMO and Bartlett's Test, the commonalities extracted, total Variance Explained, and Rotated Component Matrix for the EFA conducted on the barriers to a successful diffusion from the construction industry to the community. There were eleven (11) variables used to measure the enablers of a successful diffusion process from construction companies to the community and were all subjected to exploratory factor analysis (EFA). The methods of extraction and rotation utilised were the principal component (PC) and varimax with Kaiser Normalization, respectively.

Table 6. 26: KMO and Bartlett's Test of Sphericity for Barriers to a successful diffusion in the Ghanaian community

	KMO	Bartlett's Test of Sphericity			Reliability	
		Approx. Chi-Square	df	Sig.	N	Cronbach's Alpha

Road	0.673	290.012	55	0.000	11	0.736
Building	0.836	671.939	55	0.000	11	0.870
Combined	0.793	910.045	55	0.000	11	0.832

The study conducted a KMO measure of sampling adequacy and Bartlett's test of sphericity to ensure factorability of the correlation matrix before undertaking the EFA. The results for KMO measure of sampling adequacy and Bartlett's test of sphericity were presented in Table 6.26. The KMOs recorded were 0.673, 0.836 and 0.793 for road contractors, building contractors and combined sample respectively which were greater than the minimum cut-off of 0.7 to establish sampling adequacy (Hair et al., 2010) except sample for road contractors but greater than the KMO value acceptability minimum according to (Kaiser, 1970). Thus, the range of KMO measure of sampling adequacy is fixed at a minimum of 0.50. Similarly, the result of Bartlett's test of sphericity also revealed a significance level of 0.000 ($p<0.05$). The implication of this result is that there exists a possible correlation among the variables, thus suggesting a realistic group creating factors from the variables and explanation to proceed with FA (Field, 2009).

The reliability test, Cronbach's Alpha, was computed, and the value of 0.832 was recorded (combined), suggesting adequacy of internal consistency and reliability in the measures and the scale (Hair et al., 2014; Field, 2009). According to Field (2009), a Cronbach's Alpha above 0.70 is acceptable for scale reliability and internal consistency of the instrument. The Cronbach's Alpha identified was significantly high, 0.832> 0.70 showing high internal consistency and reliability of the instrument.

Table 6. 27: Communalities for Barriers to a successful diffusion in the Ghanaian community.

	Initial	**Extraction**		
		Road	**Building**	**Combined**

One-time nature of construction projects.	1	0.878	0.862	0.875
Time constraint (e.g. Short stay of construction companies in a community).	1	0.910	0.849	0.862
Lack of community leadership support	1	0.612	0.676	0.679
Unwillingness to adopt to change by the community members.	1	0.643	0.773	0.698
Cultural resistance (e.g. new idea not compatible with existing cultural practices and values).	1	0.586	0.598	0.618
Improper communication of new knowledge.	1	0.645	0.756	0.781
Lack of awareness of new knowledge.	1	0.625	0.694	0.646
Lack of innovativeness of new knowledge.	1	0.828	0.743	0.633
Restriction and confined nature of construction sites.	1	0.726	0.642	0.620
Lack of trust between parties (community and construction company.	1	0.540	0.747	0.680
Lack of commitment between parties (construction company and community.)	1	0.587	0.752	0.687
Average	1	0.689	0.736	0.707
Extraction Method: Principal Component Analysis.				

The overall average commonality of the variables after extraction was 0.637 (combined), indicating that the extracted communalities support the use of factor analysis on the variables. Field, (2009) suggested that the reliability of the results and interpretations in factor analysis is achieved with an average commonality of the variables after extraction should be above 0.60. Likewise, communality values of a hypothetically significant variable must yield an extraction value (eigenvalues) greater than 0.1 at the initial iteration (Field, 2009; Hair et al. 2014). All the eleven (11) variables had extracted eigenvalues greater than the 0.50. Hence all variables were retained and subsequently used for further analysis (Field, 2009; Hair et al., 2014).

After conducting all the essential checks and initial tests, the EFA was then conducted using the eleven extracted variables. The fixed number of factors to extract was set to four (4) to ensure sufficient total variance explained after three factors were extracted with about 55 per

cent cumulative variance explained. From Table 6.28, the total variance explained by the variables showed that four components were extracted with significant variance. Similarly, the Rotated Component Matrix in Table 6.29 confirms four unique component factors as each variable dominantly belonged to a single factor (component). It could be suggested, therefore that the components that emerged are enablers of a successful diffusion process from construction companies to the community.

Table 6.28: Total Variance Explained for Barriers to a successful diffusion in the Ghanaian community.

Category	Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
		Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Road	1	3.238	29.439	29.439	2.659	24.173	24.173
	2	1.908	17.341	46.780	1.955	17.770	41.943
	3	1.406	12.782	59.562	1.511	13.738	55.681
	4	1.029	9.354	68.915	1.456	13.234	68.915
Building	1	4.851	44.097	44.097	2.383	21.666	21.666
	2	1.317	11.968	56.065	2.268	20.619	42.284
	3	1.025	9.319	65.383	1.819	16.535	58.819
	4	0.901	8.188	73.572	1.623	14.753	73.572
Combined	1	4.181	38.010	38.010	2.177	19.793	19.793
	2	1.511	13.738	51.748	2.113	19.206	38.999
	3	1.228	11.160	62.908	1.849	16.809	55.808
	4	0.859	7.809	70.717	1.640	14.908	70.717

Results from Table 6.28 presented the total variance explained by each of the four extracted components in each sample. The principal component one accounted for 38.010 per cent, component two 13.738 per cent, component three 11.160 per cent and component four 7.809 per cent (combined), cumulatively accounting for about 70.717 per cent. From this, it could be seen that what the six components extracted cumulatively accounted for is above the recommended minimum of 50% (Field, 2009).

Table 6. 29: Rotated Component Matrix for Barriers to a successful diffusion in the Ghanaian community (Combined)

Lack of trust, One-time nature of construction projects, Cultural resistance and improper communication	**Component**			
	1	**2**	**3**	**4**
Lack of trust between parties (community and construction company.	0.782			
Lack of commitment between parties (construction company and community.)	0.742			
Restriction and confined nature of construction sites.	0.627			
Lack of innovativeness of new knowledge.	0.565			
One-time nature of construction projects.		0.916		
Time constraint (e.g. Short stay of construction companies in a community).		0.904		
Unwillingness to adopt to change by the community members.			0.756	
Lack of community leadership support			0.700	
Cultural resistance (e.g. new idea not compatible with existing cultural practices and values).			0.699	
Improper communication of new knowledge.				0.851
Lack of awareness of new knowledge.				0.705
Extraction Method: Principal Component Analysis.				
Rotation Method: Varimax with Kaiser Normalization.				

The rotated component matrix was used over the ordinary un-rotated matrix due to the ability of the rotated component matrix to yield and achieve simple, robust structure which makes it easy to identify and interpret the results (Field, 2009). Considering the possible interrelations among the variables contained in each component and the factor loadings, more suitable names that recap the barriers to a successful diffusion from the construction industry to the community explained by the components were derived. The identified components were lack of trust, one-time nature of construction projects, cultural resistance, improper communication.

6.14.1 Lack of trust

The rotated component matrix revealed a factor loaded lack of trust, which had a total variance explained by about 38 per cent. The following were the variables addressing lack of trust. Lack of trust between parties (community and construction company

loaded 0.782. Lack of commitment between parties (construction company and community) with a factor loading of 0.742. Restriction and confined nature of construction sites with factor loading 0.627 and lack of innovativeness of new knowledge loaded with 0.565.

Lack of trust in a diffusion program is a major hurdle to cross to be able to attain success. It is thus significant to the diffusion process that it cannot take place if the parties involved do not trust each other. One must trust you to agree to move with you or think of learning from you. Also, one must have trust in the other for him to be committed to the other, and one must trust the system in which he or she is to be able to open up without restrictions to be able to participate fully in the system. Lack of trust in a diffusion system means there would not be any diffusion at all in the first place. What this means is that Ghanaian construction companies cannot transfer their health and safety knowledge to the community if the community members do not trust them. Trust has been widely viewed as a critical facilitator of diffusion. Trust is an indispensable basis for creating a shared experience among individuals (Nonaka, 1994). According to Husted and Michailova (2002), people, in general, are not willing to share knowledge without a feeling of trust. Interpersonal trust is said to have cognitive and affective foundations (Lewis and Wiegert, 1985). Wang et al. (2018) confirmed the positive relationship between trust and knowledge sharing. It is therefore important to view lack of trust as an important barrier to a diffusion process which has the key to do and undo the process.

6.14.2 One-time Nature of Construction Projects

The second component observed, described the one-time nature of a construction project as a barrier to successful diffusion from the construction industry to the community. There were two

variables relating to this theme together explaining the variance by 13.738 per cent; one-time nature of construction projects 0.916 and time constraint (e.g. short stay of construction companies in a community) 0.904. Construction projects are known to be one time in most cases. A contractor wins a bid for a project in a community for a specific period and after the execution of such a project moves away from that location to another. Diffusion as known is a process and happens within a period, and whatever planned diffusion program the construction company might have started would be terminated at that point. Therefore, construction companies need to consider these as a critical barrier to a diffusion process between the construction company and the community in which it finds itself to factor it into the planned course of study to attain success.

6.14.3 Cultural Resistance

Cultural resistance was the theme generated based on three indicators loaded highly on factor three, with total variance explained of 11.160 per cent. The indicators and their respective factor loadings are unwillingness to adapt to change by the community members loading 0.756, lack of community leadership support loading 0.700 and cultural resistance (e.g. new idea not compatible with existing cultural practices and values) loading of 0.699. Culture provides the grounds for human communication and interaction; it is also a source of domination (Bourdieu, 1996). By this account, any planned program that does not conform with the existing cultural practices would not see the day of light of day and would be resisted by the community members. According to Bourdieu (1996), the arts, science, religion, and all symbolic systems, including language itself, shape our understanding of reality and form the basis for human communication. It is really important for every planned program that is to be presented to any human setting to take into consideration the cultural feelings of such a group.

Human decision-makers routinely ignore their own fully conscious preferences in making decisions (March 1978). He further posited that people follow the rules, traditions, feelings, and the advice or actions of others. Cultural resistance can occur to even infrastructural projects and not only diffusion of an introduction. It is therefore prudent for construction companies or any other entity for that matter to fully understand the contextual, cultural backgrounds of communities when dealing with the introduction of any new idea in order not to face resistance and protest from the community members.

6.14.4 Improper communication

The last component, component four, themed improper communication loaded by two indicators: improper communication of new knowledge with a factor loading of 0.851 and lack of awareness of new knowledge with a factor loading of 0.705. Proper communication in a planned diffusion program is essential because it has to do with the individual in the social system. It provides the means of conveying one's intentions to others in agreement or disagreement. Communication is the process by which individuals create and share information in order to reach a mutual understanding (Rogers, 1995). According to this author, it is a particular type of communication because it has to do with meaning. Thus, it is vital for any new knowledge that is being presented to an adopting unit to be correctly communicated to prevent it from being rejected. Improper communication in a diffusion program is thus seen as an important barrier because it is vital to the whole diffusion process. One may have all the best ideas or a product, but it would be rejected due to poor communication. It is therefore important for construction companies wanting to diffuse health and safety knowledge to the Ghanaian community to eliminate the act of poorly communicating the new idea to the intended group for them to be successful.

CHAPTER SEVEN

QUALITATIVE DATA ANALYSIS

7.1 INTRODUCTION

This chapter presents the analysis of qualitative data through the case study as well as the interpretation and discussion of the findings.

7.2 METHOD OF ANALYSIS

Yin (2009) noted the importance of a broader analytical strategy to guide the analysis of the data from a case study. The general analytical strategy used in this study relied on theoretical propositions, which led to the case study. The primary analytical technique used in this study was Patten matching logic and employed thematic analysis. Thematic analysis is independent of philosophy and epistemology and can be applied across a range of theoretical and epistemological approaches as well as various methods (Baun & Clarke, 2006). Buan and Clarke (2006) argued that thematic analysis is a method used to identify, analyse and report patterns (themes) within data. This involved comparing the patterns obtained from the data through thematic analysis to the patterns predicted by the theoretical framework used in the study. These themes have been identified using a deductive approach driven by the theoretical framework and have been identified at a semantic or explicit level based on the meanings of the surface rather than looking beyond or looking for deeper meanings of what has been said. The thematic analysis was used to provide an account of how health and safety knowledge can be transferred from the construction company to the Ghanaian community successfully and how knowledge can be transferred and diffused in the Ghanaian society. The construction company involved in this study case study involved a K1D1 construction company with relevant health and safety policy in place code of conducts for its

operations and health and safety professionals implementing these policies. Besides, the Ghanaian community involved in this case study is a municipality and an administrative capital of one of the sixteen regions of Ghana with a structured leadership both traditional and institutional with deferent higher learning institution and professionals making it a good community for knowledge transfer and sharing.

7.3 CASE STUDY RESULTS AND DISCUSSION

The data was collected from November 2018 to January 2019, using 9 semi-structured questions for the adoption unit, in this case, the Ghanaian community, and 7 for the transfer unit; in this case the Ghanaian construction company. The interviews lasted approximately 30 to 40 minutes, respectively. The diversity in interviewees gave a holistic view to understand how health and safety culture of the construction industry would be transferred to the Ghanaian communities in which they operate, from the perspectives of both the transfer and adopting units. The interviews were conducted in different locations. That of the transfer unit was done in a construction site where there is a live project going on, and those of the adopting unit was done in the houses and offices respectively.

7.4 FINDINGS FROM THE INTERVIEWS

7.4.1 Introduction

In this section, the themes extracted from 5 in-depth face-to-face semi-structured interviews are presented verbatim. The interviews were conducted with 5 health and safety practitioners, 3 from the Ghanaian community and 2 from a construction company. The data were analysed using a thematic analysis approach with the aid of

Nvivo software; one theme emerged from the data with the other five pre-determined from the study's conceptual framework. The themes are presented as follows.

1. Health and safety knowledge transfer.
2. Persuasion to adopting health and safety knowledge
3. The decision to adopt health and safety knowledge
4. Implementation of health and safety knowledge
5. Confirmation of health and safety knowledge
6. Sources of information in the Ghanaian community.

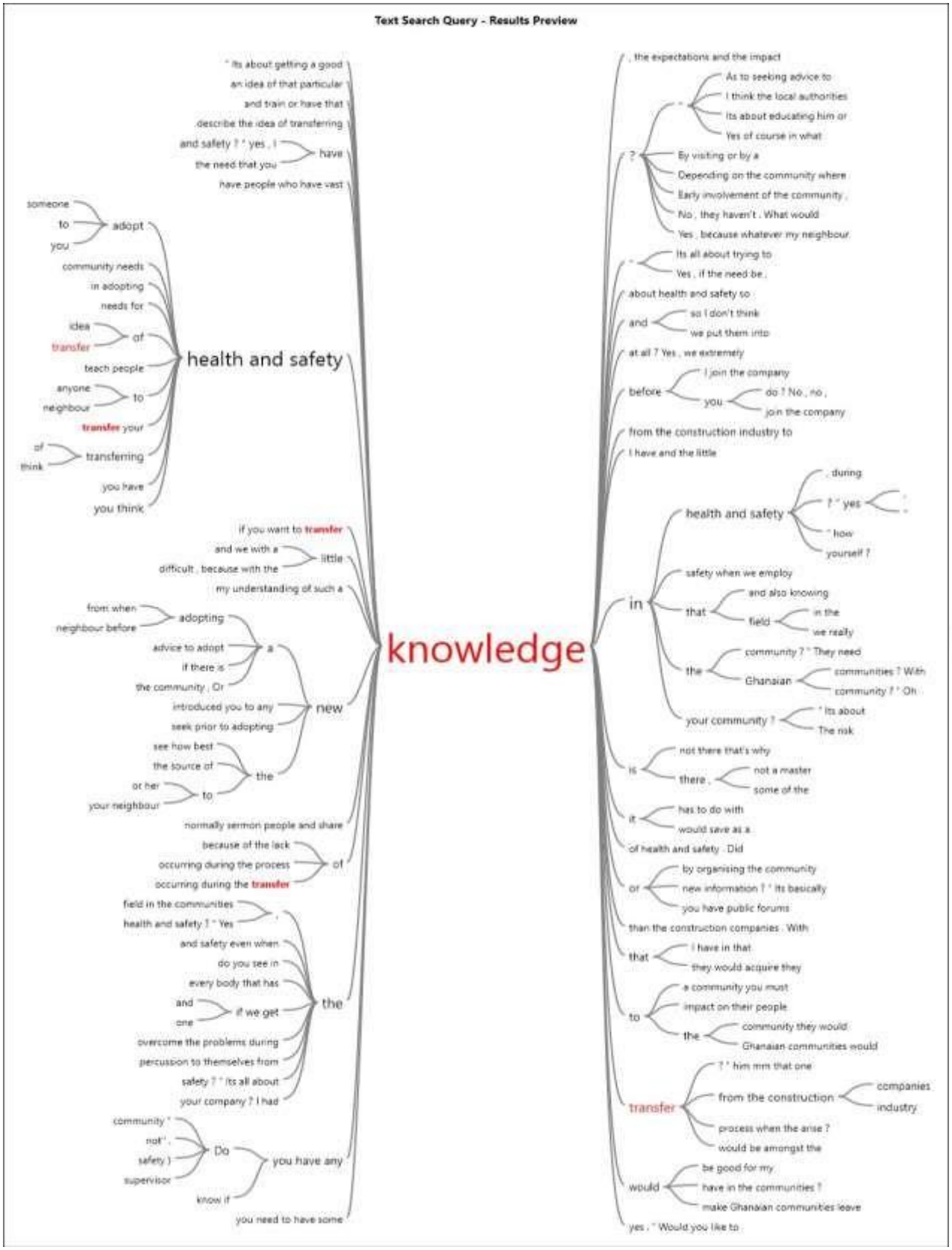

Figure 7. 1: Text search query results extracted by N Vivo 10.

In the following section, the themes will be presented alongside relevant quotations extracted from the interviews. It is worth noting that the code INT (followed by a number) denotes the interview from which the evidence quotation was taken from out of the 1-5 interviews. For example, if a quote was extracted from interview 4 then the presentation in the text will be "*the quotation*" (INT – 4).

7.2 THE THEMES ASSOCIATED WITH THE INFORMATION GAINED FROM THE INTERVIEWS.

Knowledge Transfer

When it comes to the concept of knowledge transfer, the study seeks to identify the knowledgeability of construction companies concerning health and safety. The common word used by the respondents was knowledge. According to knowledge transfer theory, knowledge is the first stage one passes through in deciding to adopt or reject a new idea (Rogers, 1995). Rogers opined that knowledge is when an individual or other decisionmaking unit is exposed to a new idea or its existence and gains some understanding of how it functions (Rogers and Shoemaker, 1971; Rogers, 1995).

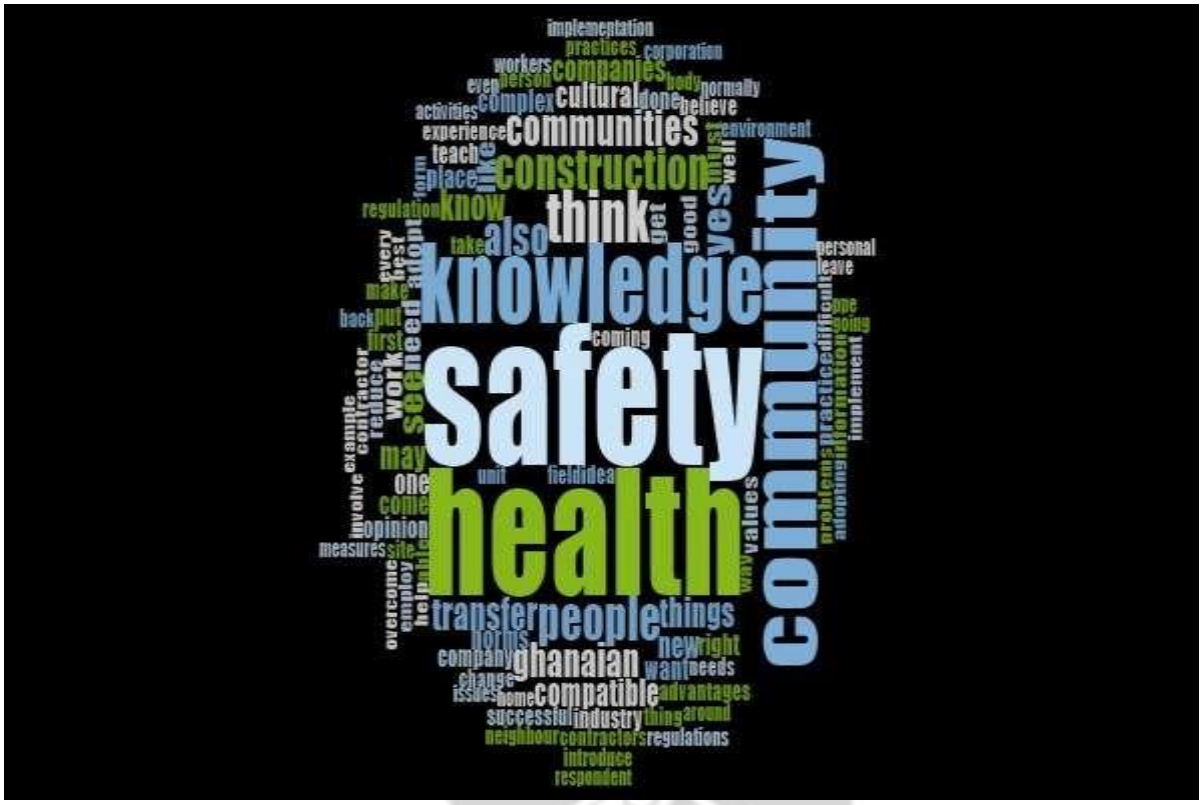

Figure 7. 2: most common words used by respondents extracted by N Vivo 10.

When the respondents were asked if health and safety knowledge existed in the construction industry in Ghana, one respondent replied by saying

> *"Yes, the knowledge is there, not a master in that field, but the one to enable us to work in the industry is there"* (INT-4). Another respondent added that
>
> *"once in a human organisation like this, as we are working with machines and other risks that are involved in our work, there is the need that you have knowledge about health and safety, so that you can take precaution and how you can treat emergencies. Definitely, there would be some accidents, so you need to have some knowledge of health and safety* (INT -2)".

This means that there is health and safety knowledge in the Ghanaian construction industry for them to be able to transfer the same in their various communities in which they operate. It is also vital for the Ghanaian community members to be exposed to health and safety knowledge first and foremost for them to be aware of the existence of the health and safety knowledge, before deciding on whether to adopt or reject such an idea.

From the responses, it is evident that one need not be a master of health and safety knowledge to be able to transfer it, but once the individual has the knowledge and can apply it to his or her daily activities, he can as well transfer same to others. It is also clear from one of the responses that as people, we live with health and safety hazards in all our daily activities in one way or the other, therefore the need to have health and safety knowledge to be able to protect oneself.

It was necessary to identify this because one cannot give what he or she does not have. All five respondents have had training in health and safety in one way or the other. In establishing this, a further question was asked to determine where they got the health and safety knowledge from, and this is what one of the respondents had to say:

> *"I did my masters' project work in health and safety, and I am still doing my PhD in health and safety, so I am very much into health and safety* (INT-5)*."*

Interestingly, another respondent had this to say:

> *"Actually, I started at home because my mother is a nurse and a safety officer, so she actually trained me from home before I proceeded for further training* (INT-2)."

Looking at the responses of the respondent (INT-2), it shows clearly that health and safety knowledge can be transferred not only through formal education but through family and community ties. This also means that health and safety knowledge transfer from the construction industry to the community is obvious and has the potential to be diffused exponentially and to trickle down to both the literate and the illiterate in our communities and to help improve the living standards of the community members, which would, in turn, be to the benefit of the construction companies in the community because safe working employees who can take personal safety precautions would work better and prevent accidents on site. When you have safety-oriented employees, you would have a safe working environment which would improve the safety culture in your organisation.

Decision

Making a decision to adopt an innovation or new knowledge into one's life may come with a lot of questions and mental exercise. It is therefore essential for the one introducing the new knowledge to adequately communicate the improvement the said new knowledge would bring to the target adopters when deciding to accept such knowledge. In this view, the study sought to understand the motivations that would enable Ghanaian citizenry to adopt health and safety knowledge when it is introduced to them. According to (INT-3) the decision to embrace health and safety knowledge is:

> *"The risk involved and the consequences that you face, the challenges that you face to the extent that it can affect your income generation because you might not be able to continue working when you get a certain class of injuries; it is the reason why I would want to adopt health and safety."*

Another respondent supported the assertion of this respondent by saying that:

> *"With daily activities and accidents, we see, I think it would prompt one to be more careful in their daily activities and heed to safety precautions* (INT-1)."

These responses are supported by Rogers (1995) who suggested that before one adopts or uses an innovation or new knowledge, he or she goes through decision making where he or she engages in activities that would either lead to their adoption or rejection of the new knowledge or innovation. There was another interesting view of another respondent who links the decision to adopt health and safety knowledge to both the transfer unit and the adoption unit. And this is what he had to say:

> *"Oh, simple. You want to reduce accident rates; because the main outcome of this health and safety thing is to reduce accidents amongst the workers and the people which would make them strong and fit for work and if that is done, we have achieved something that is great and also reduced accident rates* (NIT-4).
>
> *Also, to the contractors: when I am coming to work with you, and I know that I would be safe and nothing would happen to me because you would provide me with the necessary protections, then I would be happy to work with you (NIT-5)."*

Looking at all the responses, one would see that health and safety knowledge transfer as being proposed in this study has a lot of benefits for both the transfer unit, in this case, the construction company, and the adopting unit, in this case, the Ghanaian community. It is also observed that health and safety knowledge in the community has the potential of making our communities a safer place while improving their living standards and at the same time, improving their economic status. When people behave

safely in a community, they would have the strength to work and work well, which would increase productivity and reduce the loss of man-hours of the organisation. The workers would be able to work continuously, which would improve their economic status. This would also lead to a reduction of the government paying huge health insurance bills because people are living safely in the community. So sickness would reduce and pressure on health facilities would also be lessened. In the long run, this benefits the people, the industry and the nation as a whole.

Persuasion

Persuasion in the transfer of new knowledge is when a person forms a negative or positive attitude towards new knowledge, potential adopters at this stage are actively seeking to express in-depth the benefits of the new knowledge. The persuasion stages include; *Compatibility, Relative advantage, Complexity, Observability, Implementation and Confirmation* (Rogers, 2003). This section of the study seeks to understand the persuasion stage of health and safety knowledge in the Ghanaian community.

Compatibility

Cultural compatibility of health and safety in the Ghanaian community is one of the most important determinants of its acceptance or community protesting against the new knowledge. The study sets out to understand whether health and safety practices would be compatible with Ghanaian cultural norms and values. The most common words in the responses were *compatible* and *culture*. According to Rogers (2003), compatibility is the degree to which an innovation is perceived as being consistent with the needs of the potential adopters. It means that people would look for innovations or a new idea that they can incorporate into their systems without much strangle and not having to change their way of doing things.

When it comes to whether health and safety practices would be compatible with Ghanaian cultural norms and values, this is what one of the respondents had to say:

> *"Yes, yes, yes! It is compatible; it is compatible, it is compatible. To some extent, it is highly compatible. Yes. Because if you go back to our cultural practices and norms, health and safety practices are there, just that they are not captioned as health and safety, but it is health and safety and so highly compatible* (INT-4*)."*

It is essential for a new idea being introduced to a social system not to conflict with the already existing ways of living but to complement and improve their existing norms. Another respondent supported this assertion by saying:

> *"Culture differs from place to place, as I said earlier on in your first question the people we employ here, whatever we teach them in health and safety they may be the best people to go to the community and teach them because it is their own cultural background. I may not know their cultural background. But from where I am coming, health and safety would be very compatible with our cultural norms and values* (INT-1*)"*

Looking at the response of this respondent, it is well established that health and safety introduction into the Ghanaian community would conform to their already existing ways of doing things. It is, however, good to note that even though the contractors themselves might not know the cultural do's and don'ts of all the communities they may find themselves. It is vital to liaise with their local employees who best understand the traditional beliefs of their society to be at the forefront. It also means that it is important for every contractor to make a room or make it a policy to employ a quota of its employees from every community they find themselves in. This will increase teamwork

between them and the community for the construction companies to fulfil their corporate goals by finishing their project within schedule without much agitation and community protest.

Relative advantage

From the import of the information received in the interviews, health and safety introduction into the Ghanaian community would have a lot of advantages, therefore resulting in acceptance and implantation into their daily lives. The words that ran through their conversation most were *safety* and *awareness*. Concerning the relative advantages of health and safety to the Ghanaian community, this is what one respondent had to say:

> *"Oh, a whole lot of benefits, one if we get the knowledge and we put them into practice, it would help us reduce health problems amongst the indigenous of the communities, the cost of treating ailments would also come down drastically, the cost of living would also reduce. In fact, there will be that free movement with people in the community simply because the environment is clean, and health issues are being practised, and safety is guaranteed* (INT-4)."

This means that the relative advantage of health and safety introduction into the Ghanaian community would create awareness and therefore keep the community members safe, which in turn brings a lot of benefits to the communities. Another respondent had this to say about the advantages health and safety has for both the contractor and the community:

> *If you come to the construction industry, it is to do with health and safety of our workers, which has to do with accidents, so if we can do that, then it would not*

be the safety of the workers alone but the community too, because if an employee is injured or sick and did not come to work it affects the contractor as well and not the individual alone. How does it affect the contractor? It delays the work; the contractor has to pay compensations in some cases, and they have to take care of the families of the person who is injured and all that. So you see, it has a severe effect on the business so if that problem is solved it would reduce accidents, it would reduce costs to the contractor, it would also help the community to be healthy because if people are not involved in accidents in the workplace, then they're committed and would give of their best. The contractor and the community would benefit, so it has a considerable advantage. If that is done, the advantages are that huge (INT-5)."

This is supported by Rogers (2003) by saying that relative advantage is the perception of a new idea being better than the idea, product, or process that is already being used by a potential adopter. Further, if a potential adopter can readily see the benefits of using a new idea, the greater the likelihood of him or her adopting that new knowledge. The greater degree of the adopter's perception of the advantage, the more likely he is to embrace it. Another respondent summed it all by saying:

"Health and safety would definably change the lives of the people in the community. It would help them to live longer and would also change their ways of doing things (INT-2)."

Complexity

Concerning the complexity of health and safety implementation in the Ghanaian community, the study aims to ask respondents how they perceive the complexity of health and safety implementation in the Community. This is what (INT-3) had to say:

"Because in my community it has never been part of our upbringing or social fabric, it might take time, a longer time for us in our community to appreciate it, unlike other communities where right from the onset people are conscious of health and safety in whichever form being domestic, public, residential, commercial. It's a rare thing in our environment."

Rogers (2003) supports this argument, as he argued that complexity is the degree to which a potential adopter approaches the new idea in terms of how challenging it is to understand the concept of how easy it is to use it. From the respondents ' responses, it is clear that Ghana, being a developing nation in sub-Saharan Africa, has citizenry with limited knowledge of health and safety and therefore requires its awareness-creation. This is corroborated by some scholars who claim that there have recently been several avoidable domestic, industrial and institutional fire outbreaks coupled with vehicle collisions due to citizens ' ignorance and negligence (G N F S I R, 2016; Addai et al., 2016; Annan et al., 2014). Alkilani et al. (2013), further suggest that knowledge and performance in developing countries about health and safety are weak and therefore needs improvement. Change is a gradual process, so some community members would take time to accept it, but with time it would become part of their way of living when others see their neighbours doing the same.

Observability

Health and safety knowledge is a fundamental subject matter that needs to be understood from all angles concerning its applicability and confirmation in the social system targeted for such knowledge. The study, therefore, seeks to enquire from the respondents whether the Ghanaian community needs health and safety knowledge at all in their daily activities. The common words highlighted in their conversation were

individual and *community*. Rogers (1995) stated that at the confirmation stage an individual or a decision unit seeks reinforcement for a decision that has already been made, and may reverse this decision if exposed to conflicting messages about the new idea.

When the question was asked about health and safety confirmation in the Ghanaian community, this is what the respondent had to say:

> *"Oh, it's very laudable, it's a very important thing because it's not only helping the individuals in the communities, but it is helping the contractors as well* (INT-5)."

Another community member said:

> *"Yes, we extremely need it. Because most of the things we do them without knowing the consequences, or sometimes we know, but because the system is not well formulated, so we are all exposed to the risk (INT-3)"*

Looking at the responses, it is clear that if the individuals in the adapting unit see the importance of the new knowledge being introduced to them, then they would be willing to retain it with them. Another participant agreed with this by saying:

> *"I think yes, I think yes. To add to it, you have to know that personal safety you need to take it seriously because you can't live like that, like visiting my site like this. You come walking in some easy wear without you heeding to the safety precautions we have put out there when you hurt I would take care of you, but you will feel the pain. So, you heeding to safety precautions would help the community* (INT-1)".

Health and safety knowledge introduction in the Ghanaian society has an excellent chance of being accepted, confirmed and retained by the community members after they have adopted the knowledge. Transferring knowledge across to a targeted population alone does not mean such knowledge would be kept. Therefore, it is essential to study how good such new knowledge would be to prevent rejection after the transfer. It is good to know that diffusion does not occur in just the acceptability of new knowledge, but rejections too, so if one person in the targeted population should reject the said knowledge due to unsuitability it is likely to get to other units and result in mass rejection of such knowledge if not managed properly.

Implementation

Implementation of new knowledge like health and safety introduction in the Ghanaian society may definitely come with some challenges. This study seeks to understand how health and safety implementation in the Ghanaian community would unfold. Therefore, community members were asked to share their expectations on the implementation of health and safety knowledge. And this is what they had to say about health and safety implementation in the Ghanaian community:

> *"Yeah, oh why not, that's why I am saying that as individuals if any law or regulations do not compel you, there are certain things you don't worry yourself about. So, if we can put things in place to compel them, people would comply.*
>
> *Also, you cannot be sure that everybody would implement it because it's a change and change is a gradual situation. Since we are now bringing it on board, definitely there would be resistance here and there.* (INT-5)."

Another community member had this to add:

"Is not everybody that has the knowledge and so I don't think everybody can implement health and safety even when the knowledge is there, some of the safety measures may go with some tools or accoutrement if I may say, also even if they are not to require tools not everyone can implement health and safety but some appreciable percentage can, say 60% will be able to (INT-2)" to buttress this assertion (INT-3) said that health and safety implementation:

> "*depends on the individuals, but I believe we can do it, we have the ability to implement health and safety. It would help us in so many ways".*

It is interesting to note that all three respondents' assertions agreed with the individual innovativeness theory. This theory states that individuals who are predisposed to being innovative will adopt an innovation earlier than those who are less predisposed. The theory classified the adoption rate into five distinct categories, as follows: 1. The innovators with 2.5%, early adopters 13.5%, early majority 34%, late majority 34% and laggards 16% (Rogers, 1995). Williams et al., (2018) also argue that the intrinsic influences for a successful knowledge transfer are person-specific because all persons have different rates of absorption; some persons can codify and understand new knowledge faster than others. Therefore, the implementation of health and safety knowledge is expected to start slowly during the transfer stage, but with time would increase amongst the community members. As some begin to use the knowledge and others observe their new way of behaviour, they would also consciously or unconsciously begin to imitate them. According to the social learning theory posited by Bandura (1977), people learn from others via observation, imitation, and modelling.

Confirmation

Regarding activities that would aid the smooth diffusion of health and safety knowledge within the Ghanaian community members, the study sets out to first understand the willingness of the community members to share knowledge with one another, and then further understand how they would be able to expose others to the knowledge. A question was posed to respondents asking them if they would want to introduce their neighbours to health and safety knowledge. One of them said:

> "*Yes of course. In whatever form, I would introduce him or her (INT-4)"*

Another respondent answering the same question said: "*Yes because whatever my neighbour does may have a repercussion on me as a neighbour, so I would definitely introduce my neighbours to health and safety (INT-3)"*

The study further solicited from the participant's ways they intend to introduce their neighbours to the new knowledge, and they had these to say.

> *By visiting or by a forum depending on my understanding of such knowledge or by organising the community members and inviting experts to come and speak to us because safety is a shared responsibility* (INT-3). Another respondent also added that *"It's about educating him or her to know that when it comes to health and safety there are certain things you must do and these are the benefits and effects* (INT-4)."

All these responses were the perspectives of the adopting unit, in this case, the community members.

On the other hand, the transfer unit (the construction company) had this to say when it comes to ways of introducing their neighbours to new knowledge:

"*I think I would speak from the construction perspective in a community like this and if we are able to employ say 20% of our workforce coming from the community and we with the least knowledge in safety when we employ them and train them, they would also go back, and train or have that knowledge to impact on their people. By so doing gradually, gradually, it would be successful* (INT-1).

Another responded is of the view that:

"Yes, I think so, I think so because if my boss should give me three days to be at the office and three days to go to the community and speak about safety to the people in the community and other construction companies would also do the same in other communities then we can. Or the people we employ are from the community so if we teach them, they would also go and teach the people in the community. That way everybody would get to know. So, I have to tell them that after teaching you this you must also go and teach others at home, maybe your children, your wife, your siblings or anybody at all in the community and then from there, that people can go and teach another person and it would spread like that (INT-2)."

From this response, it is clear that Ghanaian citizens are very willing to share whatever new knowledge they have with their neighbours in the community, which is a very important determinant of successful knowledge diffusion, because knowledge diffusion thrives on networking, e.g. personal networking, community networking and social networking (Williams et al., 2018). Individual willingness to share knowledge with each other is the beginning of transferring knowledge from one point to another. Without this, knowledge transfer or diffusion is impossible to achieve. Another interesting suggestion was made by (INT-1) was this:

"*There are other able bodies that can best transfer or teach people health and safety knowledge than the construction companies. With the construction, we don't reach out to that large audience for example, like the basic schools in the communities if they are rather trained, they can go and teach others better in the community.*"

This suggestion makes a lot of contribution to how health and safety knowledge diffusion can be accelerated in the communities. It is evident that every student comes from a home and also has friends and siblings in one way or the other. Therefore this can be another way of reaching out to the masses in the community and worth noting.

Information sources

Introduction of new knowledge or a new idea into a targeted population is a complex situation and must be handled with care. This is because social systems or communities differ in so many ways based on some attributes such as leadership structure, religious considerations, cultural beliefs and the social structure. Therefore, it is very vital to understand how information gets and flows into a particular community that is targeted for the introduction of new knowledge.

This study seeks to solicit information from the participants as to where and how they are often introduced to new sources of knowledge or information in the Ghanaian community. The common words that ran through their conversations were *opinion leaders* and *community leaders*. When asked where they usually get information from in the community, one of the participants said:

"It's basically through the people in the community, many at times in the community there are opinion leaders, and we have some elders too in the community, so if there is a piece of information that gets to them, they communicate that to us in the community. "As to seeking advice to adopt new

knowledge, it has to do with the superiors, people who have practised it, done similar things over and over. I try to link up with them to see how best the new knowledge would be good for my use. (INT-4*).''*

According to Rogers (1995), society has some people who act in the position of opinion leaders. He further clarified that opinion leadership is the degree to which a person may informally influence attitudes or behaviours of other people with relative frequency in the desired manner (Rogers, 1995). This assertion was additionally endorsed by another participant who noted:

"Depending on the community where elders normally summon people and share knowledge, or you have public forums where the community is informed about new development, then you can get information from there. If you are a member of an association, maybe a church, a mosque or sometimes where some of these organisations come and educate the public, you can get information from those people (INT-3)"

According to Rogers (1995), the openion leadership is gained and maintained by the technical competence, social accessibility and adherence of the individual to the norms of the system. This indicates that the incorporation of knowledge of health and safety into the Ghanaian society must be a consideration in the role of opinion leaders and, for that matter, religious leaders in the community since these two actors have been established as those who can effectively assist in the implementation of knowledge of health and safety in the community.

The results also portrayed the Ghanaian community's socio-cultural structure, which is always organized under chiefs and elders and to some degree religious leaders who are highly respected and listened to by the members of the community and therefore can

influence their decision to adopt or reject the introduction of new knowledge in their communities.

Table 7. 1: Summary of the case study

Rogers Innovation Decision Theory	**Findings from the Case Study Under Developed themes from the case study**
Knowledge	There is enough health and safety knowledge in the Ghanaian construction industry for them to be able to transfer same into the Ghanaian community. It also found that it is important for the Ghanaian public to be exposed to the health and safety knowledge for them to be aware of it before deciding on whether to adopt or reject it.
Persuasion	The study found that health and safety knowledge is compatible with the existing Ghanaian cultural norms and value and therefore can be implemented without any protest. It also confirms the complexity as posited by Rogers as applicable in the Ghanaian community. **Health and safety relative advantage** The study found that health and safety knowledge introduction into the Ghanaian community has a lot of benefits for the people, industry, community and the nation at large and therefore should be introduced into the Ghanaian community. **Implementation complexities** The study found that implementing health and safety knowledge in the Ghanaian community would not be spontaneous because it has not been part of their way of living. Therefore, it would take some time for them to adjust to its implementation, but they are able to implement it without any complexities.
Decision	The study found that the decision to adopt health and safety knowledge in the Ghanaian community is because it has the benefits of reducing risk associated with their working environment and making them safe. That is why they would adopt it. This also means that deciding to adopt health and safety in the Ghanaian community is due to the advantages it has for them.
Implementation	The study found that health and safety knowledge in the community is implementable by the community members. It also found that the implementation depends on individual capabilities and to some extent enforced. The study further found that although health and safety knowledge is implementable by Ghanaian citizenry, it is not everybody that can do so.
Confirmation	The study found that health and safety knowledge would be adopted and put to use in the Ghanaian community because of the obvious importance the community members attach to health and safety knowledge in their lives. Therefore, it would be easily adopted, used, and confirmed in the Ghanaian community.
	Information sources Information sources are one of the themes that emerged from the study. Its reveals how new information is mostly introduced into the Ghanaian community. The study found that new information is normally received from chiefs, religious leaders, social gatherings and opinion leaders in the community.

CHAPTER EIGHT

DEVELOPMENT OF THE STAGE BY STAGE KNOWLEDGE TRANSFER AND DIFFUSION FRAMEWORK

8.1 INTRODUCTION

This chapter shows the evolution of a framework to help construction companies operating in the Ghanaian construction industry (GCI) to be able to transfer health and safety knowledge of the construction industry to the Ghanaian community. In the light of the challenges construction companies face in meeting their corporate social responsibility in the country, it is necessary to furnish them with means to be able to carry out CSR in the Ghanaian industry as required of them. The chapter presents the processes adopted for the design of the proposed framework, called the stage-by-stage knowledge transfer framework (SSKTF). It provides explanations to the various components and finally discusses the testing and validation of the framework.

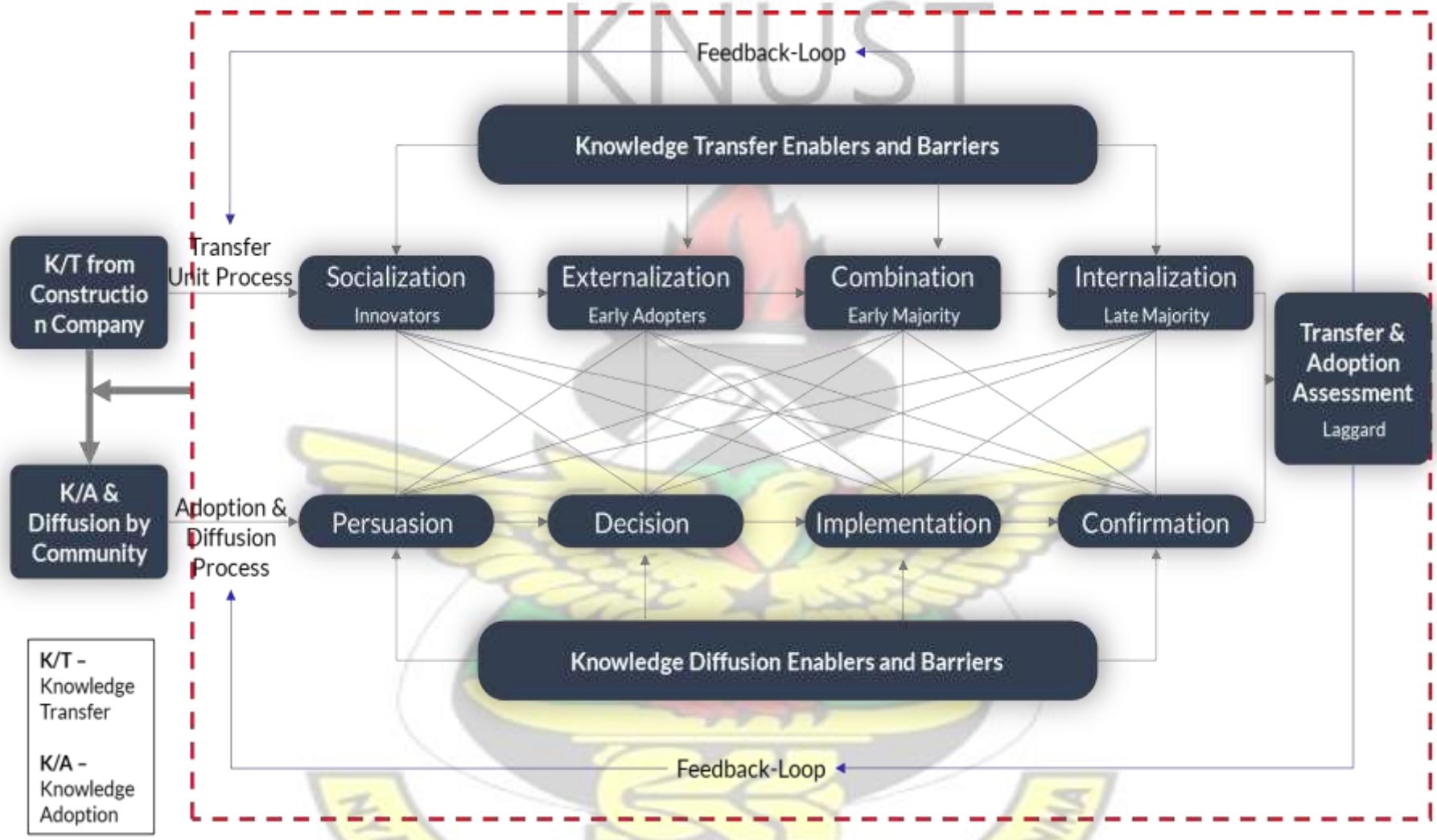

Figure 8.1. Stage by Stage Health and Safety Knowledge Transfer Framework

8.2 STAGE BY STAGE KNOWLEDGE TRANSFER FRAMEWORK.

It has been discussed earlier in this work that health and safety practices amongst the Ghanaian community are lacking. Accordingly, such poor health and safety culture amongst the Ghanaian citizenry has been with them for a very long time and changing such a culture will require an excellent systematic effort over time, and education to be able to reverse such a culture. Hence, a stage-by-stage knowledge transfer and diffusion framework are advanced.

The independent variable in the conceptual framework put forward by this study in figure 4.6 was tested during data collection to see their applicability in the Ghanaian context. From the study, actors such as socialisation, externalisation, combination and internalisation as theorized by Nonaka and Takeuchi (1995) were identified as the processes of knowledge transfer from the construction industry to the community. Also, persuasion, decision implementation and confirmation as theorized by Rogers (1995) were also identified as the stages Ghanaian community members would go through in deciding to adopt or reject health and safety knowledge and therefore were retained as the main elements of the framework.

Other variables such as individual ability to use knowledge, collaboration, networking, communication, trust and local content inclusion were identified as enablers of health and safety knowledge transfer from the construction industry to the Ghanaian community, and they have influence over both the transfer and the adopting units and therefore should be elements in the framework

The findings from the study further suggest that community and traditional leaders in the Ghanaian community, the Ghanaian culture of coexistence and neighbourly reliability, continuous collaboration and rewards, individual willingness and interpersonal networking would act as the important enablers of diffusing health and safety knowledge in the

Ghanaian community and so were included as the main elements of diffusion actors in the framework.

The stage-by-stage knowledge transfer framework (SSKTF) proposes that the knowledge transfer and diffusion process should be implemented, bearing in mind two considerations: the transfer stage consideration and the decision stage consideration. Each consideration carries a message. Whereas the transfer stage consideration aims to enhance the foundation of awareness and the introduction of health and safety knowledge and its onward transfer within a section of the community members. The decision stage seeks to embed the culture of health and safety knowledge sharing and to enhance its practice as their way of living and managing things. Both approaches have the same goal and interlink with each other and serve the same function of creating the culture of knowledge transfer and sharing the results for creating safer Ghanaian communities. Also, the SSKTF proposed in this work provides a practical step towards understanding external knowledge transfer from the construction industry to the community and the related actions and activities required to enhance the transfer process.

8.3 THE FRAMEWORK APPROACH

Before describing the elements of the framework, it is imperative at this stage to emphasize that the required time to accomplish the transfer process using the proposed framework very much relates to the time and efforts applied by the actors and also the situational context.

8.3.1 Health and Safety Knowledge Transfer Stage

The role of the transfer stage is to heighten the awareness of health and safety knowledge in the Ghanaian community by construction companies for the community members to realise the need to embrace and apply health and safety knowledge in their everyday actions.

8.3.1.1 Socialisation

Socialisation is the stage where the construction workers and the community members create and exchange Tacit to tacit knowledge. Through guidance, imitation and observation. Construction companies should first employ a quota of both skilled and unskilled labour from the community intended for the health and safety knowledge transfer. They should also make use of local community members in and around the construction site and allow a representation of the community leaders on the project team who would serve as liaisons between the community leaders and the contractor to make them aware of the planned program. At this stage, the local employees and community leader's representatives who save as (the innovators) are trained in health and safety knowledge in line with the construction company's policies and code of conduct. In contrast, these employees assimilate and apply what they have learned in the company and are encouraged to transfer the same to their various family members and neighbourhoods. According to the individual rate of adoption posited by Rogers (1995), the first group of persons to come in to contact with new knowledge or innovation are called the champions or innovators with a 2.5% theoretical adoption rate.

8.3.1.2 Externalisation

This is the stage of the framework where efforts are made to bring the whole community into the planned transfer program where the families of the first group (the innovators) having also received health and safety knowledge are encouraged to go and transfer their acquired knowledge to their friends, neighbours and colleagues. These group of adopters becomes the 13.5% early adopters according to the individual rate of adoption (Rogers 1995). At this stage, the construction companies being represented by the innovators and the early adopters join forces with the community and religious leaders in organized social

groups to propagate the health and safety knowledge, by organising fora to speak to the community members, visitations to churches, mosques, schools, and organisation of floats through the principal streets in the community to propagate the planned transfer. This is where construction workers share their experiences with the community members, resulting in transferring their tacit knowledge into explicit knowledge with the community members.

8.3.1.3 Combination

Combination at this stage Groups meets to discuss, share and learn from each other, something that is new or innovative. Therefore, both group members having gotten health and safety knowledge meets to discuss amongst themselves to see the benefits it has brought to their already existing ways of doing things these group of adopters according to the individual rate of adoption are the 34% early majority. At this point, they can discuss amongst themselves to further enrich their understanding from the perspective of their peers. They can reinforce or reject the new knowledge depending on individual conviction, thereby resulting in sharing explicit to explicit knowledge.

8.3.1.4 Internalisation

In all cases of knowledge transfer, involves two people, i.e. the source and the receiver. Therefore, both must be willing to either transfer or receive for knowledge transfer to take place. The holder of the knowledge, in this case, the construction company's workers must be willing to participate in the transfer process and be ready to give what they have learned to the community members. On the other hand, the receiver of the transferred knowledge, in this case, the community members should also be willing to receive the knowledge that is being given to them for an exchange of knowledge to take place. This can be done through meetings with the community members, the celebration of safety weeks, conversations and

integrating the workers in the community where both the community members and construction workers share experiences which would result in sharing explicit knowledge to tacit knowledge between themselves. The is the point at which many more of the community members who are yet to be exposed to the health and safety knowledge are eventually expose leading to their adoption of the new knowledge these group of adopters according to the individual rate of adoption are the 34% late majority).

8.3.2 Enablers of Health and Safety Knowledge Transfer

1. Local content inclusion: This involves the reservation of employment opportunities for local skilled and unskilled labour in the community and also the inclusion of representatives of the community members from the inception of the project to train them in health and safety and instructing them to go and do same in the community.
2. Individual ability to use knowledge: Health and safety knowledge transfer process should be managed in a way that almost every member of the community is able to use the transferred knowledge. Their ability to use the transferred knowledge is the determinant of the transfer success. Therefore there should be enough training of those championing the transfer process so that they can also make it simple and easy for everyone to use.
3. Collaboration: The construction companies should make sure there is much collaboration within the whole system between themselves and the community members. This would promote coordination and cooperation between the two parties, in this case, the source of the health and safety knowledge and the receiver of such knowledge.
4. Networking: Construction companies should create networks between company workers and community members. Efforts should be made by the construction

companies to engage more with the community members by creating the atmosphere of getting their operatives closer to the community members so that they can develop ties.

5. Trust: The construction companies should, first of all, make sure they win the trust of the community members. They should not leave any ambiguities in their dealings with the community members. They should link up very well with them to win their confidence because every little suspicion would ruin the whole transport process.
6. Communication: It is very important for the construction companies, their workers or agents to communicate every information they are sending to the community members properly to ensure easy understanding and assimilation of such information. Proper communication of health and safety knowledge would improve their efforts and reduce the amount of effort to put in. It is really important because appropriate communication is the reason as to whether they would reach their intention or not.

8.3.3 Barriers to Health and Safety Knowledge Transfer

To achieve the aim of transferring health and safety knowledge in the Ghanaian community. There are some barriers the construction companies must overcome. These are:

1. Contractual restrictions. Every construction project comes with contractual restrictions in one way or the other. Therefore, construction companies should factor in their planned transfer program from the inception of the contract, making sure all relevant stakeholders are aware of the scheduled program so that it can be factored in as part of the project.
2. Time constraints: All construction projects are time-bound; in fact, time is an essential commodity in construction projects. Therefore, construction companies

should plan the health and safety program in accordance with the project timelines in order not to start the transfer process and abandon it midway.

3. Lack of trust. Construction companies should do everything possible to eliminate the lack of trust between them and the community members. The lack of trust between them means that there cannot be any transfer, because one must trust you for him or her to learn from you. The community members would not be willing to learn any new knowledge from the construction company if they do not believe them. Therefore, it is essential to eliminate every activity that would make the community members not to trust them.
4. Type of neighbourhood. The kind of neighbourhood would determine whether knowledge transfer can thrive or not. Neighbourhoods that are open and accessible to every member of the community would provide the environment of learning from one another. In the same way, neighbourhoods that are closed and deny the community members easy access to each other would stifle the transfer of knowledge. Therefore, construction companies aiming to transfer health and safety knowledge should first of all, be conversant with the kind of neighbourhood they are going to and plan the way to approach such a community.

8.3.4 Health and Safety Knowledge Decision Stage

The decision stage intends to make sure health and safety knowledge awareness get to a vast majority of everybody in the community targeted for the transfer program by construction companies. The is the stage where individuals in the Ghanaian community accesses the health and safety knowledge being introduced to them to form an opinion to either adopt or

reject the health and safety knowledge. In order to achieve the aim of the decision stage, the following actions are required:

8.3.4.1 Persuasion

The persuasion stage is when the community members, having been aware of health and safety knowledge, would start asking questions as to the benefits of health and safety to their existence. At this point where the construction company has introduced health and safety knowledge to the community, they should make every effort to present to the community members the advantages health and safety knowledge has to their already existing ways of doing things. They should make sure the people are carried along by demonstrating to them why they should change their ways of doing things. And adopt health and safety practices, and also present to them the benefits and contributions health and safety would add to creating a safe environment of preserving their lives while improving their living standards and financial status.

Construction companies, while presenting the relative advantages of health and safety adoption, should make every effort to let the community members see the compatibility of health and safety to their cultural norms and values. It is very important because they would not adopt any knowledge, no matter its advantages if it is in contrast to their cultural norms and values. It would be protested against and rejected outright in most communities. Therefore, all efforts should be made by the construction companies to demonstrate the compatibility of health and safety knowledge to their cultural norms and values to increase their confidence in the new-found knowledge.

8.3.4.2 Decision

The decision stage in acquiring new knowledge is very vital; it is where individuals in the community go through the mental exercise of whether to accept or reject the health and

safety knowledge being introduced to them. At this stage, it is only the act of the individual and sometimes in consultation with their friend, families, neighbours and respected people in the community who they perceive of being knowledgeable, capable and trustworthy in their judgement to seek advice from them. At this stage, the construction company would have introduced health and safety knowledge to them, demonstrated the relative advantages of health and safety in their lives and laid bare the cultural compatibility of health and safety knowledge to their cultural norms and values. The community members would now be in the best position to decide on health and safety adaptation. Having seen all the improvements, it would have on their finances by reducing their hospital attendance, elimination of absenteeism from their endeavours and the advancement it would bring to their homes and environment.

8.3.4.3 Implementation

Implementation of health and safety in the framework is the stage where the construction companies drive the need and advantages of health and safety knowledge to the community members. Making them aware of the improvements it would have in their life compared to their already existing ways of living. This stage is vital because as the education and awareness increase, people would begin using the new knowledge on a trial basis. At this point, the mental exercise of whether to retain the knowledge or reject is going on. So it is important here for the construction companies to drive home the importance and need of having and retaining the health and safety knowledge. Those who are waiting to observe the first users of the new knowledge before they also adopt it can thus have the motivation and comfort to do so. At this point, they should make all efforts to clear every uncertainty that may arise in the transfer process regarding the need for adopting the new knowledge to facilitate their already existing ways of doing things.

8.3.4.4 Confirmation

Confirmation in the framework is where all efforts are made by the construction community members to seek reinforcement of the transferred health and safety knowledge. At this point, the construction companies should make a deliberate effort to reward safe working employees in the community whiles giving incentives to some of the community members who have also implemented health and safety practices to a large extent in their daily activities. This would be at the recommendation of the community members on the project committee as well as the social groups formed in the community. These would go a long way to motivate others also to want to be recognised in the same way and serve as the tipping point of the entire process.

8.3.5 Enablers of Knowledge Transfer Decision Making Process

1. Traditional and Religious Leadership. The construction companies need to be aware that there is great respect for religious and traditional leadership in the Ghanaian community. Therefore nothing can be achieved in the city where these leaders exist without their involvement. It is essential for the Construction companies, first of all, to involve these leaders in the health and safety diffusion process for them to champion the process. Since they have large followership and their judgement is trusted, their involvement would influence the decisions of their followers to also partake in the diffusion process. This would lead a vast majority to adopt it and also continue with the process until the health and safety knowledge reaches the entire social system, in this case, the Ghanaian community
2. Ghanaian Cultural Norms. Ghanaian culture of neighbourly reliability, the culture of peaceful coexistence, close family ties, organisation of safety clubs and interpersonal support systems in the Ghanaian community are cultural norms which

provide the platform for a successful diffusion system in the community. These cultural norms make the Ghanaian community a rich ground for diffusing health and safety knowledge amongst the whole community and provide the atmosphere of learning from one another. Construction companies should employ these actors in the Ghanaian community after the transfer period to make available health and safety knowledge to the entire population targeted for the transfer program since these actors would serve as the tipping point of diffusion knowledge in the Ghanaian community from the construction industry.

3. Continuous Collaboration and Rewards: Continuous collaboration and rewards in the Ghanaian community would increase not only the use of health and safety knowledge in the community, but it would reinforce its adoption and increase the rate of adoption by other persons who are yet to do so. Construction companies should make sure they continually collaborate with the Community members by rewarding safe working employees in the community through fora. They should also involve community leaders from the inception of the project so that even in the absence of the construction company, the diffusion process can continue amongst the community members.
4. Individual Willingness. Another most critical factor in the diffusion stage is the willingness of the individuals involved or the community members to learn from others.

   Construction companies transferring health and safety knowledge should take advantage of the ease of integrating new members into the Ghanaian society to create intercultural networks in the community which would provide the environment for individuals in the community to be willing to learn from them. Diffusion happens between two people: the holder and the receiver. Therefore, if the holder is willing

to give, but the receiver is not ready to receive from him or her, diffusion cannot take place.

5. Inter-personal networking. Diffusion of a new idea begins with the ability to network; it provides the actors in the social system the platform to come together and facilitate learning among themselves. In order to achieve total diffusion in the community, construction companies transferring health and safety knowledge should make sure they identify and employ interpersonal networks in the community, increase community members' willingness to participate in the diffusion process, get community leadership support for the program, fall on the mutual trust between community members and the leadership and then communicate properly to the community members.
6. External influence. Construction companies should make sure they take into consideration the influence of Government, local authorities, political parties, NGOs, and civil society organisations in the Ghanaian communities and make sure they liaise with them on the diffusion of health and safety knowledge. Most of the organisations are permanently stationed in this community and influence most of the total interventions which take place in the communities. Construction companies should therefore involve them wherever they exist as partners of the planned diffusion program who can take on the process in the absence of the construction company and also get feedback from them when necessary.

8.3.6 Barriers to Knowledge Diffusion in the Ghanaian Community

In order to achieve the aim of diffusion of health and safety knowledge in the Ghanaian community, there are some complexities the construction companies must overcome. These are:

1. Lack of trust. Construction companies should make sure they create the environment for the community members to trust them. They should make sure the leaders in the community play a steering role during the entire diffusion process while being very transparent in all their relations without any misgivings.
2. One-time Nature of Construction Projects. Construction projects happen mostly once at a location, and the contractor never returns unless there is another project there or it is a serial project. Therefore, construction companies transferring health and safety knowledge on projects should make sure they start the transfer process as soon as the project begins. And involve the opinion leaders, religious leaders, traditional leaders, as well as all relevant interested organisations in the community to champion the transfer process. Also, social groups should be formed to take charge of the diffusion process with the construction company supporting so that they can take on the diffusion process after the project is completed. This should be a conscious effort and not by chance; it should be part of the program from the onset, depending on the duration of the project.
3. Cultural Resistance. Health and safety knowledge being transferred should be well presented for it, not to conflict with the existing cultural norms and values of the community. Any conflict of health and safety knowledge with the existing traditions of any community would lead to its resistance and rejection even in the transfer stage.
4. Improper communication. Construction companies, their workers and any other persons taking part in the health and safety knowledge diffusion should make sure they communicate correctly. They were leaving no uncertainty in the minds of the community members because conflicting information would lead to uncertainty and rejections of the health and safety knowledge. It is thus important because a rejection

of one individual or several individuals can also spread out within the community members leading to total rejection.

8.3.7 Assessment of the Transfer Program

This is the stage in which the construction company go to measure the success of the transfer process and the rate of adoption. This can be done by the use of a questionnaire to measure the success of the transfer and the number of people who have adopted the health and safety knowledge against the duration of time to determine the rate of adoption as feedback while efforts are made to bring in the rest of the community members who would be waiting to see the result of the health and safety knowledge on those who have already adopted and implemented the new knowledge before they come on board these according to the individual rate of adoption are the 16% laggards**.**

8.4 VALIDATION OF THE STAGE-BY-STAGE KNOWLEDGE TRANSFER FRAMEWORK

The first question posed to the focus group discussants was "Does the framework provide an adequate process of transferring health and safety knowledge of the construction industry to the Ghanaian community? If **YES**, how is this indicated in the framework? If **NO** kindly explains why and show how this can be achieved. The aim was 1. To identify to what extent the framework is clear in terms of its interlinkages in the knowledge transfer processes. 2. To ascertain how easily the framework can be implemented by Ghanaian contractors. 3. To find out their understanding of the framework and obtain their inputs if any.

All the eight participants agreed that the knowledge transfer processes are clear and that their interlinkages are easy to understand.

One of the participants stated: *"Yes, I see this to be a perfect framework if only it would be*

effectively implemented. Taking the community through the stages of socialisation, externalisation, combination, and internalisation will enable them to understand the framework and use it to their advantage."

Another participant said: "*Yes, it produces a necessary stage of knowledge transfer that can be absorbed by all and sundry irrespective of their level of education. The socialisation as well as the internalisation steps, make it very possible for the transfer of knowledge between different classes of working groups."*

The second question was: "Does the framework provide adequate knowledge transfer influential factors to enable contractors to transfer health and safety knowledge of the industry to the Ghanaian community members? If **YES**, how is this indicated in the framework? If NO kindly explain why and indicate how this can be achieved".

This question aimed at investigating if the knowledge transfer influential factors in the framework are easy to identify, and whether they are adequate and fit for purpose.

All eight participants responded that the knowledge transfer influential factors are clear, easy to identify and provide an enabling environment for knowledge transfer from the construction industry to the Ghanaian community. The answer to one of them there was: "Yes. There could be more influential factors for the transfer of knowledge, but these provided in the framework are exhaustive enough. If these transfer influential factors are run through the various processes, they tend to give it more voice and substance at the various stages or processes".

The third question was as follows: "Does the framework provide adequate processes of making health and safety knowledge decision before adopting or rejecting it by Ghanaian community members? If **YES**, how is this indicated in the framework? If **NO** kindly

explains why and indicate how this can be achieved". The aim was to examine to what extent the participants thought that the suggested individual decision-making processes are applicable in the Ghanaian community. Exciting discussions arose on each decision-making process together with the linkage.

All eight participants identified the four stages as very influential and practical in real life. This is what one of the participants said: "YES; the framework provides adequate processes of health and safety knowledge decision making in our communities. The decision process has considered the social, economic and cultural aspects of a community. This, therefore, makes things simple for the community members to decide whether to adopt or reject the knowledge that is being transferred."

The fourth question read: "Does the framework provide adequate enablers that would facilitate health and safety adoption decision making in the Ghanaian community? If **YES**, how is this indicated in the framework? If **NO** kindly explains why and indicate how this can be achieved". It sought to examine if the knowledge decision-making enablers in the framework are easy to identify and implement and whether they are fit for purpose. All the eight participants indicated that the framework provides enablers that would indeed aid in the making of decisions before adopting or rejecting health and safety knowledge and also agreed that the enablers are fit for purpose. One of the participants noted that these enablers are key to influencing the knowledge transfer decision process.

The inquiry made by the fifth question was "Does the framework provide means of measuring the success of the transfer program? If **YES**, how is it indicated in the framework? If **NO** kindly explain, and indicate how this can be achieved". The aim was to examine whether the framework provides a means for the contractors to get feedback on the transfer program. All the eight participants agreed that the framework did provide the means of

measuring the success of the transfer program. A lot of discussions went on, during which one of the participants had this to say: “The feedback in the framework would enable the construction company to assess the level of success of the knowledge transfer programme”.

The sixth question asked, “What is your assessment of the application of the framework?” This was to be answered with one of the following three optional statements:

1. Easy to implement by contractors

2. easy to implement by academic

3. Very practical.

The aim here was to examine to what extent the participants thought that the framework would be applicable in real life by contractors. Five out of the eight participants said that the framework is very practical to implement by the contractors. At the same time, three of them chose the first optional answer, which says the framework is easy to implement by contractors. Three of the participants are also in academia noted that the framework would be easy to implement by academia.

CHAPTER NINE

SUMMARY OF FINDINGS CONCLUSION AND RECOMMENDATION 9.1

INTRODUCTION

This study set out to develop a framework for Ghanaian contractors to be able to transfer their health and safety knowledge into project host communities in Ghana as their corporate social responsibility. Seven objectives were set for this study; all the objectives were achieved. This chapter summarises the key conclusions, recommendation and contributions of this study. It discusses the findings of Chapter 6 and Chapter 7, which respond to the research questions in Chapter 1. The chapter starts with a description of the results relevant to the research questions. The chapter further Discussed the possible contribution; this study adds to the body of knowledge in the construction management field. The chapter also discusses how the research objectives were achieved. Lastly, the chapter ends with a summary of study limitations, practical implications and suggestions for future research.

9.2 MAIN RESEARCH FINDINGS

The study's central premise is that the health and safety issues in the Ghanaian community are of great concern. Also, there is a need to find a more reliable and effective way for contractors in Ghana to carry out their CSR activities. It is known that awareness of health and safety in the construction industry in Ghanaian is higher than that of the Ghanaian citizenry. The construction companies operate in these communities and are supposed to go beyond just carrying out their awarded projects and embark on corporate social responsibility programs to improve their corporate image and contribute to the well-being of their employees, their families and the community at large. Still, they are unable to do so because of the challenges they face. Therefore, there was the need to find innovative ways for construction companies to be able to transfer their health and safety policies to their

project host communities as their corporate social responsibility. At the same time, improving the lives of the workers, their families and the society as a whole.

This research aimed at addressing five main research questions:

1. *What is the state of health and safety in the construction industry in Ghana?*
2. *What are the enablers and barriers to a successful knowledge transfer process?*
3. *What are the enablers and barriers to a successful diffusion process?*
4. *How can the health and safety culture of the construction industry be transferred to the local communities in which they operate?*
5. *What corporate social responsibility challenges are Ghanaian Construction Companies faced with?*

9.2.1 What is the state of health and safety in the construction industry in Ghana? The results from both the quantitative and qualitative study show that knowledge of health and safety in the Ghanaian construction industry has increased, and further indicates the presence of knowledge of health and safety in the Ghanaian construction industry. Findings from a survey questionnaire focused on health and safety in the Ghanaian construction industry reveals that a large percentage of Ghanaian construction firms prioritize health and safety by providing safety policies and codes of conduct for their organisations. From the results, the study found that the group category of construction companies was statistically significantly related to their emphasis on health and safety performance in the construction industry in Ghana. Consequently, there is statistical evidence to suggest that road contractors put a greater focus on health and safety than building contractors.

The survey questionnaire addressing those responsible for implementing and communicating health and safety in the construction industry in Ghana shows that safety

officers are those responsible for implementing and communicating health and safety in the construction industry in Ghana. With project engineers who are also responsible for implementing and communicating health and safety.

Analysis of a questionnaire survey to tackle the state of health and safety culture maturity in the Ghanaian construction industry shows that the health and safety culture of the Ghanaian construction industry is at the first level-the pathological stage on the health and safety maturity ladder. What this means is that even though there are health and safety policies and codes of conduct in place among Ghanaian contractors, safety is not seen as a key business risk. The implementation of health and safety at job sites is therefore not emphasized by management and frontline staff.

9.2.2 What are the enablers and barriers to a successful knowledge transfer process?

Quantitative data findings indicate five factors as enablers of transferring health and safety and four barriers to health and safety knowledge transfer from the construction industry to the Ghanaian community. The survey questionnaire analysis addressing knowledge transfer enablers from the Ghanaian construction industry to the community identified six factors grouped from twenty-one variables. These are:

Trust

Collaboration

Networking

Communication

Individual ability to use knowledge.

The analysis of the survey questionnaire addressing barriers to knowledge transfer from the Ghanaian construction industry to the community identified four factors that are grouped from eleven variables. These are:

Time constraints

Lack of trust

Type of neighbourhood

Contractual restrictions

9.2.3 What are the enablers and barriers to a successful diffusion process?

The findings from quantitative data indicate six factors as the enablers of health and safety knowledge diffusion and four barriers to health and safety knowledge diffusion in the Ghanaian community. The analysis of the survey questionnaire addressing enablers of knowledge diffusion in the Ghanaian community identified six factors that are grouped from 21 variables. These are:

Traditional leadership

Community cultural norms

Continue collaboration and rewards

Individual willingness

Inter-personal networking

Political influence

The analysis of the survey questionnaire addressing barriers of knowledge diffusion in the Ghanaian community identified four factors that are grouped from 11 variables. These are:

9.2.4 How can health and safety culture of the construction industry be transferred to the local communities in which they operate?

Findings from the qualitative data analysis indicated six stages by which knowledge can be transferred from the Ghanaian construction industry to the community in which they operate.

The analysis of the case study addressing how knowledge can be transferred from the Ghanaian construction industry to the Ghanaian community identified six stages. From the case study, stages of transferring knowledge from the construction industry to the community can be summarised as:

1. Knowledge stage
2. Persuasion stage
3. Decision stage
4. Implementation stage
5. Confirmation stage and
6. Sources of information stage

The literature review addressing the mode of knowledge transfer and conversion in Table (3) identified four stages of transferring and converting knowledge. These are:

1. Socialisation
2. Internalisation
3. Externalisation
4. Combination

The first five stages mentioned above are a confirmation of the innovation-decision theory by Rogers (1995), which formed the thematic areas under which the case study was carried out. With the addition of one more stage - “sources of information” - as found by the study as the means by which information is disseminated in the Ghanaian communities. The four later stages were found as the processes of knowledge transfer and conversion from the construction industry to the community.

The findings from quantitative data indicate 5 factors as the media of health and safety knowledge transfer from the construction industry to the Ghanaian community. The analysis of the survey questionnaire addressing media of knowledge transfer from the Ghanaian

construction industry to the community identified five factors that are grouped from twelve variables. These are:

1. Awareness creation
2. Community engagement
3. Community orientation
4. Community integration
5. Opinion leaders' engagement

9.2.5 What corporate social responsibility challenges are Ghanaian Construction Companies faced with?

The findings from quantitative data indicate six significant corporate social responsibility challenges in the Ghanaian construction industry. The analysis of the survey questionnaire addressing CSR challenges in the Ghanaian construction industry identified six challenges from nine presented to construction companies in the country. These are:

1. Ghanaian contractors associate CSR with avoidable expenses
2. Lack of legal framework to guide implementation
3. Lack of incorporating CSR into vision and mission statements
4. Lack of financial resources
5. Too much corruption in the industry
6. Lack of adequate training in CSR implementation

The study went further to identify CSR activities being mostly undertaken by Ghanaian contractors. The analysis of the survey questionnaire addressing CSR activities in the Ghanaian construction industry identified four activities from twenty presented to construction companies in the country. These are:

1. Sanitation

2. Health education and screening
3. Renovation of schools
4. Support to orphanages

9.3 CONTRIBUTION OF THE RESEARCH

As stated in chapter 1, this study aims at seven objectives. The first iwas to analyse the state of health and safety in the Ghanaian construction industry, Highlighting performance and their improvement efforts. The second is to establish important enablers of knowledge transfer from the construction industry to the Ghanaian community. The third is to establish critical barriers of knowledge transfer from the construction industry to the Ghanaian community. The fourth is to establish important enablers of a diffusion process in the Ghanaian community. The fifth is to establish critical barriers to a successful diffusion process in the Ghanaian community. The sixth is to establish corporate social responsibility activities Ghanaian construction companies are engagement in, whiles analysing key corporate social responsibility challenges confronting the industry, and the seventh is to propose a framework to guide the transfer and diffusion of health and safety into project host communities by construction companies and to validate the designed framework.

This research contributes to the body of knowledge in at least four areas.

1. The first contribution to knowledge is in the area of knowledge transfer and diffusion theory. This study adds to knowledge by integrating innovation diffusion theory (Rogers, 2003) and knowledge conversion and transfer theory (Nonaka and Takewshi, 1995) by applying it to a new context and helps to better explain health and safety knowledge transfer and adoption from the construction industry to the community.

2. The study contributes to knowledge by providing solutions for construction companies to carry out their corporate social responsibility engagement with little budgetary constraint. Therefore, increasing their profit margins and fostering a good relationship between the companies and one of their major stakeholders which is the community.
3. This study has discovered some different findings from those reported in other studies because this study focuses on factors and processes that would aid in the transfer of knowledge from a construction organisation and its subsequent adoption in a community.

   Furthermore, the research highlights the relationship between factors and processes that lead to an improved understanding of external knowledge transfer from the construction industry. This research found enablers and barriers of/to knowledge transfer and enablers and barriers of/to the diffusion of new knowledge in both the transfer and adoption unit which influence the successful transfer and diffusion of new knowledge from a construction company to a community.

   By establishing and explaining the enablers and barriers to knowledge transfer and diffusion from the construction industry to the community. It is focused on establishing enablers and barriers that have the potential of helping external knowledge transfer or stifling the same process from the construction industry, and enablers that would assist the diffusion of knowledge outside the construction industry or barriers that would stifle the same process.

   From the survey analysis, several enablers and barriers emerged: knowledge transfer enablers, knowledge transfer barriers, knowledge diffusion enablers and knowledge diffusion barriers. The four groups of enablers and barriers of external knowledge transfer from the construction industry to the community can be developed to

positively contribute to health and safety knowledge transfer and diffusion from the construction industry to project host communities.

The application of the Rogers innovation-decision theory in the case study further provides the process of knowledge transfer and diffusion from the construction industry to the community in a different context than earlier applied.

4. The fourth contribution is to corporate social responsibility studies in the construction industry by identifying challenges confronting Ghanaian contractor in fulfilling the CSR obligation. The study established six challenges facing construction companies from engaging in CSR and shows that these challenges are multifaceted. These challenges, when tackled would enhance CSR performance in the construction industry. It also indicates that CSR should be contextualised based on specific countries and industry, and not approached on a wholesale basis. The study also established CSR activities mostly employed by construction companies in the industry.
5. The last contribution is the proposed stage-by-stage knowledge transfer and diffusion framework that describes factors that influence knowledge transfer and diffusion from the construction industry to the community. The stage-by-stage framework brings together two theories and shows the relationship between knowledge transfer and diffusion and focuses on the essential factors that positively and negatively influence knowledge transfer and diffusion from the construction industry to the community. The framework is divided into two parts, namely the transfer stage comprising socialisation, externalisation, combination and internalisation. And the diffusion stage comprising persuasion, decision, implementation and confirmation. These processes have been noted to be the most used in transferring and diffusing knowledge in transfer and diffusion literature.

Therefore, this framework can be used as a practical guide for construction companies to transfer knowledge from the industry to the communities they find themselves in.

Benefits of this study to the Society

1. In addition to the contributions as mentioned above, there are other contributions of this study to Government and the entire Ghanaian community as a whole. This research provides an innovative way of transferring or creating health and safety knowledge and awareness amongst Ghanaian citizenry to help prevent most of the domestic, industrial and institutional accidents while improving their wellbeing.
2. The research also has benefits for the Government in the following ways: Domestic accidents put pressure on the national purse by way of paying hospital bills by the national health insurance authority. Payment of insurances and compensations to accident victims and destruction of national monuments due to fire outbreaks resulting in additional expenses on the Government. This research has the potential of eliminating much risk associated with these situations, due to the awareness level of the citizenry in the area of health and safety.

9.4 RECOMMENDATIONS

The findings provided practical, theoretical and policy implications that contribute enormously to construction management practices in connecting corporate social responsibility to health and safety, knowledge transfer, and diffusion.

9.4.1 Theoretical Implications

The application of the innovation diffusion theory in investigating the adoption of new knowledge in the Ghanaian construction industry is limited. Therefore,

i. Further study should be conducted on the constructs linking the knowledge transfer unit and the adopting unit's processes in other to understand their actual linkage and dependency.

ii. Further study should be conducted to understand the actual time or duration it would require a construction company to transfer and diffuse health and safety knowledge into project host communities.

iii. Further study should be conducted to understand challenges confronting small and medium contractors in Ghana from carrying out their corporate social responsibility.

9.4.2 Practical Implication

The findings of this study indicated that both road and building contractors have health and safety policies and codes of conduct in place and also have health and safety officers and project engineers communicating and implementing these policies and codes of conduct.

However, their health and safety culture is at the first stage on the health and safety ladder.

1. Thus, for the Ghanaian construction industry to go from its current state to the next stage along the health and safety maturity ladder, management should move from the point of simply providing health and safety policies and code of conduct and make sure emphasis is placed on the need for supervisors to effectively enforce health and safety measures on-site.
2. Management should also make sure health and safety policies and codes of conduct are well communicated amongst workers, visitors and all persons involved in the projects.

3. Management should encourage workers to disclose or report all health and safety issues, especially near misses on site, to enable them to assess and put measures in place to improve the workplace safety culture.
4. Management should continuously be proactive on health and safety issues by analysing and identifying all manner of hazards associated with activities on-site beforehand to help mitigate or eliminate them.
5. Management should put the opinion leaders, community leaders and religious leaders in front to champion this stage while management facilitates its acceleration.
6. Management should ensure the involvement of the workforce from the onset of the transfer process.
7. Furthermore, the transfer process should be integrated into the whole project planning and programs of works to prevent obstruction by the project activities.
8. Management should also make sure allocation is made for the employment of the community members and adequate training given to them in the area of health and safety so they can champion the whole transfer process.
9. Contractors should provide their organisations with mission and vision statements that include CSR as this would have a major impact on improving their corporate image because everybody can see their commitment to being good corporate citizens which would go a long way to improve their competitiveness.
10. Contractor association in Ghana should build the capacity of its members in the area of training in CSR implementation.
11. Construction companies should include CSR implementation in their policies and programs and make sure they make a conscious effort towards CSR implantation.
12. Construction companies should make sure they engage in CRS activities that have a direct impact on the community members and socially tangible. Management should

also make sure their CRS engagements are reported annually to enhance their corporate image.

9.4.3 Policy Implication

1. Policymakers should provide the nation with a country-specific corporate social responsibility policy that would direct CSR implementation by organisations which would have a direct impact on the citizenry and not for the organisation image only.
2. Policymakers should provide the Ghanaian construction industry with an industryspecific corporate social responsibility policy taking into consideration the nature of the Ghanaian construction organisation to help build their capacity in CSR implementation.
3. Policymakers should include the designed framework as part of the criteria for selecting a contractor for major governmental projects in the country to help in enforcing the transfer of health and safety knowledge from the construction industry to the community in which they operate.

9.5 LIMITATION AND RECOMMENDATION FOR FUTURE RESEARCH

This research focused on construction companies transferring health and safety knowledge into project host communities as a corporate social responsibility to these organisations. This study, like any other research studies encountered some limitations in its method and scope, although these limitations do not invalidate the study in any way. These setbacks are outlined below:

i. The framework developed in this study is limited to long term projects alone. it cannot be implemented on a short term project. For an effective knowledge transfer to take place in a social system, it needs time from the inception of the

transfer program to its saturation in the social system as a whole targeted for the transfer program. Therefore, transferring health and safety knowledge from a construction company to a community would have to be done on projects with duration spanning from two years and above.

ii. The case study was conducted in one community and one K1D1 contractor. The time within which the research was conducted could not allow for multiple community and contractors in-depth studies. Therefore, future research should be conducted on a nation-wide basis with more contractors to get in-depth understand of the transfer of knowledge and its diffusion on a large scale. iii. Contractors involved in this study included all categories of contractors, with both Ministry of Roads and Highways and Ministry of Works and Housing classification. Therefore, the understanding of types of challenges confronting SMEs in the construction industry will help contextualize their challenges and also understand whether they are involved in CSR activities or not.

iv. Another limitation of this study is getting enough people in the Ghanaian community with health and safety knowledge to be able to appreciate the questioning and provide valid answers to them.

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APPENDIX A

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI
COLLEGE OF ART AND BUILT ENVIRONMENT DEPARTMENT OF CONSTRUCTION TECHNOLOGY AND MANAGEMENT

Dear Sir/Madam,

QUESTIONNAIRE SURVEY- HEALTH AND SAFETY KNOWLEDGE TRANSFER AND DIFFUSION ON CONSTRUCTION PROJECTS AS A CORPORATE SOCIAL RESPONSIBILITY

I am currently undertaking a research to develop a framework for the transfer of health and safety knowledge and its diffusion into project host communities as a corporate social responsibility to the construction companies. Corporate social responsibility is the commitment of businesses to contribute to the development of employees, their families,'

local community and the society at large to improve their quality of life. Construction companies are being urged to go beyond just their project execution and contribute socially to the communities of their operation as a give back to those communities. It's noted that companies who are able to carry out the corporate social responsibility would always feel welcome to these communities.

As part of the research I am conducting a questionnaire survey to seek inputs from building and road contractors within the construction industry in Ghana. Since only a limited number of companies are sampled, your experiences and perceptions on the subject matter are very important to this research. The research would also provide information on corporate social responsibility challenges faced by the Ghanaian construction industry and offer recommendations on how to carryout corporate social responsibility in the construction industry with less cost to the companies.

I would be grateful if you could kindly devote about thirty (30) minutes of your time to complete the enclosed questionnaire and return it as soon as possible. Your response will be treated as STRICTLY CONFIDENTIAL. The information would be used for academic purposes only, as one part to a university research project. Only a consolidated summary of the result may be published, i.e. no names of participating individuals will be referred to and only the aggregate group will be reported. A summary of findings will be made available to you upon request.

Should you have any question, please feel free to contact me by phone on 0208491571/ 0244915867 or by email at wjusticee30@yahoo.com or wjusticee30@gmail.com.

Thank you very much for your participation in the survey. Yours truly,

Justice Williams	Prof F.D.K. Fugar	Dr E. Adinyira
PhD Candidate	1st Supervisor	2ed Supervisor
Dept. of Construction	Dept. of Construction	Dept. of Construction
Tech. & Management	Tech. & Management	Tech. & Management
KNUST	KNUST	KNUST
Kumasi	Kumasi	Kumasi

QUESTIONNAIRE SURVEY

The questionnaire is divided into three main sections, please check the appropriate options and give brief answers where necessary.

SECTION A: BACKGROUND INFORMATION

What is your job position in the company?

[ ] Director [ ] Managing Director [ ] Safety Officer [ ] Project Engineer [ ] Project Manager

[ ] others specify……

What is your educational level?

[ ] PhD [ ] MSC [ ] BSC [ ] B-TEC [ ] HND [ ] others specify……

How many years' experience do you have in the industry?

[ ] Less than 6 years [ ] 6 – 10 years [ ] 11 – 15 years [ ] 16 – 20 years

How long has your company been in existence?

[ ] 5 – 10 years [ ] 11 – 15 [ ] 16 – 20 years [ ] more than 20 years

[ ] others specify……..

SECTION B: EMPHASIS ON CORPORATE SOCIAL RESPONSIBILITY.

We are interested in knowing the challenges facing Ghanaian construction companies in fulfilling their corporate social responsibility. We are also interested in identifying some of the corporate social responsibility programs in which they're engaged in.

Q1. Is your company involved in any corporate social responsibility activities?

[ ] YES [ ] NO

If yes continue with question 1b if no please go to question 2

Q1b. Kindly indicate the frequency at which you employ the following activities as part of your company's corporate social responsibility**.**

5 = Always 4= Occasionally 3 = Rare 2= Very rarely 1 = Never

	Corporate social responsibility activities	**1**	**2**	**3**	**4**	**5**
1	Health education / health screening					
2	Fire prevention education					
3	Safety drills.					
4	Provision of Scholarship schemes					
5	Building of community clinics					
6	Environmental protection education					
7	Building schools blocks					
8	Sanitation (e.g. cleaning and desilting gutters)					
9	Provision of skills training (e.g. dress making, masonry, carpentry etc.)					
10	Provision of Counselling to the youth (e.g. drug abuse, entrepreneurship, career development etc.)					
11	Preservation of monuments					
12	Supply of furniture to schools					

13	Renovation of hospitals					
14	Renovation of schools					
15	Building recreational centres (e.g. football parks, play grounds)					
16	Provision of water (safe drinking water)					
17	Support to orphanages, schools for the disabled (deaf, blind, etc.)					
18	Support for the work of NGOs					
19	Medical support to the poor and needy (e.g. Towards a surgical procedure)					
20	Sponsorship of sporting activities					
21	If others specify……..					
	…….					
	…….					
	…….					
	…….					
	…….					
	…….					

Q2. From 1 – 5 kindly indicate your agreement to the following variables as challenges facing the construction industry in fulfilling their CSR.

5= Strongly Agree 4= Agree 3= somehow agree 2= don't agree 1= Strongly don't agree

	Challenges facing construction companies in fulfilling their CSR in Ghana	**1**	**2**	**3**	**4**	**5**
1	CSR is not incorporated into our company's vision and mission statement					

2	There is too much corruption in the industry to be able to take up CSR implementation					
3	We don't have any attachment to the community in order to carry out CSR.					
4	We do not have sufficient financial resources for CSR implementation					
5	We do not have relevant knowledge about CSR implementation					
6	We do not have adequate training for CSR implementation					
7	We lack legal framework to guide CSR implementation in the industry					
8	There are no significant benefits for CSR implementation					
9	We associate CSR with avoidable expenses					
10	If others specify……...					
	…….					

SECTION C: EMPHASIS PUT ON HEALTH AND SAFETY, KNOWLEDGE TRANSER AND DIFFUSION.

We are interested in knowing the state of health and safety performance in the Ghanaian construction industry. We're also interested in knowing their safety culture and practices. By your own experience please answer the following questions as applicable to your company.

Q3. Does your company have (1) a health and safety policy (H&S), (2) health and safety code of conduct or (3) practice health and safety in anyway? If you answer **YES** to any of the above continue with the next question if **NO** continue with question 4

Yes [ ] No [ ]

Q3a. If yes, who is mainly responsible for implementing and communicating health and safety in your company?

[ ] the managing director

[ ] Health and Safety Officer [ ] administrator

[ ] project engineers [ ] foremen

[ ] HR officer

If others specify……

……

……

……

……

Q4. Kindly answer **Yes** or **No** to **only 1** out of the following 10 statements provided in this table as the state of health and safety culture in the Ghanaian construction industry. By answering **yes** or **no** to any statement means you agree or disagree with the preceding statement.

	The state of Safety culture in the Ghanaian construction industry	**Yes**	**No**
1	People don't really care about H&S issues in the Ghanaian construction industry.		
2	The Ghanaian construction industry is only driven by regulatory compliance, making sure one don't get caught.		
3	People take safety seriously only when there is an accident on site.		
4	Workers don't do what they are told to do by management on site.		

5	Companies only focus on systems and data collection without verifying the effectiveness of the results of the data collected.		
6	In the Ghanaian construction industry a lot of safety audits are performed and people begin to feel they're doing well without proven the audits.		
7	Health and safety is manage base on what has happened in the past to prevent future occurrences		
8	In the Ghanaian construction industry the workforce get involved in safety practices and prevent wrong doing.		
10	In the Ghanaian construction industry every person tries to be as informed as possible to prepare them for unexpected.		

Q5. Kindly indicate the extent of your agreement to the following variables as knowledge transfer media?

5= Strongly agree 4= Agree 3= Not sure 2= Disagree 1= Strongly disagree

	Knowledge transfer media	**1**	**2**	**3**	**4**	**5**
1	The use of opinion leaders in the community.					
2	The use of leaflets with safety inscriptions.					
3	The use of town hall meetings.					
4	The use of mass media (e.g. radio, television, public announcing system etc.)					
5	The use of local food vendors on construction site.					
6	Organisation of safety meetings in the community (e.g. between construction workers and the community members)					
7	Safety demonstrations in the community.					
8	Celebration of safety weeks in the community.					
9	Use of signage with health and safety inscriptions					

10	Provision of orientations for visitors, sub-contractors and suppliers from the community.					
11	Through peer groups in the community (e.g. inter community groupings)					
12	The use of social media (e.g. Facebook, WhatsApp, twitter Instagram etc.)					
13	If others specify ……...					

Q6. Kindly identify the following variables as enablers of knowledge transfer from the construction industry to the community. **5= Extreme Enabler 4 = Moderate Enabler 3 = Not sure 2= Not an enabler 1= Extremely not an enabler**

	Enablers of knowledge transfer from construction companies to the community	**1**	**2**	**3**	**4**	**5**
1	Employment of local labour (e.g. masons, labourers, carpenters, steel benders etc.)					
2	Playing word search games to share health and safety knowledge.					
3	Inter personal networking between workers of the company and the community members.					
4	Close inter-connectivity nature of Ghanaian community settings (inter community).					
5	Community members Ability to innovate and use new knowledge.					
6	The ability to communicate properly.					
7	Individual willingness to participate.					
8	Through working colleagues in the community.					

9	Decentralization of Organisational policy relating to knowledge transfer.					
10	Willingness of employees to share knowledge with others.					
11	Ability to Speak common language between construction workers and community members.					
12	Capacity to learn and use new knowledge by the community members.					
13	Individual capability and competence in using the new knowledge.					
14	Inter community networking between Ghanaian communities (intra community).					

15	Willingness to adopt to change by the community members.					
16	Increase collaboration of both parties (community and construction company).					
17	The ease of integrating new members into Ghanaian communities.					
18	The collective and open nature of Ghanaian communities.					
19	Using local suppliers and sub-contractors on the project as change agents.					
20	Building mutual trust between the community and the construction company.					
21	Others……..					
	…….					
	…….					
	…….					
	…….					

Q7. Kindly identify the following variables as barriers to knowledge transfer from Construction Company to the community.

5= Extreme barrier 4 = Moderate barrier 3 = Not sure 2= Not a barrier 1= Extremely not a barrier.

	Barriers to knowledge transfer from the construction industry to the community	1	2	3	4	5
1	Time constraint in the transfer process.					
2	Gated elite's community settings in some parts of the country.					
3	Inability to communicate properly.					
4	Lack of trust between parties (community and construction company).					
5	Budget limitation on the part of the construction company.					
6	Lack of management support.					
7	External influence (e.g. political and social).					
8	Rules and regulation attached to construction projects (e.g. project duration, payment terms etc.)					
9	Lack of motivation of staff to share knowledge.					
10	Employees' unwillingness to share knowledge.					
11	Others ……...					
	……...					
	……...					
	……...					
	……...					
	……...					
	……...					

Q8. Kindly identify the following variables as enablers of a successful diffusion processes from the construction industry to the community.

5= Extreme Enabler 4 = Moderate Enabler 3 = Not sure 2= Not an enabler 1= Extremely not an enabler

	Enablers of a successful diffusion process from construction companies to the community	**1**	**2**	**3**	**4**	**5**
1	Community leadership support for the new knowledge.					
2	Inter personal networking between community members.					
3	Ghanaian culture of neighbourliness & reliability.					
4	Community members Willingness to participate in the diffusion process.					
5	Mutual trust between community leadership and community members.					
6	The extended family system and close family ties of Ghanaian communities.					
7	The ability to communicate properly to the community members.					
8	The culture of Peaceful coexistence in the Ghanaian communities.					
9	Rewarding safe working employees in the community.					
10	Willingness to learn from others by the community members.					
11	External influence (e.g. political, social, government policy etc.).					
12	Involving opinion leaders from the community in the project.					
13	The ease of individual integration into Ghanaian communities.					
14	Respect for community leadership.					

15	Ease of access to Ghanaian community leaders (e.g. chiefs and elders).					
16	Working in teams to answer sets of HSE questions in the community.					
17	Respect for religious leadership in the Ghanaian communities.					
18	Organisation of safety clubs in the communities.					
19	Creating inter-personal support system in the communities.					
20	Maintaining continued collaboration between construction company and the community members.					
21	Inter- cultural networking between communities.					
22	Others……..					
	…….					
	…….					
	…….					
	…….					
	…….					

9. Kindly identify the following variables as barriers to a successful diffusion system from Construction Company to the community.

5= Extreme barrier 4 = Barrier 3 = Not sure 2= Not a barrier 1= Extremely not a barrier.

	Barriers to a successful diffusion from the construction industry to the community	**1**	**2**	**3**	**4**	**5**
1	One time nature of construction projects.					
2	Time constraint (e.g. Short stay of construction companies in a community).					
3	Lack of community leadership support					
4	Unwillingness to adopt to change by the community members.					
5	Cultural resistance (e.g. new idea not compatible with existing cultural practices and values).					
6	Improper communication of new knowledge.					
7	Lack of awareness of new knowledge.					
8	Lack of innovativeness of new knowledge.					
9	Restriction and confined nature of construction sites.					
10	Lack of trust between parties (community and construction company.					
11	Lack of commitment between parties (construction company and community.)					
12	Others …….					
	…….					
	…….					

APPENDIX B

INTERVIEW GUIDE

Interview Guide for the adopting unit (**the community**)

This interview guide is not a complete list of questions for each interview but a guide containing the list of issues that must be undertaken in the interview. Where there is the need to ask others questions outside of the guide for further explanations or to get useful information, this would be done. Some questions may also be skipped where not appropriate or they do not apply.

1. Introduction of the study

Innovation decision variables

Knowledge

a. Do you have any knowledge in health and safety?
b. From whom did you first hear about health and safety?
c. Where do you normally get your information from?
d. Has the opinion leaders in your community ever introduce you to the existence of a new knowledge?

Persuasion

e. What would make you adopt health and safety knowledge in your community?
   Relative advantage
f. What advantages do you think the introduction of health and safety knowledge in your community would have over your current state?
   Complexity
g. How complex do you perceive health and safety knowledge adoption in your community?
   Compatibility
h. How compatible is health and safety implementation with your existing cultural norms and values?
   Observability
i. Would you wait for another person to adopt health and safety knowledge in

your community before you do?

Trial-ability

j. Would you first want to try health and safety knowledge before using? And why?

Decision

k. What would inform your decision to adopt health and safety knowledge?
l. From whom do you seek advice before adopting a new knowledge?
m. Is your decision to use the new knowledge individual or collective?
n. What questions or clarifications do you seek prior to adopting a new knowledge?

Implementation

o. Would you seek advice from a colleague, friend or neighbour before adopting health and safety knowledge?
p. Why would you accept and implement health and safety knowledge in your daily routines?

Confirmation

q. Would you like to introduce a neighbour to health and safety knowledge?
r. By what means would you introduce your neighbour to this new knowledge?
s. Do you think the Ghanaian community needs health and safety knowledge at all?

2. What do you suggest for a more successful cooperation between construction companies and Ghanaian communities to overcome problems occurring during the process of knowledge transfer?

Interview Guide for the transfer unit (**CONSTRUCTION COMPANY**)

This interview guide is not a complete list of questions for each interview but a guide containing the list of issues that must be undertaken in the interview. Where there is the need to ask others questions outside of the guide for further explanations or to get useful information, this would be done. Some questions may also be skipped where not appropriate or they do not apply.

1. Introduction of the study.
2. In your opinion do you think construction companies are capable of transferring health and safety knowledge to the Ghanaian communities?

3. What kind of needs do you see in health and safety knowledge transfer from the construction companies to the community?

Innovation decision variables

4. Knowledge
   a. Do you have any knowledge in health and safety?
   b. How did you get to know of the existence of health and safety?
5. Persuasion
   g. How complex do you perceive the implementation of health and safety by Ghanaian communities?
   h. By your own experience how compatible would health and safety practice be with Ghanaian existing cultural norms and values?
   i. In your opinion what advantages do you think transferring health and safety knowledge from the construction industry to the Ghanaian communities would have compare to it is currently?
6. Decision

e. What do you think in your own opinion would inform the decision to adopt health and safety knowledge in the Ghanaian communities?

7. Implementation
   c. By your own experience do you think Ghanaian citizenry has the ability to implement health and safety knowledge in their daily routines?

8. Confirmation
   d. By your experience how successful do you think health and safety knowledge transfer would be amongst Ghanaian citizenry?
9. What do you suggest for a more successful cooperation between construction companies and Ghanaian communities to overcome problems occurring during the process of knowledge transfer?
2. What kind of needs do you see in health and safety knowledge transfer from the construction companies to the community?
3. How would you describe the idea of transferring health and safety knowledge from construction companies to the community?